

ABSTRACT

Title of dissertation: TESTING A DUAL PATH FRAMEWORK OF THE BOOMERANG EFFECT: PROATTITUDINAL VERSUS COUNTERATTITUDINAL MESSAGES

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This dissertation aims to differentiate two types of boomerang effects on belief and attitude change: a boomerang effect under a proattitudinal message and a boomerang effect under a counterattitudinal message. By employing a 2 (Message valence: anti-policy vs. pro-policy) \times 2 (Issues: legal age for drinking vs. legal age of marriage) \times 2 (Threat to freedom: low threat vs. high threat) \times 2 (Argument quality: low quality vs. high quality) plus 2 (Control groups: no-message control for the two issues) cross-sectional factorial design ($N = 458$), antecedents and mediators that bring about the two types of boomerang effect were examined. Under a counterattitudinal message, both argument quality and prior belief strength predicted a boomerang effect: Those receiving a low-quality argument or those with a strong prior belief, as compared with the control group, exhibited a boomerang on belief and attitude. The dominant mechanism that explained the relationship between argument quality and belief position boomerang was counterarguing (vs. anger). Under a proattitudinal message, there was an indirect effect of trait reactance on belief boomerang through anger (vs. negative cognitions). But the perceived threat to attitudinal freedom did not predict a boomerang effect. These results

contribute to attitude change research by empirically separating cognitive and affective mechanisms for boomerang effects. Furthermore, this study refines the construct of negative cognitions and integrates reactance theory and the cognitive response perspective on boomerang effects. Both structural equation models and confirmatory factor analysis suggested that counterarguments and nonrefutational thoughts were two distinct types of negative cognitions. The two constructs were caused by different sets of antecedents and had different outcomes: Poor argument quality caused counterarguments, whereas perceived threat and trait reactance caused nonrefutational thoughts. Only counterarguments mediated the effects of argument quality on the boomerang effects for belief (e.g., the extent to which the legal drinking age should be decreased on a magnitude scale) and belief position (e.g., the legal age for drinking), which subsequently predicted the boomerang effect on attitude (e.g., the extent to which the legal drinking age is liked). This dissertation expands the theoretical scope of belief and attitude change research. Future research should explore the persuasive appeals for mitigating the cognitive or affective process resulting in a boomerang effect. Among those who are more prone to boomerang on certain issues, a boomerang appeal can be employed to persuade.

TESTING A DUAL PATH FRAMEWORK OF THE BOOMERANG EFFECT:
PROATTITUDINAL VERSUS COUNTERATTITUDINAL MESSAGES

By

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Chapter 1: Introduction

In the persuasion and attitude change literature, there are many views as to whether there is such a thing as a *boomerang effect* or a *backfire effect* (J. Brehm, 1966; Cho & Salmon, 2007; Hornik, Jacobsohn, Orwin, Piesse, & Kalton, 2008; Hovland, Harvey, & Sherif, 1957; Pechmann & Slater, 2005; Ringold, 2002; Yzer, Cappella, Fishbein, Hornik, & Ahern, 2003). A boomerang effect has been understood to be one type of reduced persuasion (Quinn & Wood, 2004; Wegener, Petty, Smoak, & Fabrigar, 2004).

The reasons for the diverse views regarding the existence of a boomerang effect are that there are different measurements and definitions of boomerang effects. In terms of measurement, some scholars maintain that a necessary requirement for a boomerang is to have a pretest that measures participants' initial positions (Bettinghaus & Baseheart, 1969; Boster, Turner, & Lapinski, 2009; Hovland et al., 1957). Participants' initial positions are used as a baseline for the observation of boomerang effects: If one's belief moves away from the message-advocated position as compared with his or her initial position, then a boomerang effect has occurred. On the other hand, some scholars indicate that having a control group (i.e., a group exposed to an alternative message or no message) is sufficient to show a boomerang effect (Bessarabova, Fink, & Turner, 2013; Byrne & Hart, 2009). In this case, a control group's position is considered to be an alternative type of baseline for determining the occurrence of boomerang effects. Furthermore, although some measure a boomerang effect on a relatively continuous unidimensional scale (e.g., Fishbein, Jamieson, Zimmer, Haeften, & Nabi, 2002; Fortier, 2011; Hornik et al., 2008; Hovland, Janis, & Kelly, 1953; Kelley & Volkart, 1952; Sherif, Taub, & Hovland, 1958), others have used a dichotomous scale (e.g., Snyder & Wicklund, 1976; Werle & Cuny, 2012; Wright, Wadley, Danner, & Phillips, 1992) or a multidimensional scale (e.g., Bessarabova et al., 2013).

Despite these differences, a boomerang effect is typically defined in terms of its effect or

outcome. For example, Hovland and his colleagues indicated that a boomerang effect occurs when the advocated position in a persuasive message produces an attitudinal shift in the direction opposite to the advocated position of the message (Hovland et al., 1953; Kelley & Volkart, 1952; Sherif et al., 1958). Hovland et al. (1953) employed a measure of net change in attitude, which is the result of subtraction of one's initial premessage position from one's postmessage position, to evaluate whether a boomerang effect occurs. For example, suppose an undergraduate's premessage position for the appropriate tuition raise is 10%. After receiving a message that advocates a 30% tuition increase, the student may believe that there should be no tuition increase at all, which represents support for a zero percent tuition increase. This outcome is a boomerang effect of -10% ($= 0\% - 10\%$).

However, scholars have not systematically examined the causes of a boomerang effect and whether these causes create a boomerang effect of the same kind. In other words, we still do not understand the mechanisms that underlie a boomerang effect. According to Stinchcombe (1987), this conceptualization of a variable by common sense is expected at the beginning stage of a science. However, "as science advances, it progressively redefines its concepts until they accurately represent the phenomena in the world" (Stinchcombe, 1987, p. 40). Therefore, we should redefine a boomerang effect not merely in terms of its common sense meaning but also in terms of its mechanism.

Thus, a better definition is necessary for developing knowledge of boomerang effects. One way to do so is to define a boomerang effect in terms of its causes and effects. A boomerang effect is one of "the natural variables that creates administrative problems" (Stinchcombe, 1987, p. 41). But this variable may not have a unique set of causes. For example, a boomerang effect may be caused by reactance (J. Brehm, 1966; S. Brehm & Brehm, 1981) or low-quality

arguments (Park, Levine, Westerman, Orfgen, & Foregger, 2007). The goal of this dissertation is to identify and redefine the boomerang effect based on the set of its causes and effects. Only by separating possible different types of boomerang effects caused by different mechanisms will we be able to determine whether there is a unitary phenomenon termed a boomerang effect.

An operational definition of a boomerang effect based on its outcome is employed before we are able to separate different mechanisms for a boomerang effect. Cross-sectional experimental studies that have found a boomerang effect in terms of its operational definition were synthesized in Table 1. Some studies were designed in a way to observe a boomerang effect in a laboratory (e.g., Cohen, 1962; Fortier, 2011; Werle & Cuny, 2012; Wicklund & Brehm, 1968; Wright et al., 1992), whereas some have accidentally found a boomerang effect (e.g., Fishbein et al., 2002; Hornik et al., 2008; Park et al., 2007). Specifically, after receiving a message, if participants showed belief or attitude change in a direction that was opposite to the one advocated in a message, either with a within-subjects or between-subjects design, there is a boomerang effect (Byrne & Hart, 2009; Hovland et al., 1957).

Based on an analysis of these prior studies (see Table 1 for a list of studies in which a boomerang effect was observed), two possible types of boomerang effects are examined. The first type is a boomerang effect that occurs after people receive a proattitudinal message that threatens their attitudinal freedom. In a number of studies, participants showed a boomerang effect after they received a message that advocated a position consistent with their own (Bessarabova et al., 2013; Schultz, Nolan, Cialdini, Goldstein, & Grisevicius, 2007; Silvia, 2006; Snyder & Wicklund, 1976, Experiment 1; Wicklund, 1974; Worchel & Brehm, 1970) and had high threat to their attitudinal freedom (Bessarabova et al., 2013; Heller, Pallak, & Picek, 1973; Sensenig & Brehm, 1968; Silvia, 2006; Snyder & Wicklund, 1976; Worchel & Brehm, 1970).

When people process a proattitudinal message, *reactance* is expected to be a dominant explanation for a boomerang effect; reactance is a motivational state that causes a person to attempt to restore the eliminated or threatened freedom (J. Brehm, 1966; S. Brehm & Brehm, 1981).

The second type of boomerang effects is a boomerang effect that occurs after people receive a counterattitudinal message. In several studies, either argument strength (B. Johnson, Smith-McLallen, Killeya, & Levin, 2004; Park et al., 2007; Petty, Cacioppo, & Goldman, 1981) or prior belief strength (Gollust, Lantz, & Ubel, 2009; Hart & Nisbet, 2011; Na, 1999; Nyhan & Reifler, 2010) were found to be predictors of a boomerang effect. When people process a counterattitudinal message, one's generation of counterarguments is expected to be a dominant explanation for a boomerang effect.

This dissertation will differentiate these two possible types of boomerang effects by examining the dominant mechanism (i.e., negative affect or counterarguments) for each boomerang effect and investigate the antecedents that bring about the two types of boomerang effect. A dominant mechanism means that compared to another mechanism, the particular mechanism is more influential (see the Method chapter for an operational definition of a dominant mechanism).

The idea that there are two types of boomerang effects raises the question of how to differentiate them. Without differentiation, we are not able to tell whether each of these mechanisms has a set of unique causes and effects. For example, after receiving a counterattitudinal message that contains low quality arguments, participants are expected to have high levels of counterarguing (i.e., direct rebuttal of arguments in the message; Brock, 1967) and low levels of negative affect. In this scenario, if these participants show more negative affect

than counterarguing, there is no need to differentiate a boomerang effect under a counterattitudinal message and a boomerang effect under a proattitudinal message, because the two types of boomerang effects were explained by the same mechanism. Thus, we may conclude that a boomerang effect is a unitary concept with a unique set of causes and effects.

One can measure anger to differentiate a boomerang effect under a proattitudinal message from a boomerang effect under a counterattitudinal message. Anger is considered as a mediating mechanism of reactance (Dillard & Shen, 2005). Dillard and Shen's (2005) results show that high-threat participants experience more anger than low-threat participants. In addition, one can measure counterarguing to differentiate the two types of boomerang effects. Counterarguing is considered to be one type of negative thoughts (e.g., Dillard & Shen, 2005; Rains & Turner, 2007). Counterarguing (vs. negative affect) is expected to be a dominant explanation for a boomerang effect for a counterattitudinal message. In contrast, counterarguing is not a sufficient condition for a boomerang effect for a proattitudinal message. Other types of negative cognitions (e.g., nonmessage-originated negative thoughts) may explain the cognitive process of reactance that mediates a boomerang effect for a proattitudinal message.

The purpose of this dissertation is to differentiate the two potential types of boomerang effects and to examine the antecedents and mediators that bring about each type. The next chapter provides an overview of theories useful for explaining a boomerang effect, including reactance theory, the elaboration likelihood model, and biased assimilation. Seven hypotheses and two research questions are proposed based on the theoretical framework. The Method chapter provides descriptions of the procedures and results for five pilot studies, data collection, measurement of variables, and analytical approaches for the main experiment. The Results chapter delineates results from statistical analyses in the main experiment. The dissertation

concludes with a discussion of implications of the results, limitations, and directions for future research.

Chapter 2: A Dual Path Boomerang Framework: Proattitudinal vs. Counterattitudinal Messages

A Boomerang Effect Under a Proattitudinal Message

The theory of psychological reactance. According to the theory of psychological reactance, when an individual's exercise of freedom is threatened by "an increase in the perceived difficulty of attaining a potential outcome" (S. Brehm & Brehm, 1981, p. 3), one responds with reactance. Reactance is "the motivational state that is hypothesized to occur when a freedom is eliminated or threatened with elimination" (S. Brehm & Brehm, 1981, p. 37). Applied to the study of persuasion and attitude change, a persuasive message that restricts or threatens one's freedom to take alternative positions is expected to cause reactance (J. Brehm, 1966). When experiencing reactance, people attempt to re-establish their attitudinal freedom in various ways, including by derogating the source (Kohn & Barnes, 1977; Wright, 1986), moving away from the position advocated by the communicator (i.e., a boomerang effect; see, e.g., Heller et al., 1973; Worchel & Brehm, 1970), or obtaining social support (Bochner & Insko, 1966).

The level of reactance an individual has depends on the amount of threat the person perceives regarding the freedom that is threatened and the importance of that attitudinal freedom (S. Brehm & Brehm, 1981). A persuasive message that aims to change an attitude can be one source of threat to freedom (e.g., Fishbein et al., 2002; Walster & Festinger, 1962). If one perceives that a persuasive message tries to change his or her opinion regarding an issue, one may perceive that his or her freedom to take alternative positions is threatened. Thus, the person experiences reactance. The amount of threat that one experiences can be influenced by the explicitness of the persuasive intent (Bolton, Cohen, & Bloom, 2006; Dean, Austin, & Watts, 1971; Heller et al., 1973; Sensenig & Brehm, 1968; Strack, Schwarz, Bless, Kübler, & Wänke,

1993; Yzer et al., 2003), language intensity (Dillard & Shen, 2005; Miller, Lane, Deatrick, Young, & Potts, 2007; Quick & Considine, 2008; Quick & Stephenson, 2008), and the power of the communicator (J. Brehm, 1966, pp. 113-116; Dean et al., 1971). It is possible that the effect of reactance is substantial enough to result in a boomerang effect (J. Brehm, 1966).

The importance of the attitudinal freedom that is threatened by a communication also influences the amount of reactance that one experiences. On the one hand, it is possible that one perceives the freedom to take a proattitudinal position as important. For example, if a person supports the current legal drinking age, then that person is likely to assign higher importance to his or her belief position on drinking (i.e., believing in the legal drinking age of 21) as compared with topics toward which the person has no prior belief (e.g., flossing). On the other hand, given a proattitudinal message that threatens one's attitudinal freedom, one may perceive the freedom to take alternative positions as equally important or even value the attitudinal freedom to take alternative positions more before their exposure to the threat. According to commodity theory, the more a commodity (i.e., anything that is relevant to the person possessing it) is perceived to be unavailable, the more receivers value or desire the commodity (Brock, 1968). Thus, a belief or behavior that cannot be obtained may be judged to be more valuable by message receivers (Byrne & Hart, 2009).

The perceived threat of a proattitudinal message may be particularly strong for those whose attitude strength is moderate (S. Brehm & Brehm, 1981; Smith, 1977, 1978; Snyder & Wicklund, 1976, Experiment 1; Worchel & Brehm, 1970). Smith (1977) indicated that she did not find a boomerang effect because subjects in her experiment were strongly committed to the position advocated in the message and might have perceived the attitudinal freedom to take other positions to be less important. Therefore, when receiving a proattitudinal message, people may

experience reactance because their freedom to adopt other positions, which may be equally (or even more) important to them, is threatened.

Boomerang given a proattitudinal communication. A proattitudinal message is defined as a message with which a person initially agrees prior to exposure to the message. When there is a proattitudinal communication that contains a threat to attitudinal freedom, those who initially agreed with the position advocated in a message will exhibit a boomerang effect because they need to establish their freedom not to take the position advocated in the message, according to the notion of the prior exercise of freedom (Wicklund, 1974). Thus, a communication that threatens one's attitudinal freedom only causes a boomerang effect among those who initially agreed with the advocated position in the message (Bessarabova et al., 2013; Schultz et al., 2007; Silvia, 2006; Snyder & Wicklund, 1976, Experiment 1; Werle & Cuny, 2012; Wicklund, 1974; Worchel & Brehm, 1970). For example, Schultz et al. (2007) found that among households that were already saving energy, there was a boomerang effect in their behaviors (i.e., increased energy consumption) after their exposure to a proattitudinal message that advocated saving energy. Worchel and Brehm (1970) found that only subjects who initially agreed with the communicator (i.e., that were presented with a proattitudinal message) showed attitude change in a direction that was opposite to the message position. Worchel and Brehm (1970) argued that "a subject who disagrees with the communicator is already exercising the freedom 'threatened,' while the subject who agrees with the communicator is not exercising the freedom threatened" (Worchel & Brehm, 1970, p. 21).

In this study, a boomerang is considered as one possible route to restoring the threatened or eliminated attitudinal freedom, by moving away from the advocated message position as compared to a control group. For example, regarding the legal drinking age policy, one may

accept 18 as the legal age. A proattitudinal message that advocates lowering the legal age from 21 to 18 threatens the person's freedom to take the alternative positions not advocated by the message. As a result, the person may show a boomerang effect by moving away from the message's advocated position as compared with his or her initial belief (i.e., the postmessage belief could be 22 or 17). Because beliefs and attitudes are interrelated and can affect each other (Woelfel & Fink, 1980), the person may also show a boomerang effect on the attitudinal level, by having a more favorable attitude toward the current drinking policy or by indicating less agreement with advocated message position (i.e., lowering the legal age).

Our conceptualization of a boomerang effect is consistent with the original work on psychological reactance (S. Brehm & Brehm, 1981; Worchel & Brehm, 1970; Wicklund, 1974) but different from that of other studies (Quick & Stephenson, 2007a, 2007b, 2008). Quick and his colleagues considered a boomerang an unintended effect of a persuasive message not desired by message producers, particularly in the health domain. In addition, Quick and his colleagues adopted a broader definition of a boomerang by considering the boomerang effect on both the individual and group levels. For example, given a message that promotes exercising, a message recipient is considered to have a boomerang effect if the person (1) is less motivated to exercise, (2) is more motivated to imagine being around others who do not exercise, and (3) is more motivated to do other unhealthful behaviors such as smoking.

Antecedent: Perceived threat to attitudinal freedom. For a proattitudinal communication, the amount of reactance one experiences can be manipulated by the amount of perceived threat to the person's attitudinal freedom (S. Brehm & Brehm, 1981). Previous studies suggest that a manipulation combining intent to persuade and language intensity was effective in inducing reactance (Bessarabova et al., 2013; Dillard & Shen, 2005; Miller, Lane, Deatrick,

Young, & Potts, 2007). Intent to persuade can cause reactance because respondents may perceive a message as being manipulative (Bessarabova et al., 2013). And the use of an intense and explicit message can cause reactance (Miller et al., 2007; Silvia, 2006). Explicit language “conveys a single meaning and leaves little doubt as to the source’s intentions” (Miller et al., 2007) and can be conveyed by the use of imperatives (e.g., *should*). But explicit language does not create a low quality message, which is defined by its validity of reasoning and organization of arguments.

Based on the discussion above, when a proattitudinal message with a clear persuasive intent and intense language is present, individuals are expected to perceive high threat to their attitudinal freedom for not adopting the position advocated in the message, which may cause reactance and subsequently a boomerang effect. Therefore, Hypothesis 1 predicts that among those who receive a proattitudinal message, those who perceive high threat to their attitudinal freedom (vs. the control participants) have a boomerang effect; those who perceive low threat to their attitudinal freedom (vs. the control participants) do not have a boomerang effect.

H1: Those who receive a proattitudinal message that has a high threat to their attitudinal freedom (vs. the control participants), but not those who receive a proattitudinal message that has a low threat to their attitudinal freedom (vs. the control participants), exhibit a boomerang effect.

Mediator: Reactance. The theory of psychological reactance suggests that reactance mediates the relationship between perceived threat to attitudinal freedom and a boomerang effect. To test this idea of mediation, a clarification of the conceptualization and measurement of reactance is needed. Although S. Brehm and Brehm (1981, p. 37) claimed that reactance cannot be measured directly and can only be studied by its outcome, several scholars have proposed that

reactance is a combination of affect (i.e., anger) and cognition (i.e., negative thoughts; Dillard & Shen, 2005; Kim, Levine, & Allen, 2013; Quick & Bates, 2010; Quick & Kim, 2009; Quick & Stephenson, 2007b; Rains & Turner, 2007). Specifically, participants who received a high freedom-threatening message had more reactance in terms of having more anger and more negative thoughts as compared to those who received a low freedom-threatening message.

When people feel that their freedom of choice is threatened, they show reactance by displaying negative affect, such as discomfort or aggressive feelings (J. Brehm, 1966). According to Miron and Brehm (2006), whether the discomfort is perceived as anger or other emotions depends on the characteristics of the threat (e.g., the legitimacy of the threat). Anger has consistently been found to represent this discomfort (e.g., Dillard & Shen, 2005; Rains & Turner, 2007), particularly when the message has both a personal insult and high attitudinal threat (Abelson & Miller, 1967; Kim et al., 2013).

Furthermore, when people receive a message that threatens their attitudinal freedom, they also show reactance by generating negative thoughts toward the persuasive communication (Bessarabova et al., 2013; Brock, 1967; Petty & Cacioppo, 1979a; Rains & Turner, 2007). Following the reactance literature, negative thoughts are defined in a broad sense: They are thoughts that (1) express disagreement with any component of a message (e.g., message source or evidence) or (2) suggest alternatives to the advocated position in the message. Negative thoughts do not necessarily include counterarguing and there can be other types of negative thoughts. (This will be explained below; Brehm, 1966, pp. 106-108.)

In addition, trait reactance, one's personal propensity to experience reactance (Dillard & Shen, 2005; Hong & Faedda, 1996; Quick & Stephenson, 2008), may also affect the degree of reactance aroused if a proattitudinal message contains a threat to one's attitudinal freedom. In

Dillard and Shen's (2005) study, both threat to attitudinal freedom and trait reactance predicted attitudes toward binge drinking and flossing through the mediator of reactance. Thus, Hypothesis 2 predicts that given a proattitudinal message, reactance (i.e., negative affect and negative cognitions) mediates the effect of perceived threat and trait reactance on a boomerang effect.

H2a: Given proattitudinal communication, there are indirect effects of perceived attitudinal threat on the boomerang effect through anger and negative cognitions, such that the higher perceived attitudinal threat, the more anger and negative cognitions, which result in a larger boomerang effect.

H2b: Given proattitudinal communication, there are indirect effects of trait reactance on the boomerang effect through anger and negative cognitions, such that the higher trait reactance, the more anger and negative cognitions, which result in a larger boomerang effect.

Given a proattitudinal message that threatens one's attitudinal freedom, anger and negative cognitions as mediators may vary in their relative dominance or importance. It is of interest whether anger or negative thoughts is the dominant mediator for the reactance process, because the dual path boomerang framework hypothesizes different sets of antecedents and mediators for differentiating the two types of boomerang effects. If one has more negative thoughts (vs. anger) given a proattitudinal message with attitudinal threat, there is less evidence for differentiating a boomerang effect under a counterattitudinal message and a boomerang effect under a proattitudinal message, because the two types are explained by a similar mediator (i.e., counterarguing is one type of negative thought). In some of the previous studies, anger (vs. negative thoughts) contributed more to reactance, as the factor loading of reactance on anger (vs. negative thoughts) was larger in magnitude (Quick & Kim, 2009; Rains & Tuner, 2007, Experiment 1). Other studies found that both negative thoughts and anger were equally important

mediators as both had significant indirect effects that were similar in magnitude (Dillard & Shen, 2005; Quick & Stephenson, 2007b). Thus, to understand the relative dominance of anger, as compared to negative cognitions, Research Question 1 is proposed:

RQ1: Is anger (vs. negative cognitions) the dominant process of a boomerang effect given a proattitudinal message?

A Boomerang Effect Under a Counterattitudinal Message

Considering a counterattitudinal message. According to the theory of reactance (J. Brehm, 1966) and the prior exercise of freedom (Wicklund, 1974), those who initially disagree with the position advocated in a message may experience low levels of reactance. This is because by having message-inconsistent positions, those who initially disagree with the message position have already exercised their freedom for not accepting the advocated position in the message. Snyder and Wicklund (1976) argued that those who were in initial disagreement with a message position are more secure about having the freedom not to take the position advocated in the persuasive message, because they have exercised that freedom by showing disagreement. S. Brehm and Brehm (1982) suggested that a counterattitudinal issue might not create enough reactance to cause a boomerang effect:

If a person believes X and the freedom to believe this is threatened by someone else telling the person to believe Y, subsequent endorsement of any position on the X side immediately reestablishes the freedom to believe X. Confronted with a motive to comply as well as a motive to resist, the person can satisfy both motives simultaneously. He or she can comply by moving toward the counterattitudinal position but can resist by staying on his or her initial side. Given this state of affairs, it may be difficult to create strong enough reactance to propel one's attitude further away from the communicator's position.

(pp. 133-134)

Thus, confronted with a counterattitudinal message, people can easily re-establish their freedom to adopt their prior view by staying at the initial position rather than by having a boomerang effect. Therefore, a counterattitudinal message should not result in a boomerang effect through reactance.

However, a counterattitudinal persuasive message that is unconvincing may cause a boomerang effect that is mediated by a different mechanism, that is, by counterarguing. A counterattitudinal message should elicit greater elaboration, more counterarguments (Brock, 1967; Fink & Cai, 2013, p. 92), and possibly a boomerang (B. Johnson et al., 2004). This type of boomerang effect mediated by counterarguing has been examined in studies of cognitive response and cognitive elaboration.

Antecedent: Argument quality. According to the cognitive response perspective (Petty & Cacioppo, 1979b, 1984), how a message is evaluated by the receiver determines the outcome of the communication. People who are motivated to process a message are more likely to determine their attitudes by scrutinizing the quality of arguments in a message (i.e., the central route, as compared to the peripheral route, to persuasion; Petty & Cacioppo, 1979b). When individuals receive a counterattitudinal communication, they tend to elaborate on the message, that is to say, they are more likely to think about the quality of the message, assuming that they are involved with the message. If the quality of the message is perceived to be low, they tend to counterargue the message, which might give rise to a boomerang effect. That is, argument quality may be an antecedent of a boomerang effect given counterattitudinal communication. Park et al. (2007) proposed that low-quality arguments (as compared to high-quality arguments) are sufficient to yield a boomerang effect regardless of the level of ego-involvement, message

involvement, or the type of the advocated position in the message (pro vs. con). However, Neimeyer, MacNair, Metzler, and Courchaine (1991) found that weak arguments are associated with reduced persuasion rather than with a boomerang effect.

This inconsistency may be explained by the different definitions of argument quality. Neimeyer et al. (1991) used the effect-based definition of argument quality: Strong arguments are those that induce favorable thoughts in message recipients, whereas weak arguments are those that induce unfavorable thoughts in message recipients (Petty, Cacioppo, & Goldman, 1981). However, Park et al. (2007) defined argument quality as a pre-existing feature of a message: Strong arguments are characterized by sound logic, valid reasons, logical persuasion, and statistical statements, whereas weak messages rely on personal opinions, assertions without support, and circular arguments (O'Keefe, 2003). Thus, the arguments that induce unfavorable thoughts may be logical and valid (e.g., a woman who strongly disagrees with abortion may have unfavorable thoughts toward a message that advocates the right to have an abortion, even if the message has sound logic and valid reasons). As a result, message recipients may find it difficult to argue with logical arguments that induce unfavorable thoughts. And it should be much easier to attack an illogical message that relies on circular arguments or anecdotal information, even though the message may induce favorable thoughts. Thus, it may be easier to create a boomerang effect when argument quality is defined in terms of its characteristics rather than its effect.

Some scholars have argued that argument quality is not a sufficient antecedent of a boomerang effect, and only the interaction between message involvement and argument quality predicts a boomerang effect (e.g., B. Johnson et al., 2004; Petty et al., 1981). B. Johnson et al. (2004) found that low argument quality (vs. high argument quality) was associated with a boomerang effect among those message-involved people who receive a counterattitudinal

message. Message involvement refers to the extent to which a message topic has personal meaning and important personal consequences (Petty & Cacioppo, 1979b, 1984). Indeed, those who are more involved with a message may exhibit more attitude change that is opposite to that advocated in the message after their exposure to a low-quality message (i.e., there is an interaction between argument quality and message involvement). However, given that message involvement is one factor that causes message receivers' elaboration of arguments in the message, alternative factors that motivate people to scrutinize a message, such as perceived importance of the message or ego involvement with the message (Johnson & Eagly, 1989), may also interact with argument quality in creating a boomerang effect.

Few of the studies that have examined the influence of argument quality on attitude change have reported a boomerang effect. One reason for the lack of evidence for the existence of a boomerang effect may be a lack of theoretical explication. Except for reactance theory (J. Brehm, 1962) and the competitive processing hypothesis (Byrne & Hart, 2009), there is rarely any theory or model that explicates the relationship between a boomerang effect and its antecedents. Another reason for the few findings of a boomerang effect given counterattitudinal communication with low argument quality may be that the designs in previous studies did not facilitate the finding of a boomerang effect, because neither a control group was used nor were participants' initial attitudes measured (e.g., Bohner, Ruder, & Erb, 2002). Park et al. (2007) observed a boomerang effect caused by weak arguments; they did measure participants' initial attitudes. But because Park et al. (2007) did not measure participants' generation of counterarguments, we do not know whether counterarguing mediated the boomerang effect observed in their study.

Therefore, Hypothesis 3 predicts that among those who receive a counterattitudinal

message, those who receive low-quality arguments (vs. the control participants) will have a boomerang effect, but those who receive high-quality arguments (vs. the control participants) will not show a boomerang effect.

H3: Those who receive a counterattitudinal message that has low quality arguments (vs. the control participants), but not those who receive a counterattitudinal message that has high quality arguments (vs. the control participants), exhibit a boomerang effect.

Antecedent: Prior belief strength. According to motivated reasoning theory (Hart & Nisbet, 2011; Redlawsk, 2006; Strickland, Taber, & Lodge, 2011) or the biased assimilation hypothesis (Lord, Ross, & Lepper, 1979), people who hold strong beliefs or attitudes on a social issue are likely to interpret and process a message in a biased manner that reinforces their predisposition. Because of biased assimilation, those with a strong belief may perceive low argument quality in a counterattitudinal message, because these people may be more skeptical of the attitude-inconsistent information (vs. the attitude-consistent ones; Ditto & Lopez, 1992; Nyhan & Reifler, 2010). Consequently, based on the effect of argument quality on a boomerang effect, those with a strong belief are expected to generate counterarguments and have a boomerang (Redlawsk, 2006). That is to say, after receiving a counterattitudinal message, a person who holds a strong attitude toward a message may have a boomerang effect. Similarly, according to Cohen's (1962) extension of cognitive dissonance theory, if people hold a strong belief on a social issue and their prior cognitions are "highly resistant to change" (Cohen, 1962, p. 77), they may bolster their initial belief (i.e., reduce dissonance) by adding consonant cognitions, such as by responding with a boomerang effect or by enhancing the strength of their beliefs (see also Festinger, Riecken, & Schachter, 1956).

Several studies support the influence of prior belief or attitude strength on a boomerang

effect (Gollust et al., 2009; Hart & Nisbet, 2011; Na, 1999; Nyhan & Reifler, 2010). Hart and Nisbet (2011) found that after exposure to a message that discussed the possible harms to health due to global climate change, Republicans had a boomerang effect by showing significantly decreased support for climate change mitigation policies compared to a control group. Gollust et al. (2009) found that Republicans reported a lower level of support for public health policies compared to control participants after these Republicans read a counterattitudinal message that attributed Type 2 diabetes to social determinants. Na (1999) showed that those with a strong attitude who received a counterattitudinal message had a boomerang effect. Furthermore, Na (1999) found that participants' generation of counterarguments mediated the effect of attitude strength on a boomerang effect. According to Na (1999), those with a strongly held attitude can "easily and willingly generate counterarguments from their already elaborated cognitive structure for that strongly held attitude" (Na, 1999, p. 591).

Some nonexperimental studies show that attitude strength is associated with a boomerang effect. Hovland et al. (1957) examined attitudes toward a controversial message (support for prohibition vs. repeal of prohibition in a dry state). Prior to the communication, people were purposely selected from several "dry" or "wet" groups. These people had established and publicly had committed themselves to dry or wet views, which probably indicated high attitude strength. After those who held the extreme "dry" position were exposed to a highly counterattitudinal "wet" communication, they showed a boomerang effect. Similarly, Kelley and Volkart (1952) conducted a study in which Boy Scouts were exposed to a message that challenged group-anchored attitudes. Students who placed a high value on their membership in the Boy Scouts (i.e., those who were presumed to be strong attitude holders) had attitude change away from the advocated message position. And N. Miller (1965) found that those who had

highly dogmatic and extreme initial attitudes and were involved with the message also showed attitude change away from the advocated position.

Hypothesis 4 predicts that among those who receive a counterattitudinal message, those whose prior belief is strong (vs. the control participants) will have a boomerang effect. Among those who receive a counterattitudinal message, those whose prior belief is weak (vs. the control participants) will not show a boomerang effect.

H4: Those who receive a counterattitudinal message and have a strong prior belief (vs. the control participants) exhibit a boomerang effect. Those who receive a counterattitudinal message and have a weak prior belief (vs. the control participants) do not exhibit a boomerang effect.

Mediator: Counterarguing. The dominant mechanism that mediates a boomerang effect under a counterattitudinal message should be the generation of counterarguments.

Counterarguments are defined as arguments with reasoning that directly refute or attack one or more arguments in the message (Jacks & Cameron, 2003). This definition is consistent with Brock's (1967) definition that counterarguments are "declarative statements directed against the advocated position" and contain "a specific unfavorable or undesirable consequence that was not simply a restatement or paraphrase of the advocated position" (p. 301).

Counterarguing should mediate the relationship between argument quality and the boomerang effect under a counterattitudinal message. Many studies have shown that argument quality predicts the generation of counterarguments, which affects persuasion. Counterarguing should be differentiated from reactance-based anger. Rains and Turner (2007) found that manipulated argument quality in a message about banning alcohol did not have any significant influence on reactance, a combination of anger and negative cognitions, in the first experiment.

Rains and Turner (2007) explained that participants may neglect the manipulation of argument quality that was placed after the manipulation of perceived threat to attitudinal freedom, because “once they perceived a threat to their freedom, the actual arguments supporting the threat may be unimportant” (p. 262). Although their explanation may be easily tested by changing the placement of the two manipulations, there is a more plausible explanation based on cognitive elaboration (Petty & Cacioppo, 1979b, 1984): The influence of argument quality on an attitude is mediated by counterarguing rather than by reactance; the two mechanisms are different.

This dissertation examines whether counterarguing mediates the relationship between argument quality and the boomerang effect across issues with different advocated positions. Thought listing may be used to measure counterarguing (Greenwald, 1968; Petty, Ostrom, & Brock, 1981). With this approach, both one’s attitude and thoughts after message exposure are assessed. Differences in message elaboration are reflected in the differences in the number and types of thoughts listed. Thus, Hypothesis 5 predicts that in the counterattitudinal message condition, counterarguing mediates the effect of argument quality on a boomerang effect.

H5: In the counterattitudinal message condition, there is an indirect effect of argument quality on a boomerang effect through counterarguing, such that the lower argument quality, the more counterarguing, which results in a larger boomerang effect.

In addition, to establish the dual path to boomerang effects, we need to test whether counterarguing, anger, or their combination mediates the relationship between argument quality and a boomerang effect (by examining the significance of the indirect effects through the mediators). If both counterarguing and anger mediate the relationship between argument quality and a boomerang effect, it is highly likely that the actual mechanism underlying this process is reactance. If that is the case, there is no need to differentiate the two types of boomerang effects.

Kim et al. (2013) found that argument quality predicted reactance, which subsequently led to reduced persuasion for the issue of banning cellphones in class. But Kim et al. (2013) only employed one issue with a single advocated position, which largely constrains the generalizability of their results. Therefore, Research Question 2 asks whether counterarguing (vs. anger) is a dominant process in a boomerang effect given a counterattitudinal issue.

RQ2: Is counterarguing (vs. anger) the dominant process of a boomerang effect given a counterattitudinal communication?

An Integrated Dual Path Framework: Differentiating Negative Cognitions and Counterarguing

Based on the dual path boomerang framework, negative cognitions were hypothesized to mediate the relationship (1) between perceived threat and a boomerang effect and (2) between trait reactance and a boomerang effect given proattitudinal communication; and counterarguing was hypothesized to mediate the relationship between argument quality and a boomerang effect given counterattitudinal communication. However, the definitions of negative cognitions and counterarguing have been used inconsistently in previous studies. The two concepts were used interchangeably in some studies (Dillard & Shen, 2005; Festinger & Maccoby, 1964; Kim et al., 2013) but were treated as distinct constructs in other studies (Brock, 1967; Cameron, Jacks, & O'Brien, 2002; Jacks & Cameron, 2003). To refine the research on reactance and cognitive response, we differentiate the two concepts by considering counterarguing as one type of negative thoughts. Negative thoughts can be categorized into two types: Counterarguing that comprises negative thoughts with direct rebuttal of arguments in the message (Brock, 1967), and nonrefutational thoughts, which do not refute the arguments in the message (Jacks & Cameron, 2003). Typical nonrefutational thoughts found in the literature include self-attitude bolstering,

which involves generation of thoughts that are favorable toward one's prior attitude without directly refuting message arguments (Cameron et al., 2002, p. 206); communication derogation, which involves insulting the message without providing arguments (Wright, 1986); and suggestion of alternatives to the advocated position or to the problem discussed in the message (Osterhouse & Brock, 1970).

Previous studies have not examined the type of negative thoughts that are caused by perceived threat and trait reactance in the reactance process. It is possible that nonrefutational negative thoughts, rather than counterarguments, are the type of negative thoughts generated given a message that threatens one's attitudinal freedom. Perceived threat to attitudinal freedom may play the role of a heuristic cue during message processing (Rains & Turner, 2007), which results in less elaboration and fewer counterarguments targeting the message. This heuristic cue may also give rise to more nonrefutational thoughts such as communication derogation. Silvia (2006) found that communication derogation, one type of nonrefutational negative thought, mediated the influence of perceived attitudinal threat on respondents' attitude. It is also unknown whether counterarguing, nonrefutational thoughts, or both are caused by low quality messages. It is reasonable that people may exhibit more message or source derogation (i.e., one type of nonrefutational negative thoughts) given low quality arguments. To differentiate counterarguments and nonrefutational thoughts and to examine the antecedents and outcomes of the two, several hypotheses are proposed:

H6a: There is an indirect effect of perceived threat on a boomerang effect through nonrefutational thoughts, such that the higher perceived threat, the more nonrefutational thoughts, which result in a larger boomerang effect.

H6b: There is an indirect effect of trait reactance on a boomerang effect through

nonrefutational thoughts, such that the higher trait reactance, the more nonrefutational thoughts, which result in a larger boomerang effect.

H7a: There is an indirect effect of argument quality on a boomerang effect through counterarguing, such that the lower argument quality, the more counterarguing, which results in a larger boomerang effect.

H7b: There is an indirect effect of argument quality on a boomerang effect through nonrefutational thoughts, such that the lower argument quality, the more nonrefutational thoughts, which results in a larger boomerang effect.

Measuring a Boomerang Effect

As previously stated, a boomerang effect has been evaluated inconsistently. Some scholars maintain that a necessary requirement for a boomerang is to have a pretest that measures participants' initial positions (Bettinghaus & Baseheart, 1969; Boster et al., 2009; Hovland et al., 1957), whereas some scholars indicate that having a control group (i.e., a group exposed to an alternative message or no message) is sufficient to show a boomerang effect (Bessarabova et al., 2013; Byrne & Hart, 2009). In this study, a control group's belief and attitude were used as the baseline for measuring a boomerang effect. This is because if subjects are asked to indicate their belief and attitude prior to the message, they may be sensitized and be aware of their postmessage belief or attitude change. Sensitization could cause bias from the interaction between pretest and message.

In addition, some scholars have used a dichotomous scale to determine the existence of a boomerang effect (e.g., J. Brehm, 1966, pp. 109-112; Snyder & Wicklund, 1976; Worchel & Brehm, 1970; Wright et al., 1992). For example, in Wright et al.'s (1992) experiment, female students were exposed to a message that had three levels (i.e., high, low, and control) of threat to

their freedom and were asked to evaluate the relative attractiveness of two males. Before the manipulation messages, all these women received some basic information about the two males. In the high-threat condition, these women were told that there was not any choice but to choose candidate A, who was superior to candidate B on several dimensions, such as appearance. In the low-threat condition, the women received a suggestion to choose A. In the control condition, there was no message. If fewer women in the high-threat condition (vs. the control condition) selected candidate A, these women in the high threat condition had a boomerang effect. Wright et al. (1992) found that only 14% participants in the high threat condition chose A (i.e., the candidate who was praised by the message); in contrast, 56% participants in the control condition chose A. Thus, Wright et al. (1992) concluded that there was a boomerang effect. However, Wright et al. (1992) used a dichotomous scale where a subject had to go with either the “choose A” or the “do not choose A” option. It can be easier to find a boomerang effect with a dichotomous rather than a nondichotomous scale such as a continuous measure (Bessarabova et al., 2013). With the dichotomous scale, an individual is forced to select one of the two options and there is a 50% chance that the person has a boomerang effect without considering other factors. However, with the continuous scale, one can move to any position and the likelihood of a boomerang effect should be much lower.

A number of scholars have used Likert-type scales in studies regarding reactance (e.g., Silvia, 2006; Smith, 1977). Variables measured by Likert-type scales are not continuous and may have many cases at the floor or ceiling because Likert-type scales are bound at the top and the bottom (Fink, 2009). For example, Smith (1977) used the gain score of participants' responses from pretest to posttest on a Likert-type scale to measure attitude change. A negative gain score in the high-threat condition that was significantly different from the gain score in the low-threat

condition or in the control condition would indicate that threat to freedom caused a boomerang effect. Using this scale, Smith (1977) did not observe a boomerang effect.

In addition, a boomerang effect has been measured on different variables, including beliefs (e.g., Qucik & Considine, 2008; Snyder & Wicklund, 1976; Wicklund & Brehm, 1968; Wright et al., 1992), attitudes (e.g., Dean et al., 1971; Silvia, 2006; Smith, 1977, 1978; Worchel & Brehm, 1970; Wright, 1986), and behavioral intention or actual behavior (e.g., Dillard & Shen, 2005; Rains & Turner, 2007, Study 2; Schultz et al., 2007).

In the current study, boomerang effects were measured by continuous scales (e.g., magnitude scales) on belief and attitude. The continuous scale provides the following benefits: First, a continuous scale measures both whether there is a boomerang effect as well as the magnitude of the boomerang effect; second, a continuous scale is not bound at the top, thus it does not have potential ceiling effects. For example, let's assume that a person's attitude toward an issue prior to a communication is 5 on a 5-point Likert-type scale. After receiving a low-quality counterattitudinal message, the individual may generate counterarguments toward the message and source and have a boomerang effect. However, if there is a boomerang effect, it may not be captured by the 5-point Likert-type scale, because the individual cannot move further than 5 on this scale. The person may show no attitude change (i.e., score 5) or change toward the message (i.e., score lower than 5). Therefore, continuous scales will be employed to measure belief and attitude, which will then be used to compute a difference score that represents a boomerang effect.

Belief and Attitude Boomerang

The dual path boomerang framework considers the boomerang effects on beliefs and attitudes. To be precise, a belief can be nonevaluative or evaluative (e.g., "X is Y," where Y can

be either nonevaluative or evaluative, whereas an attitude means “I like [or dislike] X.”)

According to theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) and the summative model of attitude (Fishbein, 1967), one’s attitude toward an issue is a function of one’s salient beliefs about the issue. Thus, a message that advocates a belief position on a social issue may elicit a respondent’s salient beliefs on the issue (O’Keefe, 2002). And the likelihood and evaluation of the salient beliefs affects one’s attitude toward the issue (Fishbein, 1967).

Similarly, according to media priming theory, a message related to a specific belief increases the salience of that belief, which could strength the correlation between that belief and an attitude (Iyengar & Kinder, 1987). Therefore, a low-quality counterattitudinal message that advocates decreasing the legal drinking age may cause the boomerang effects on belief (e.g., the extent to which the legal drinking age should be decreased on a magnitude scale) and belief position (e.g., the legal age for drinking), which subsequently causes a boomerang effect on attitude (e.g., to extent to which subjects like the legal drinking age).

Summary

The dual path framework hypothesizes that the two types of messages (i.e., a proattitudinal message and a counterattitudinal message) may bring about boomerang effects with a different set of antecedents and dominant mediators. On the one hand, after people receive a proattitudinal message, it is expected that a persuasive communication that threatens attitudinal freedom can create a boomerang effect that is mediated by reactance, which is a combination of anger and negative thoughts. Anger, compared to counterarguing, is expected to be dominant. On the other hand, after people receive a counterattitudinal message, it is expected that a low-quality persuasive communication will create a boomerang effect that is predominantly mediated by the generation of counterarguments. There has been one study that supports the dual paths to

boomerang effects: Smith (1978) found that those who were in moderate agreement with a message and those who were in extreme disagreement with a message both had boomerang effects. But Smith did not measure reactance or counterarguing and had no way to differentiate these two types of boomerang effects.

Furthermore, for integrating the dual paths to boomerang effects in one model, this dissertation categorizes negative cognitions into counterarguments and nonrefutational negative cognitions. It is predicted that nonrefutational negative cognitions mediate the effect of perceived threat on the boomerang effect; both counterarguments and nonrefutational negative cognitions are expected to mediate the effect of argument quality on the boomerang effect.

Chapter 3: Method

In this chapter, first, the approaches to data collection and analysis are discussed, including data winsorizing, data transformation, and index formation. Then, five pilot studies conducted prior to the main experiment are presented and their results are discussed. Finally, the method of the main experiment is described, including the participants, study design, procedures, instrumentation, and the analytical strategy to determine the significance of the boomerang effects across experimental conditions.

Data Collection and Analysis

Before collecting the data for the proposed experiment, five pilot studies were conducted. The purpose of the first and second pilot studies was to select two topics for the main experiment. In the third pilot study, participants were asked to generate arguments regarding the two topics. Based on the results of the third pilot study and additional issue-related information from newspapers and the Internet, eight sets of arguments that vary on issue type, message valence, and argument quality were generated for stimuli in the main experiment. In the fourth pilot study, these messages were tested for the success of the manipulation of argument quality. In the fifth pilot study, arguments that failed the manipulation check in the fourth pilot were revised and tested again. With the arguments that passed the manipulation check in the fourth and fifth pilot studies, eight stimuli with variations on issue type (i.e., legal age for drinking vs. legal age of marriage), message valence (i.e., propolicy vs. antipolicy), and argument quality (i.e., high vs. low) were generated for the main experiment.

The purpose of the main experiment was to examine the boomerang effect under proattitudinal and counterattitudinal persuasive communication and to model the mechanisms for different types of boomerang effects. Data collection for this dissertation was approved by the University of Maryland Institutional Review Board (date of approval: February 23, 2015). All of

the pilot tests and the final experiment were conducted online using Qualtrics (Snow & Mann, 2013). All pilot tests and the main experiment are described below.

Data winsorizing and transformation. To control for outliers, winsorization was conducted for the variables measured by the magnitude scales: The values that were above the ninety-fifth percentile value were recoded to be equal to the ninety-fifth percentile value. If a variable appeared relatively nonnormal (i.e., the skewness or kurtosis was higher than 2.50 or lower than -2.50), it was transformed through exponentiation (e.g., a score raised to the power of a value between 0 and 1). The data winsorizing and transformation strategy was consistently applied to all data in the pilot studies and the main experiment. The winsorized and transformed scores of variables are reported in the measurement sections.

Pilot Study 1: Topic Generation

The purpose of the first pilot study was to select several candidate topics for the study. Participants were instructed to complete a survey in which they were asked to list five issues that they hear about from parents, the media, their friends, or other sources (see Appendix A). The topics that are most frequently mentioned are assumed to be perceived as important, realistic, and ego-involving by a majority of participants. A personally involving, important, and realistic issue should make an individual value the threatened or eliminated freedom more and motivate one to process the message and generate thoughts about the message. Participants also indicated their view or position on these issues. An ideal issue is expected to have both opponents and supporters, such that arguments about an issue can be framed as either proattitudinal or counterattitudinal in the main study.

Participants. A sample of 60 students was recruited from undergraduate communication courses at the University of Maryland. Seventy percent ($n = 42$) of respondents were female; the

mean age was 19.73 ($Mdn = 19$, $SD = 2.27$), with ages ranging from 18 to 32 years of age.

Forty-five percent ($n = 27$) of our participants were Caucasian, thirteen percent ($n = 8$) were Black or African-American, twelve percent ($n = 7$) were Hispanic or Latino American, twenty-two percent ($n = 13$) were Asian or Asian American, two percent ($n = 1$) were Middle Eastern, and six percent ($n = 4$) did not fit into the provided categories. Participants were restricted to select only one option.

Procedures. Participants were directed to an online survey on Qualtrics once they signed up for the study on the Department of Communication participants pool (SONA) at the University of Maryland. Participants were instructed to list five issues that they hear about from parents, the media, their friends, or other sources. They were also asked to indicate their opinions for each issue listed. The data were coded by the author.

Results and discussion. The results indicates that out of 60 respondents, 18 mentioned the Ferguson unrest (i.e., protests and riots that began after the fatal shooting of a Black man by a White police officer in Ferguson, Missouri), 16 mentioned the issue of gender equality and the rights of lesbian, gay, bisexual, and transgender people (LGBT), 14 mentioned sexual assault on campus, 14 mentioned tuition, 10 mentioned underage drinking, and 9 mentioned raping or bullying in fraternities and sororities. The remaining issues were mentioned by fewer than nine people and were not considered.

Respondents' opinions on the issue were coded into three categories: *protopic*, *antitopic*, or *NP* (*no identified position*). An ideal issue should be both protopic and antitopic for different people. For the Ferguson unrest, 14 out of 18 people were antitopic and 4 were coded as NP; for gender equality, 12 out of 16 people were protopic and 4 were NP; for sexual assault, 8 out of 14 were antitopic and 6 were NP; for tuition raise, 10 out of 14 were antitopic, 1 was protopic, and 3

were NP; for underage drinking, 6 out of 10 were protopic, 2 were antitopic, and 3 were NP; for raping or bullying in fraternities and sororities, 6 out of 9 were antitopic and 3 were NP. In summary, an overwhelming number of people had a one-sided opinion for the Ferguson unrest, gender equality, and sexual assault and therefore these issues were not considered for our study. Two issues, underage drinking and tuition, were further tested in Pilot Study 2.

Pilot Study 2: Topic Selection

In the second pilot study, underage drinking, tuition raise, and three additional topics (i.e., the legal age for marriage, the amount of sleep one needs each day, and undergraduate career training courses) were tested. The three additional issues were not mentioned by undergraduates and were thus expected to be less involving as compared with issues that were mentioned by the undergraduates. The main experiment ideally should include two topics with variation on issue involvement for higher generalizability, so the inclusion of additional topics in the second pilot study offered some flexibility in topic selection.

In the second pilot study, participants were instructed to indicate their beliefs and attitudes (e.g., How much do you like the current legal drinking age?; see Appendix B for the questionnaire) for five topics on 11-point scales where 1 indicates “Not at all,” 6 indicates “Moderate,” and 11 indicates “Extremely.” Although 11-point scales are less precise than magnitude scales (Fink, 2009), variable scores on 11-point scales usually need no transformation and can be used for data description. Because the main purpose of this pilot study was to choose an issue by observing the histograms for participants’ positions, the use of 11-point scales was desirable. For an ideal issue, (1) responses on belief position should show some variation; (2) respondents should not possess extreme beliefs or attitudes: on the attitudinal continuum (from *not agree at all* to *completely agree*) for a topic, a majority of responses do not reside at the two

ends of the continuum, such that respondents' attitude are free to move in either direction to exhibit persuasion or boomerang. For example, assuming that many respondents indicate 1 “*Not At All*” when they are asked whether they like the current legal drinking age, then it would be highly unlikely to observe any boomerang effect given a propolicy message. This is because responses lumped at the lower bound of the scale cannot move below 0.

Furthermore, the two issues to be selected are expected to vary on respondents' prior belief strength. The relationship between prior belief strength and a boomerang effect is not clear in the literature. On the one hand, people with a strong prior belief may discount the influence of a counterattitudinal message by showing a boomerang effect (Smith, 1978). On the other hand, people with a weak prior belief (vs. those with a strong prior belief) may show less inertia or resistance to change (Saltiel & Woelfel, 1975) and thus may be more likely to move their position on the belief continuum for an issue given a persuasive message. In this case, whether those with a strong prior belief move closer or away from the message-advocated position may be determined by message characteristics such as argument quality.

Participants. A sample of 41 students was recruited from undergraduate communication courses at the University of Maryland. Sixty-six percent ($n = 27$) of respondents were female; the mean age was 19.12 ($Mdn = 19$; $SD = 1.42$), with ages ranging from 18 to 25 years of age.

Fifty-one percent ($n = 21$) of our participants were Caucasian, seventeen percent ($n = 7$) were Black or African-American, five percent ($n = 2$) were Hispanic or Latino American, twenty-five percent ($n = 10$) were Asian or Asian American, and two percent ($n = 1$) did not fit into the provided categories. Participants were restricted to select only one option.

Procedures. Participants were directed to an online survey on Qualtrics once they signed up for the study on the Department of Communication participants pool (SONA) at the

University of Maryland. Participants were instructed to indicate their belief positions and attitudes (see Appendix B for the items) for five topics. The data were analyzed using summary statistics and the data's frequency distributions.

Results and discussion. The variation of the belief positions for each issue was examined first. Outliers were identified through an examination of histograms, and they were removed. However, there were only outliers for the belief position on amount of tuition. For the legal drinking age, respondents believed in an average age of 19.15 ($Mdn = 18$, $SD = 1.73$) years, with a range of from 17 to 24. For current tuition, respondents believed in an average tuition of \$4,135.27 ($Mdn = \$4,000$, $SD = \$1,507.42$) for full-time resident undergraduates at the University of Maryland for the Spring 2015 semester. For legal marriage age, respondents believed in an average age of 17.98 ($Mdn = 18$, $SD = 1.29$) years, with a range from 16 to 21. For amount of sleep, respondents believed in an average time of 7.97 hours sleep ($Mdn = 8$, $SD = 0.86$) each day, with a range from 7 to 10. For undergraduate career training courses, respondents believed in an average number of 3.65 courses ($Mdn = 4$, $SD = 2.08$), with a range from 0 to 10. Comparatively speaking, respondents' belief position has a large variation for current tuition; medium variation for legal drinking age, marriage age, and the required number of career training courses; and small variation for amount of sleep one needs each day. Thus, the hours of sleep each day was not considered.

The histograms for all the belief and attitude variables for the five issues are provided in Figures 1-5. From the distribution of responses, we can see that there is an overwhelming percentage of opposers (vs. supporters) for tuition raise (Figure 2) and for having less than 7-8 hours of sleep each day (Figure 4). Thus, it is not feasible to frame the two issues as either proattitudinal or counterattitudinal, and therefore the two issues were not considered further.

Two issues, the legal age for drinking and the legal age for marriage, were selected as the two issues for the main study. The two issues are comparable to some extent. More important, when one specific position (e.g., lower the legal drinking age) is advocated in a message regarding these two issues, the message can be either proattitudinal or counterattitudinal for different participants. This ensures that a boomerang effect can be tested for both proattitudinal and counterattitudinal communication. It seems that people have more established and potentially strong attitudes on the legal age for drinking but not on the legal age for marriage, as indicated by the finding that more people chose to take the stance *do not like the policy at all* on the drinking age issue ($M = 4.56, SD = 2.85$) but not on the marriage issue ($M = 6.20, SD = 2.03$). This variation on attitude strength for the two issues increases the generalizability of any potential findings of a boomerang effect.

Pilot Study 3: Argument Generation

In the third pilot study, respondents were asked to indicate their position on the legal age for drinking and legal age for marriage and to generate four arguments that support their position and four arguments opposed to their position for both issues (see Appendix C for the questionnaire). Then these arguments were further edited to form four sets of arguments for two issues: strong propolicy arguments; weak propolicy arguments; strong antipolicy argument; weak antipolicy arguments. High-quality and low-quality messages were generated for an argument by manipulating the type of evidence. Strong arguments were produced by adding logical, statistical, and credible evidence that supports the advocated position in the message; weak arguments were produced by adding anecdotes or illogical arguments (see Petty & Cacioppo, 1979a). Both student-generated content and news report from the Internet were used for evidence. The readability level of the arguments was examined to make sure that respondents were able to

comprehend the arguments in the main study and that the strong and weak versions of an argument were comparable on readability. These sets of arguments were also examined to make sure that they matched on the perceived threat of attitudinal freedom.

Participants. A sample of 37 students was recruited from undergraduate communication courses at the University of Maryland. Sixty-five percent ($n = 23$) of respondents were female; the mean age was 18.91 ($Mdn = 19$; $SD = 1.27$), with ages ranging from 18 to 24 years of age.

Sixty-nine percent ($n = 24$) of our participants were Caucasian, nine percent ($n = 3$) were Black or African-American, three percent ($n = 1$) were Hispanic or Latino American, fourteen percent ($n = 5$) were Asian or Asian American, and five percent ($n = 2$) did not fit into the provided categories. Participants were restricted to select only one option.

Procedures. Participants were directed to an online survey on Qualtrics once they signed up for the study on the Department of Communication participants pool (SONA) at the University of Maryland. Participants were instructed to generate arguments that supported and opposed their positions for two issues (i.e., the legal age for drinking; the legal age for marriage). The data were compiled to form a pool of arguments.

Results and discussion. The complete compiled pool of arguments is provided in Appendix D. For legal drinking age, example antipolicy arguments included “The current legal drinking age has pushed underage drinking into private and less controlled environments, where young adults may be more prone to binge drinking and other unsafe behaviors” and “Government should regulate the consumption of alcohol based on the difference of age rather than set 21 as a legal age for drinking.” Example propolicy arguments included “A legal drinking age of 21 reduces traffic accidents and fatalities” and “Beginning to drink during high school may be relatively more likely to lead to later abuse and addiction than delaying drinking until

adulthood.”

For the legal marriage age, example antipolicy arguments included “At 16, one lacks the relational skills and emotional maturity required to sustain the marriage” and “It will put an unnecessary burden and unnecessary debt on these young people who get married at 16.” Example propolicy arguments included “Marrying at a young age may help teenagers mature” and “Parental consent helps those youth who decide to marry at an early age make a right choice.”

Based on the pool of arguments, four sets of arguments for these two issues that varied on valence (i.e., propolicy vs. antipolicy) and quality (i.e., high vs. low) were generated. In each set, there were four to six arguments. For each argument, there was an average of 78 words ($SD = 14$). These arguments were proofread by the author as well as two native English speakers to make sure the material was free of grammatical or other types of errors. Readability of each argument was examined using the Flesch-Kincaid grade level (Kincaid, Agard, O’Hara, & Cottrell, 1981) through an online readability calculator. The Flesch-Kincaid grade level score represents the U.S. grade level needed to understand a reading passage in English (Kincaid et al., 1981). A score of 9 means that an individual with at least a ninth-grade readability level should be able to understand the content. The readability of all four sets of arguments was good ($M = 10.88$, $SD = 1.71$) and ranged from 9 to 14. Thus, undergraduates in our main study should be able to comprehend these arguments. In addition, the weak and strong set of arguments did not have significant difference on the Flesch-Kincaid grade level, $t(14) = 0.28$, $p = .78$, or the number of words, $t(14) = -0.88$, $p = .39$.

Pilot Studies 4 and 5: The Manipulation of Argument Quality

In Pilot Studies 4 and 5, participants were randomly assigned to either a strong or weak

block of arguments (typically four to six arguments in each block) for each of the four argument sets (propolicy arguments for drinking age; antipolicy arguments for drinking age; propolicy arguments for marriage age; antipolicy arguments for marriage age). A participant had to evaluate a total of nineteen arguments. Participants were asked to rate the strength of the arguments that they just read on magnitude scales (see Appendix D for the questionnaire). The sequence of arguments in each set was counterbalanced.

Participants. Fifty-nine subjects participated in the fourth pilot study. However, the results of the fourth study were not good: In each of the four argument sets, more than half of the arguments did not work as expected because there was no significant difference on the perceived strength of a weak and strong version of the argument. To improve the manipulation, Pilot Study 5 was conducted with revised arguments from the fourth pilot study. A total of 65 subjects participated in the fifth pilot study. As the content of the questionnaires for the fourth and fifth studies was similar, only the questionnaire for the fifth pilot study is provided in Appendix D, and only results from the fifth pilot study are included.

Procedures. Participants were recruited from undergraduate classes in communication at the University of Maryland. They signed up for the study through SONA, the Department of Communication participants pool at the University of Maryland. Participants were first asked to familiarize themselves with magnitude scales (0 indicates *not at all*, 100 indicates a *moderate amount*, and the scale has no upper bound) by reading instructions for magnitude scales and by completing four practice questions. Participants were not directed to the questionnaire until they provided correct answers to the four practice questions.

Results and discussion. The original scores on the magnitude scales were highly skewed and thus were transformed by winsorization and exponentiation (see the instrumentation section

of the main experiment for details). Transformed scores were reported. Several independent-sample t tests were conducted to test whether the high-quality version of an argument was stronger than the low-quality version. These results provided support for the effectiveness of the argument quality manipulation. Generally speaking, respondents rated the high-quality arguments stronger than the low-quality arguments for each of the four argument sets with variations on the issue (drinking age vs. marriage age) and message valence (propolicy vs. antipolicy). For example, in the propolicy drinking age argument set that contains five pairs of high-quality versus low-quality of arguments, the high-quality version of an argument ($M = 2.82$, $SD = 1.86$, $n = 33$) was rated stronger than its low quality version ($M = 1.57$, $SD = 1.32$, $n = 32$), $t(63) = 3.12$, $p < .01$. Of the nineteen pairs of arguments, three pairs did not work as expected and were thus removed.

The Main Experiment

The purpose of the main experiment was to identify a boomerang effect under different conditions of perceived message type (i.e., proattitudinal vs. counterattitudinal), threat to attitudinal freedom (i.e., high vs. low), and argument quality (i.e., high vs. low) on two issues (the legal age for drinking and of marriage) and to examine the cognitive and affective mechanisms that account for different boomerang processes.

Data collection and participants. Data collection occurred in December 2015 and March 2016. A total of 458 undergraduates were recruited for the main experiment. Among these undergraduates, 238 students participated in the first study, on the legal age for drinking in Maryland, and 220 students participated in the second study, on the legal age of marriage in Maryland. Although messages in the two studies were different in content, the design and protocol of the two studies were the same except for some minor changes in wording. Data were

collected through the Department of Communication Participants Pool (SONA) at the University of Maryland. All students received extra-credit in a communication course for their participation.

In the main experiment ($N = 458$), fifty percent of participants ($n = 231$) were male. The mean age was 19.38 years ($Mdn = 19.00$, $SD = 1.81$), with ages ranging from 18 to 30 years of age. Of participants who provided their ethnicity or race information ($N = 450$), fifty-nine percent ($n = 267$) were White, twelve percent ($n = 54$) were Black or African-American, six percent ($n = 26$) were Latino or Hispanic American, one percent ($n = 5$) were American Indian, Alaska Native, or Pacific Islander, eighteen percent ($n = 79$) were Asian or Asian American, one percent ($n = 6$) were Middle Eastern, and two percent ($n = 13$) did not fit into the provided categories. Participants were restricted to select only one option.

Design and procedures. A 2 (Message valence: antipolicy vs. propolicy) \times 2 (Threat to freedom: low threat vs. high threat) \times 2 (Argument quality: low quality vs. high quality) \times 2 (Issue: legal age for drinking vs. legal age of marriage) plus 2 (Control groups: no-message control for each issue) design (18 conditions total) was employed (see Appendix E for the complete questionnaire). The manipulations of message valence and argument quality were identical to those used in the last (fifth) pilot study. To create a condition in which participants perceive threat to their attitudinal freedom, participants read the following paragraph that forced them to agree with the advocated position: *So those are my reasons for the position I advocated. They are good reasons, so I know you have no choice but to agree with them. Because when you think about it you are really forced to agree* (Silvia, 2006). These manipulations were given on Qualtrics. This paragraph was placed at the end of the message to make sure the manipulation of perceived threat did not interfere with argument quality. As observed by Silvia (2006), when the perceived threat was placed at the beginning of message, respondents may have an unfavorable

attitude toward the message and thus generate counterarguments, regardless of argument quality.

Approval (December, 2015) was obtained from the University of Maryland IRB. After participants signed up for the study, they were directed to the study on Qualtrics, through the link provided by the Department of Communication Participants Pool (SONA). First, participants completed a consent form. Then participants were told that they would use three types of scales in this study: 11-point or 4-point Likert-type scales, count scales, and magnitude scales. Participants read instructions regarding how to respond to these scales and completed a practice exercise for the magnitude scales. Respondents were not able to proceed to the next section until they successfully completed the exercise by answering five questions in the exercise correctly.

After respondents finished the magnitude scale practice exercise, they were asked to indicate their premessage position and belief strength and were then randomly assigned to a condition. After respondents read the stimulus, they answered survey questions measuring their belief (e.g., the extent to which the legal age for drinking should be decreased) and attitude (e.g., the extent to which they liked the current legal drinking age) toward the issue discussed in the stimulus. In addition, respondents answered questions gauging their traits (e.g., trait reactance) and demographic variables. At the end of the study, all participants were debriefed about the purpose of the experiment and were welcome to print the debriefing form. To control for the potential order effect on questionnaire, the postmessage survey questions were divided into three blocks: outcome variables, mediators (anger and thought listing), and manipulation checks and trait variables. The sequence of the question blocks was counterbalanced. Respondents in the control conditions did not read any stimulus and thus were not debriefed. The control respondents were asked only to indicate their responses on the outcome, trait, and demographic variables.

Instrumentation. Participants' postmessage belief and attitude and premessage belief strength were measured on continuous scales. The manipulation checks, mediators, and trait variables were measured on 11-point or 4-point scales. And the premessage belief was measured by a single binary item for mitigating sensitization (see discussion in the following section). Scores of variables measured by continuous scales were examined for outliers and skewness before investigating the descriptive statistics as well as the histograms of the variables (Anscombe, 1973; Fink, 2009). To control for outliers and skewness, the values that were above the ninety-fifth percentile value were recoded to be equal to the ninety-fifth percentile value. After winsorization, if the distribution of scores still appeared relatively nonnormal (i.e., the skewness or kurtosis was higher than 2.50 or lower than -2.50), the scores of these variables were transformed by exponentiation (e.g., these scores raised to a power of a value between 0 and 1 if positively skewed). If the distribution of the variable values was relatively normal after transformation (i.e., the skewness and kurtosis were in the range between -2.50 and 2.50), then the transformation was considered successful. Table 2 provides the transformation strategies for the outcome variables on magnitude scales and their summary statistics after transformations. For variables on magnitude scales, the transformed scores (if a transformation was necessary) are reported below. All the statistical analyses were conducted on the transformed predictor and outcome variables. Variables not on magnitude scales were relatively normal and not transformed.

For the variables that have unidimensional structures based on previous studies (e.g., anger; Dillard & Shen, 2005), all the items were averaged to calculate a composite score. For the variables that have multidimensional structures based on previous studies (e.g., trait reactance; Hong, 1992), a principal components analysis was used to form the indexes using the first

unrotated principal component (Afifi, Clark, & May, 2004). A principal component score (i.e., a standardized weighted sum of all the items based on their contribution to the principal component) was calculated for trait reactance.

Premessage belief and belief strength. First, participants indicated their premessage belief on the issue by choosing one of the following options: “Oppose the policy” (Drinking: 61.5%; Marriage: 50.2%) versus “support the policy” (Drinking: 38.5%; Marriage: 49.8%). The pretest of respondents’ belief and attitude could lead to sensitization (see discussion in the Introduction chapter). Thus, a single binary measure of belief was employed to (1) determine whether the message is proattitudinal or counterattitudinal for the individual, and (2) to mitigate the potential biases from sensitization. Second, people’s belief strength was measured on a magnitude scale by one question: “How strongly do you believe in your position?” (Drinking: $M = 149.91$, $SD = 114.85$; Marriage: $M = 71.67$, $SD = 29.89$). Transformed scores of premessage belief strength are reported.

Postmessage beliefs and attitudes. Transformed scores of beliefs and attitudes are reported below. First, two questions captured participants’ issue-relevant beliefs on magnitude scales. Participants indicated their beliefs toward changing the current policy on one of these two issues. Namely, they indicated the extent to which they agreed that the legal age for drinking should be decreased ($M = 10.38$, $SD = 0.47$) or that the legal age of marriage should be increased ($M = 94.57$, $SD = 7.11$). And participants’ belief positions on the issue were measured by one question: “What do you think Maryland’s legal drinking [marriage] age should be?” For drinking age, the average belief position was 19.41 ($SD = 0.37$); for marriage age, the average belief position was 18.16 ($SD = 0.12$). Then, participants were asked to indicate their attitudes on the given issue by indicating the extent to which they liked the current legal age for drinking ($M =$

20.62, $SD = 1.08$) or for marriage ($M = 69.07$, $SD = 3.64$). As expected, subjects' beliefs and attitude were correlated. For the drinking age, subjects' belief toward decreasing the drinking age was significantly correlated with their attitude toward the policy ($r = -.66$, $p < .001$, $n = 260$) and their belief position for the drinking age ($r = -.53$, $p < .001$, $n = 260$); for the marriage age, subjects' belief toward increasing the marriage age was significantly correlated with their attitude toward the policy ($r = -.37$, $p < .001$, $n = 240$) and their belief position for the marriage age ($r = .37$, $p < .001$, $n = 240$).

Boomerang effect. A boomerang effect was assessed by comparing the postmessage belief and attitude scores of participants in the experimental and the control condition for the specific issue. If participants in the experimental condition had belief or attitude scores further away from the position advocated in the message, as compared with those in the control condition, a boomerang effect was observed. For example, suppose that participants receive a message that advocates lowering the current legal drinking age. There is a boomerang effect if these participants express less agreement with lowering the drinking age, a more favorable attitude toward the current drinking age, or a higher belief position on the legal drinking age, as compared with those in the control group. Therefore, participants' responses on beliefs and attitudes were coded on both the group and individual levels for testing boomerang effects given different hypotheses. The coding strategies for the statistical analyses are discussed in detail in the Results chapter.

Message and message source disparagement. Scales of communication and message source disparagement were adapted from Bochner and Insko's (1966) study. Both communication and message source disparagement were measured on 11-point scales from 1 *strongly disagree* to 11 *strongly agree*. Communication disparagement was measured by eight

questions regarding the extent to which the communication “made sense,” “covered all relevant aspects necessary for evaluating the topic,” “was easy to understand,” “was reasonable,” “was well-written,” “was convincing,” “was interesting,” and whether participants “like the message.” Scores from the eight items were reverse coded and averaged to represent message disparagement (Drinking: $M = 4.72$, $SD = 2.12$, Cronbach’s alpha = .92; Marriage: $M = 5.06$, $SD = 2.19$, Cronbach’s alpha = .93). Disparagement of the message source was reversed coded and measured by six questions regarding the extent to which the communicator was “sincere,” “competent,” “trustworthy,” “intelligent,” “credible,” and “knowledgeable” (Drinking: $M = 5.00$, $SD = 1.91$, Cronbach’s alpha = .91; Marriage: $M = 5.02$, $SD = 2.22$, Cronbach’s alpha = .94).

Trait reactance. Hong’s (1992; Hong & Faedda, 1996; Hong & Page, 1989) reactance scale was used to measure trait reactance. Previous studies have shown that Hong’s reactance scale has a four-factor structure (Hong, 1992; Hong & Page, 1989). The 11-item scale from 1 *strongly disagree* to 11 *strongly agree* consists of three items relating to participant’s emotional response to restricted choice (e.g., “I become angry when my freedom of choice is restricted”), three items regarding reactance to compliance (e.g., “Regulations trigger a sense of resistance in me”), three items about resisting influence from others (e.g., “I resist the attempts of others to influence me”), and two items on reactance towards advice and recommendations (e.g., “I consider advice from others to be an intrusion”; see Appendix E for the complete scale). The focus of the current study is not the factorial structure of trait reactance. So trait reactance was measured by the standardized principal component score that explains the largest variance in the correlation matrix of all 11 items.

Control variables. Participants’ competence to exercise their belief or attitudinal freedom was measured on a magnitude scale and the transformed scores are reported below.

Previous studies have shown that people who feel more competent to exercise their belief or attitudinal freedom tend to have a boomerang effect after exposure to a high-threat communication (Wicklund & Brehm, 1968). Based on Smith's (1977) measure, participants were asked the extent to which they feel that "they currently possess sufficient information and knowledge about the issue to make an intelligent decision regarding their position" on a magnitude scale (Drinking: $M = 150.23$, $SD = 130.43$; Marriage: $M = 81.36$, $SD = 55.28$). Participants reported their demographic information including age, gender, ethnicity and race, and year in college.

Manipulation check: Argument quality. Argument quality was measured by seven items (Rains & Turner, 2007). On 11-point scales from 1 *extremely disagree* to 11 *extremely agree*, participants rated the degree to which the message was *smart, well supported, compelling, effective, informative, detailed, and weak*. After reverse coding and averaging, the mean of argument quality was 5.23 ($SD = 2.17$, Cronbach's alpha = .77) for drinking age and was 5.06 ($SD = 2.19$, Cronbach's alpha = .81) for marriage age.

Manipulation check: Perceived threat. Based on Dillard and Shen's (2005) study, perceived threat was measured by four items: "The message threatened my freedom to choose," "The message tried to make a decision for me," "The message tried to manipulate me," and "The message tried to pressure me." Participants indicated the extent to which they agreed with the four items on 11-point scales from 1 *extremely disagree* to 11 *extremely agree*. After averaging, the mean of perceived threat was 4.75 ($SD = 2.93$, Cronbach's alpha = .92) for drinking age and was 4.93 ($SD = 2.82$, Cronbach's alpha = .92) for marriage age.

Mediator: Anger. Anger was measured by four items that gauge the extent to which participants feel irritated, angry, annoyed, and aggravated (Dillard & Shen, 2005). Participants

indicated the extent to which they agreed with the four items on 4-point scales from 1 *definitely do not feel* to 4 *definitely feel*. After averaging, the mean of anger was 1.76 ($SD = 0.83$, Cronbach's alpha = .88) for drinking age and was 1.84 ($SD = 0.81$, Cronbach's alpha = .87) for marriage age.

Mediators: Negative thoughts and counterarguments. Thought listing was employed to measure both negative thoughts and counterarguments (Brock, 1967; Petty et al., 1981). After the persuasive message, participants were asked to list all the thoughts they had while reading the message by entering text consecutively in five blank boxes provided by Qualtrics.

Participants' cognitive responses were coded on two variables by two independent coders: Negative thoughts and counterarguments (see Chapter 2 for a detailed discussion on the difference between negative thoughts and counterarguments). In this dissertation, counterarguments were defined as message-related arguments that attack the message (Petty et al., 1981) and were not "simply a restatement or paraphrase" of the message (Brock, 1967, p. 301). For a thought to be considered a counterargument, the cognition should be a negative thought and explicitly refute one or more arguments of the persuasive communication (Jacks & Cameron, 2003) with reasoning (in order to be arguments at the first place). Negative thoughts are cognitive responses that show disagreement with message position, arguments, or source in a variety of ways. Negative thoughts include both counterarguments that directly refute the arguments in the message and nonrefutational negative thoughts (Cameron et al., 2002), which include the suggestion of alternatives to the issue or position in the message (Osterhouse & Brock, 1970), attitude bolstering (Cameron et al., 2002), and insulting the message or message source without providing arguments (Wright, 1986). Mere affective (e.g., unhappy) or physical

(e.g., I am tired) responses were not considered to be negative thoughts or counterarguments (Rains & Turner, 2007; Shaver, Schwartz, Kirson, & O'Connor, 1987).

Negative thoughts and counterarguments were measured by counting the number of negative thoughts and counterarguments for each participant. Nonrefutational thoughts were calculated by subtracting the number of counterarguments from the number of negative thoughts. Because we were only interested in the cognitive responses of participants who received persuasive communication, only thoughts of those in the experimental conditions (but not control conditions) were coded ($n = 346$). The coding scheme was explained to the two independent coders who are doctoral candidates in communication. After two rounds of training, both coders coded 10% responses to establish intercoder reliability. Krippendorff's alpha reliability scores were calculated through the `kalpha` macro in SPSS (Hayes & Krippendorff, 2007). Coders' Krippendorff's alpha was .86 on negative thoughts and .88 on counterarguments, suggesting acceptable intercoder reliability (Krippendorff, 2012). The two coders proceeded to code the remaining responses. In our final dataset, the average number of negative thoughts was 1.32 ($SD = 1.37$) for the legal drinking age and was 0.93 ($SD = 1.28$) for the legal marriage age; the average number of counterarguments was 0.74 ($SD = 1.06$) for the drinking age and was 0.50 ($SD = 0.97$) for the marriage age. The number of nonrefutational thoughts was computed by subtracting the number of counterarguments from the number of negative thoughts. The average number of nonrefutational thoughts was 0.59 ($SD = 0.84$) for the legal drinking age and was 0.43 ($SD = 0.74$) for the legal marriage age. The original nontransformed scores were reported. The discriminant validity of anger, negative thoughts, counterarguments, and nonrefutational thoughts was examined by correlations and confirmatory factor analysis (CFA) and are discussed in the next chapter.

Chapter 4: Results

This chapter starts with a description of the manipulation checks for perceptions of threat to freedom and argument quality. Second, the results from correlations and CFAs for the discriminant validity of mediators are presented. Third, the analytical approach for ANOVAs and the results of a series of ANOVAs with polynomial contrast are presented for H1, H3, and H4. Last, the analytical schemes and results of three structural equation models are detailed for the remaining hypotheses (H2, H5, H6, and H7) and research questions (RQ1 and RQ2).

Manipulation Checks

Manipulation check: Perceived threat. Our model predicts that threat to attitudinal freedom (i.e. high vs. low), argument quality (i.e. high vs. low), and perceived message valence (i.e., whether a message is perceived as proattitudinal or counterattitudinal) predict a boomerang effect. Two analyses of variance (ANOVAs) were performed to determine the effect of threat manipulation on perceived threat to freedom on the two issues: the legal age for drinking and the legal age of marriage. Threat, argument quality, and message valence were the independent variables, and perceived threat to freedom was the dependent variable. Regarding the legal age for drinking issue, the R^2 for the entire model was 13.3% (adjusted $R^2 = 9.5\%$). The results indicated that the effect of the threat induction was significant, $F(1, 174) = 13.06, p < .001$: The individuals in the low-threat condition perceived significantly less threat to freedom ($M = 4.12$; $SD = 0.30$; $n = 88$) than those in the high-threat condition ($M = 5.66$; $SD = 0.30$; $n = 86$). The effect of the argument quality manipulation was not significant, $F(1, 174) = 0.39, p = .53$. The effect of the message valence manipulation was significant, $F(1, 174) = 6.65, p < .05$: The individuals in the antipolicy-message valence condition perceived significantly less threat to freedom ($M = 4.34$; $SD = 0.30$; $n = 86$) than those in the propolicy-message condition ($M = 5.44$; $SD = 0.30$; $n = 88$). There were no significant interactions between the independent variables.

Regarding the legal age for marriage, the R^2 for the entire model was 9.1% (adjusted $R^2 = 5.1\%$). The results indicated that the effect of the threat induction was significant, $F(1, 168) = 8.65, p < .01$: The individuals in the low-threat condition perceived significantly less threat to freedom ($M = 4.48; SD = 0.30; n = 84$) than those in the high-threat condition ($M = 5.73; SD = 0.30; n = 84$). The effect of the message valence manipulation was not significant, $F(1, 168) = 0.05, p = .82$. The effect of the argument quality manipulation was significant, $F(1, 168) = 4.90, p < .05$: The individuals in the high argument-quality condition perceived significantly less threat to freedom ($M = 4.64; SD = 0.30; n = 85$) than those in the low argument-quality condition ($M = 5.58; SD = 0.30; n = 83$). There were no significant interactions between the independent variables.

Based on these results, it was concluded that the effect of the threat manipulation on perceived threat to freedom was successful. But given the same threat manipulation, individuals who received the propolicy message (vs. the antipolicy message) perceived more threat to freedom regarding the legal age for drinking; individuals who received the low-quality message (vs. the high-quality message) perceived more threat to freedom regarding the legal age for marriage. Thus, results should be interpreted with caution.

Manipulation check: Argument quality. Two ANOVAs were performed to determine the effect of the argument quality manipulation on perceived argument quality on the two issues: the legal age for drinking and the legal age for marriage. Threat, argument quality, and message valence were used as independent variables, and perceived argument quality was used as the dependent variable. The R^2 for the model on the legal age for drinking was 9.2% (adjusted $R^2 = 5.4\%$), and the R^2 for the model on the legal age of marriage was 16.9% (adjusted $R^2 = 13.3\%$). The results indicated that the effect of the argument quality induction was significant, $F(1, 174)$

= 13.47, $p < .001$, for the legal age for drinking, and $F(1, 168) = 21.74$, $p < .001$, for the legal age for marriage. On both issues, the individuals in the low argument quality condition perceived significantly lower argument quality (drinking: $M = 4.59$, $SD = 0.23$, $n = 86$; marriage: $M = 4.21$, $SD = 0.30$, $n = 83$) than those in the high argument quality condition (drinking: $M = 5.79$, $SD = 0.23$, $n = 88$; marriage: $M = 5.71$, $SD = 0.23$, $n = 85$). The effect of the threat manipulation was not significant on the two issues, $F(1, 174) = 1.34$, $p = .25$, for the legal age for drinking; $F(1, 168) = 0.23$, $p = .63$, for the legal age for marriage. The effect of the message valence manipulation was not significant for the legal age for drinking, $F(1, 174) = 1.34$, $p = .25$; however, the effect of the message valence manipulation was significant for the legal age of marriage, $F(1, 174) = 4.55$, $p < .05$. Furthermore, there were no significant interactions between the independent variables.

Based on these results it was concluded that the effect of the argument quality manipulation on perceived argument quality was successful. However, on the legal age for marriage, individuals who received the antipolicy message (versus the propolicy message) perceived higher argument quality. Thus, results should be interpreted with caution.

Discriminant Validity of Mediators

Correlations. For the discriminant validity of anger, negative thoughts, counterarguments, and nonrefutational thoughts, their correlations were examined among those who were asked to indicate their postmessage thoughts (i.e., those in the experimental conditions, $N = 349$). Results showed that anger was slightly correlated with nonrefutational thoughts ($r = .13$, $p < .05$), counterarguments ($r = .21$, $p < .001$), and negative thoughts ($r = .25$, $p < .001$). The correlation between counterarguments and nonrefutational thoughts was not significant ($r = .07$, $p = .18$), whereas the correlation between counterarguments and negative thoughts was

moderate ($r = .65, p < .001$). These results provided some initial evidence for the discriminant validity of these mediators.

Confirmatory factor analysis. For a further examination of the discriminant validity of mediators, a confirmatory factor analysis (CFA) was conducted with R “psych” package (Revelle, 2014). The two-factor model is shown in *Figure 6*. The two latent constructs were anger and negative cognitions and their error terms were allowed to covary. The four measurement items of anger were predicted to load on anger, whereas counterarguments and nonrefutational thoughts were predicted to load on negative cognitions. The error terms of observed variables were not allowed to covary. The maximum likelihood (ML) method was employed for parameter estimation.

Overall, the specified CFA (*Figure 6*) fit the data well, $\chi^2(8, N = 349) = 53.86, p < .01$, SRMR = 0.03, RMSEA = 0.13, and CFI = 0.94. SRMR was smaller than .09 and CFI was close to 0.95, as recommended by Hu and Bentler (1999). The model fit indices suggested that (1) the overall discrepancy between the observed and model-implied covariance matrix was not significant, and (2) the proposed model fit the data better than a baseline null model. But the RMSEA was larger than 0.06, suggesting that the overall discrepancy between the observed and model-implied covariance matrix was not good taking into account the model’s simplicity.

Modification indices were computed for improving the model-data fit. Based on the indices, the error variances of anger item 2 and anger item 4 were allowed to covary (see *Figure 7*). After respecifying the structure, the model parameters were estimated again with ML. The modified model fitted the data very well, $\chi^2(7, N = 349) = 13.50, p > .05$, SRMR = 0.02, RMSEA = .05, and CFI = 0.99. The p value for χ^2 was larger than the critical value of .05, which implied that the model-implied covariance matrix was not significantly different from the

observed covariance matrix. And all model fit indices were desirable considering the recommendations from Hu and Bentler (1999). Because the initial model was nested within the modified model, the χ^2 differences between the two models were computed, $\Delta\chi^2 = 40.36$, $df = 1$, $p < .001$. Thus, the modified model was significantly better than the initial model.

As shown in *Figure 7*, all freely estimated factor loadings on the construct of anger were significant, $p < .001$. Nonrefutational negative cognitions significantly loaded on the construct of negative cognitions, $beta = .20$, $p < .05$ (the factor loading for counterarguments was fixed). The correlation between two latent constructs was $.65$, $p < .01$. Because anger, negative cognitions, counterarguments, and nonrefutational negative thoughts demonstrated good discriminant validity in confirmatory factor analysis, these constructs can be treated as distinct mediators in subsequent statistical analyses.

Coding Proattitudinal versus Counterattitudinal Subgroups

The hypotheses and research questions predicted different boomerang effects for the proattitudinal versus counterattitudinal subgroups. Because participants' prior belief on the policy issues were not manipulated but measured prior to the message exposure, the proattitudinal ($n = 196$) versus counterattitudinal ($n = 149$) subgroups were coded from the experimental conditions. In the proattitudinal communication conditions, participants' prior attitude and manipulated message valence were consistent: (1) Those who opposed the policy received an antipolicy message; (2) those who supported the policy received a propolicy message. But in the counterattitudinal communication conditions, participants' prior attitude and manipulated message valence were inconsistent: (1) Those who opposed the policy received a propolicy message; (2) those who supported the policy received an antipolicy message (see Table 3). This treatment encourages us to observe the boomerang effect on both sides of the

attitudinal continuum for a topic and increases the generalizability of our results.

There were several reasons for the nonrandom assignment treatment of prior belief. First, two real policy issues were employed to increase the external validity of the experiment. As a result, participants had well-established prior beliefs on the issues, especially for the legal age for drinking. It is difficult to manipulate participants' well-established prior beliefs. Second, previous studies measured rather than manipulated prior belief or attitude (Hovland et al., 1957; Kelley & Volkart, 1952; N. Miller, 1965). Last but not least, according to the hypothesized dual path model of boomerang effects, belief strength was related to counterarguing, which might subsequently predict a boomerang effect (see discussion in Chapter 2). Thus, using policy issues that the participants may feel strongly about serves the purpose of the study better than using fake issues. However, using made-up issues for manipulating prior belief allows for random assignment, a significant criterion for inferring causality between prior belief and boomerang effects. More discussion on the advantages and limitations of the nonrandom assignment treatment of prior belief is included in the Discussion chapter.

Hypothesis Testing: Subgroup ANOVAs

H1 predicts that among those who receive a proattitudinal message, those who perceive high threat to their attitudinal freedom, but not those who perceive low threat to their attitudinal freedom (vs. the control participants), would have a boomerang effect. H3 predicted that among those who receive a counterattitudinal message, those who receive low-quality arguments, but not those who receive high-quality arguments (vs. the control participants), would show a boomerang effect. H4 predicted that among those who receive a counterattitudinal message, those whose prior belief is strong, but not those whose prior belief is weak (vs. the control participants), would show a boomerang effect.

Analytical approach. Among those who received a proattitudinal message ($n = 196$), ANOVAs were conducted for testing H1. Among those who received a counterattitudinal message ($n = 149$), ANOVAs were conducted for testing H3 and H4. Subjects' responses in each experimental condition were coded into different groups for testing boomerang effects in the ANOVAs. The coded group variable can be modeled as a fixed factor predicting the dependent variables and used for examining the polynomial contrasts (i.e., the trend of the outcome variable across the ordered levels of the factor variable) in a linear model.

Coding boomerang and nonboomerang groups. The rules and procedures for coding are delineated here: First, with the predictions of boomerang effects from these hypotheses and the operationalization of the boomerang effect, cells where a boomerang was expected were coded into group 1, 2, and 3, and cells where no boomerang was expected were coded into group 4, 5, and 6 (for detecting unexpected boomerang effects). The coded groups 2 and 5 represented the same control cell (2 and 5 were used only for differentiating the recoded boomerang and nonboomerang groups). Second, those in coded group 1 were expected to show a boomerang effect by scoring lower than the control group, and those in coded group 3 were expected to show a boomerang effect by scoring higher than the control group. For example, given a proattitudinal antipolicy message, those in a high attitudinal threat cell would show boomerang effects by liking the current policy more (vs. the control participants), believing in a higher legal drinking age, and having a less favorable attitude toward changing the policy. So these subjects' responses were coded into group 3, 3, and 1, respectively, for the three dependent variables. Applying this rule, all 18 conditions were coded into the six groups for each dependent variable on an issue (see Table 3 and Table 4). Last, the coded group entered the univariate linear model as a fixed factor for comparing the difference of group means, inspecting the direction of

difference, and exploring the linearity of the effects. Because of our directional hypotheses, an ANOVA was judged to be statistically significant when the p value of the test was at least .05 one tailed.

H1: Perceived threat and boomerang. Based on H1, among those who received a proattitudinal message, those who perceived a high threat to their attitudinal freedom (H1a), but not those who perceived a low threat to their attitudinal freedom (H1b), as compared with the control participants for the specific issue, were predicted to exhibit a boomerang effect. With the proattitudinal subgroup ($n = 196$), the coded boomerang groups (1-3) were the fixed factor in the univariate model for testing H1a and the coded nonboomerang groups (4-6) were the fixed factor in the univariate model for testing H1b. The first group represented those who received high-threat arguments and were predicted to have a boomerang effect by scoring lower than the control group; the third group represented those who received high-threat arguments and were predicted to have a boomerang effect by scoring higher than the control group; and the second group was the control group. The fourth group represented those who received low-threat arguments and were predicted to not show a boomerang effect by scoring lower than the control group; the sixth group represented those who received low-threat arguments and were predicted not to have a boomerang effect by scoring higher than the control group; and the fifth and the second group were the same control group (named differently for distinguishing the coded boomerang and nonboomerang groups).

Among those who received the proattitudinal message ($n = 196$), several ANOVAs revealed significant effects of the recoded boomerang factor on five outcome variables (see Table 5), including respondents' belief toward changing the legal age for drinking, $F(2, 116) = 17.58, p < .001, R^2 = .24, \text{adjusted } R^2 = .22$; respondents' belief toward changing the legal age

of marriage, $F(2, 87) = 11.27, p < .001, R^2 = .20$, adjusted $R^2 = .18$; the extent to which respondents liked the current legal age for drinking, $F(2, 116) = 21.22, p < .001, R^2 = .27$, adjusted $R^2 = .26$; the extent to which respondents liked the current legal age of marriage, $F(2, 87) = 16.15, p < .001, R^2 = .26$, adjusted $R^2 = .24$; and the belief position on the legal age of marriage, $F(2, 85) = 21.02, p < .001, R^2 = .32$, adjusted $R^2 = .31$. But the effect of the recoded boomerang groups on the belief position for the drinking age was not significant, $F(2, 116) = 0.86, p = .43$. However, the comparisons of recoded group means suggest persuasion, not boomerang (Table 5). The persuasion effect was stronger for the issue of marriage age (vs. the drinking age). For both issues across three outcome variables, the means of boomerang groups (1-3) were inconsistent with our predictions. For example, on the extent to which the legal drinking age was liked, those who received the antipolicy high-threat message (group 1) showed a boomerang effect ($M = 38.77, SD = 12.15$) by scoring higher than the mean of the control group ($M = 19.89, SD = 16.99$). Similarly, those who received the propolicy high-threat message (group 3) showed a boomerang effect ($M = 12.05, SD = 9.62$) by scoring lower than the mean of the control group ($M = 19.89, SD = 16.99$). In summary, H1a was not supported.

Another six ANOVAs revealed significant effects of the recoded nonboomerang factor on three outcome variables across two topics (see Table 6). Again, comparisons of recoded nonboomerang group means suggested persuasion. For both issues across three outcome variables, the group means were consistent with our predictions (Table 6). Thus, H1b was supported.

H3: Argument quality and boomerang. Based on H3, those who received a counterattitudinal message with low-quality arguments (H3a), but not those who received a counterattitudinal message with high-quality arguments (H3b), as compared with the control

participants for the specific issue, were expected to exhibit a boomerang effect. With the subgroup of respondents who received the counterattitudinal message ($n = 149$), the coded boomerang groups (1-3) were the fixed factor in the univariate model for testing H3a and the recoded nonboomerang groups (4-6) were the fixed factor in the univariate model for testing H3b. The first group represented those who received low-quality arguments and were predicted to have a boomerang effect by scoring lower than the control group (for the specific issue); the third group represented those who received low-quality arguments and were predicted to have a boomerang effect by scoring higher than the control group; and the second group was the control group. The nonboomerang groups were recoded with a similar rule.

The boomerang groups (H3a). Among those who received the counterattitudinal message ($n = 149$), several ANOVAs were conducted for H3a (see Table 7). For the legal drinking age, among those who received a counterattitudinal low quality message, there were significant boomerang effects on all three dependent variables, including their belief toward lowering the drinking age, $F(2, 97) = 6.94, p < .01, R^2 = .13$, adjusted $R^2 = .11$; the extent to which they liked the current legal drinking age, $F(2, 97) = 6.20, p < .01, R^2 = .12$, adjusted $R^2 = .10$; and the belief position on the legal age for drinking, $F(2, 97) = 3.71, p < .05, R^2 = .07$, adjusted $R^2 = .05$. The means of the coded boomerang groups (1-3) were consistent with our predictions on the three outcome variables for drinking age. For example, on attitude (i.e., the extent to which the legal drinking age was liked; see Table 7), those who received propolicy low-quality arguments (group 1) showed a boomerang effect ($M = 13.23, SD = 11.61$) by scoring lower than the mean of the control group ($M = 19.89, SD = 16.99$). Similarly, those who received antipolicy low-quality arguments (group 3) showed a boomerang effect ($M = 33.01, SD = 12.97$) by scoring higher than the mean of the control group ($M = 19.89, SD = 16.99$). Results from

polynomial contrasts suggested an overall linear trend ($p < .01$), but not a quadratic trend ($p > .05$) on all three dependent variables.

For the legal marriage age, among those who received a counterattitudinal low-quality message, there were significant boomerang effects on all three dependent variables, including respondents' belief toward raising the marriage age, $F(2, 87) = 2.40, p < .05$, one tailed, $R^2 = .05$, adjusted $R^2 = .03$; the extent to which the current legal marriage age was liked, $F(2, 87) = 3.43, p < .05, R^2 = .07$, adjusted $R^2 = .05$; and the belief position on the legal age of marriage, $F(2, 85) = 5.03, p < .01, R^2 = .11$, adjusted $R^2 = .09$. The means of recoded boomerang groups (1-3) were consistent with the predictions on the three outcome variables (see Table 7). The results from polynomial contrasts suggested an overall linear trend ($p < .05$, one tailed) rather than a quadratic trend ($p > .05$) on belief and attitude. But a quadratic trend ($p < .01$), rather than a linear trend ($p > .05$), was found for belief position. Overall, the results on belief and attitude for both issues supported H3a.

The nonboomerang groups (H3b). Among those who received the counterattitudinal message ($n = 149$), several ANOVAs were conducted for H3b (see Table 8). Among those who received a counterattitudinal high-quality message, there were significant effects of recoded nonboomerang groups on the extent to which respondents liked the current legal age for drinking, $F(2, 102) = 4.99, p < .01, R^2 = .09$, adjusted $R^2 = .07$; the extent to which respondents liked the current legal age of marriage, $F(2, 89) = 3.93, p < .05, R^2 = .08$, adjusted $R^2 = .06$; and the belief position on the legal age of marriage, $F(2, 87) = 5.38, p < .01, R^2 = .11$, adjusted $R^2 = .09$ (see Table 8). The comparisons of recoded nonboomerang group means suggested unexpected boomerang effects. Results from the polynomial contrasts suggested linear trends for the extent to which respondents liked the current legal age for each issue ($p < .01$). Thus, H3b was not

supported.

H4: Belief strength and boomerang. Based on H4, among those who received a counterattitudinal message, those whose prior belief was strong (H4a), but not those whose prior belief was weak (H4b), as compared with the mean of control participants for the specific issue, were expected to exhibit a boomerang effect. As belief strength was measured rather than manipulated, we categorized the subjects' response on premessage belief strength into high (strong prior belief) and low (weak prior belief) based on a median split. The medians were 100 for legal drinking age and 80 for legal marriage age. With the subgroup of respondents who received the counterattitudinal message ($n = 149$), we recoded the three boomerang groups (1-3) and the three nonboomerang groups (4-6). The first group represented those with a strong prior belief and were predicted to have a boomerang effect by scoring lower than the control group; the third group represented those with a strong prior belief and were predicted to have a boomerang effect by scoring higher than the control group; and the second group was the control group. The nonboomerang groups were recoded with a similar rule.

Among those who received the counterattitudinal message ($n = 149$), six ANOVAs were conducted for H4a (see Table 9). For the legal drinking age, there were significant linear effects of the boomerang groups on respondents' belief toward lowering the drinking age, $F(2, 91) = 12.63, p < .01, R^2 = .22$, adjusted $R^2 = .21$, the extent to which respondents liked the current legal drinking age, $F(2, 91) = 15.40, p < .01, R^2 = .26$, adjusted $R^2 = .24$, and the belief position on the legal age for drinking, $F(2, 91) = 2.58, p < .05$, one tailed, $R^2 = .06$, adjusted $R^2 = .03$. Similarly, for the legal marriage age, there were significant linear effects of recoded boomerang groups on the extent to which respondents liked the current legal marriage age, $F(2, 87) = 5.38, p < .01, R^2 = .11$, adjusted $R^2 = .09$, and the belief position on the legal marriage age, $F(2, 85) =$

7.59, $p < .01$, $R^2 = .16$, adjusted $R^2 = .14$. But the effect of the recoded boomerang groups on respondents' belief toward raising the marriage age was not significant, $F(2, 87) = 0.63$, $p = .54$. As expected, the means of recoded boomerang group on the outcome variables were consistent with the predicted group means. For example, on attitude (i.e., the extent to which the legal drinking age was liked; see Table 9), those with a strong prior belief who received a propolicy message (group 1) showed a boomerang effect ($M = 10.47$, $SD = 13.47$) by scoring lower than the mean of the control group ($M = 19.89$, $SD = 16.99$). Similarly, those with strong prior belief who received an antipolicy message (group 3) showed a boomerang effect ($M = 44.13$, $SD = 11.12$) by scoring higher than the mean of the control group ($M = 19.89$, $SD = 16.99$). Results from polynomial contrasts suggested an overall linear trend ($p < .05$) on all three dependent variables. Therefore, H4a was supported.

Several ANOVAs with the nonboomerang groups as the fixed factor were conducted for testing H4b (see Table 10). Overall, there was no significant effect of the recoded nonboomerang groups on the dependent variables for the two issues, as predicted by H4b. Results from polynomial contrasts did not suggest any linear or quadratic trend. H4b was supported.

Auxiliary interaction tests. Several interactions in the linear models were conducted as auxiliary tests for the effects of perceived threat and argument quality on the boomerang effects in the proattitudinal and counterattitudinal subgroups, respectively. In these models, the fixed factors were the predicted interaction effects and the dependent variables were belief and attitude boomerang, which were computed from the difference between the mean of control subjects and an individual score on belief and attitude (see the section on computing individual boomerang scores). Overall, the results (see Table II in Appendix I) supported the interactions between subgroup and argument quality on drinking age for belief boomerang, $F(1, 174) = 7.60$, $p < .01$,

$R^2 = .41$, adjusted $R^2 = .40$, and for belief position boomerang, $F(1, 174) = 6.17$, $p < .05$, $R^2 = .40$, adjusted $R^2 = .38$. For example, Figure I1 showed that for subjects in the counterattitudinal subgroup, those receiving low-quality arguments had larger belief boomerang ($M = 4.54$, $SE = 0.94$) than those receiving high-quality arguments ($M = 2.23$, $SE = 0.88$). These results were consistent with the previous subgroup ANOVAs.

Exploratory post hoc tests. To explore a boomerang effect in a specific experimental condition, a series of post hoc t tests were conducted for comparing the difference of the mean of an experimental condition and the mean of the control participants for the specific issue (see Tables G1-G6 in Appendix G). Overall, the results solidified the analysis of variance results: Boomerang effects were observed across topics and across outcome variables. And in the experimental condition of low argument quality, there was consistently a boomerang effect regardless of any other condition. Tables H1-H3 in Appendix H show the number of subjects who had a boomerang effect in each message condition.

Summary. Overall, the results supported H3 and H4. Given the counterattitudinal message, those who received low-quality arguments or had a strong prior belief, as compared with the control participants, exhibited boomerang effects. But those who received high-quality arguments or had weak prior belief, as compared with the control participants, did not exhibit any boomerang effect. But H1 was only partially supported. Given the proattitudinal message, those who received either the high-threat message or the low-threat message did not show any boomerang effect. In the following section, several structural equation models were tested to examine the mediators for the two types of boomerang effects.

Hypothesis Testing: Subgroup Structural Equation Modeling

H2 predicted that given proattitudinal communication, there were indirect effects of both

perceived attitudinal threat and trait reactance on the boomerang effect through anger and negative cognitions. H5 predicted that given the counterattitudinal communication, there was an indirect effect of argument quality on a boomerang effect through counterarguing. In addition, RQ1 asked whether anger (vs. negative cognitions) was the dominant process of a boomerang effect given proattitudinal communication. RQ2 asked whether counterarguing (vs. anger) was the dominant process of a boomerang effect given counterattitudinal communication.

A boomerang effect was coded at the individual level for the structural equation models. The three boomerang variables were created to measure the boomerang effects on respondents' (1) belief on changing the policy (i.e., the extent to which the policy should be changed), (2) belief position on the policy, and (3) attitude toward the current policy (i.e., how much they liked the policy).

Computing individual boomerang scores. Boomerang effects were indirectly determined by the advocated message position and the control group mean. A set of decision rules was established for coding the boomerang variables. Consider the example of coding belief boomerang for drinking age. For an antipolicy message on drinking age, an individual's boomerang score was computed by subtracting the mean of control participants on drinking age from the person's score on belief toward changing the current policy. For a propolicy message on drinking age, an individual's boomerang score was computed by subtracting the person's score on belief toward changing the current policy from the mean of control participants on drinking age. A positive boomerang score indicates that the individual had a boomerang effect, and the value of the score indicates the magnitude of the boomerang effect. Similar coding rules were applied to code belief position and attitude boomerang. For coding efficiency, several for-loops were programmed on R to apply the decision rules and generate the three boomerang variables

(see Appendix F for the R code).

Examining the indirect effects. Based on the hypotheses and research questions, two separate structural equation models were constructed for the proattitudinal (Table 8) and counterattitudinal (Table 9) subgroups. The significance of the hypothesized indirect effects in H2 (see Table 8) and H5 (see Table 9) were tested through the R “Lavaan” package (Rosseel, 2011). For example, in Table 8, the indirect effect of perceived threat on the belief boomerang through anger in H2 can be examined by testing the significance of the product of the path coefficient linking perceived threat and anger (a1) and the path coefficient linking anger and belief boomerang (b1). Because attitude is a summative function of salient beliefs (Ajzen & Fishbein, 1980), attitude boomerang is modeled as an outcome of belief boomerang and belief position boomerang. Similarly, the indirect effect of perceived threat on belief position boomerang through anger can be examined by testing the significance of the product of the path coefficient linking perceived threat and anger (a1) and the path coefficient linking anger and belief position boomerang (b3). A similar technique was employed for testing indirect effects in H2 and H5 (see Table 9). Because these hypotheses were directional, the significance of the estimated predictor and indirect effects was judged to be statistically significant when the *p* value was less than .05 one tailed.

H2: Mediators given a proattitudinal message. H2a predicted an indirect effect of perceived threat on a boomerang effect through anger and negative cognitions given a proattitudinal message. H2b predicted an indirect effect of trait reactance on a boomerang effect through anger and negative cognitions given a proattitudinal message.

Among those who received a proattitudinal message, a structural equation model (SEM) was constructed for testing H2. Table 8 provides the model of the hypothesized indirect effects.

The summary statistics and correlation matrix of the variables in the proattitudinal SEM are included in Table 11. Specifically, the endogenous variables were belief boomerang, belief position boomerang, and attitude boomerang. Attitude boomerang was modeled as an outcome of belief and belief position boomerang (see *Figure 8*). The mediators were anger and negative cognitions. The error terms of two mediators and two belief boomerang variables were set to covary, respectively. In addition, the exogenous variables were (1) perceived threat to attitudinal freedom and trait reactance, and (2) control variables, including issue type, prior belief strength, and perceived competence to exercise belief freedom. Control variables were used for predicting both the mediators and endogenous variables but were not shown in *Figure 8* for simplicity.

In the specified structural equation model, the variables measured by a single item were specified as observed variables. Only anger was assessed by multiple items (Cronbach's alpha = .92). To adjust for the measurement error of anger, anger was treated as a latent variable with one indicator (i.e., the averaged composite) and the error term of the indicator fixed at $(1 - \alpha)$ times the indicator's variance (Bollen, 1989). With an inspection of the missing data (6 data entries), the values appeared to be missing at random (MAR). Thus, the missing data were treated with the full information maximum likelihood (FIML, Enders & Bandalos, 2001).

The sample size ($N = 196$) was sufficient for the specified SEM. Bentler and Chou (1987) suggested a ratio of at least 5 participants to each free parameter estimated within the model. The proattitudinal SEM had 39 parameters to be estimated, suggesting a minimum sample size of 195. Nunnally (1967) suggested a minimum of 10 cases per variable. The proattitudinal SEM had 10 variables, suggesting a minimum sample size of 100. And a sample size of 150 for SEM has been recommended by SEM analysts, including Anderson and Gerbing (1988) and Holbert and Stephenson (2002). Parameters were estimated by maximum likelihood.

The overall model-data fit was good, $\chi^2(6, N = 196) = 5.13, p > .05$, SRMR = 0.017, RMSEA = .00, and CFI = 1.00. The p value for χ^2 was larger than the critical value of .05, which implied that the model-implied covariance matrix was not significantly different from the observed covariance matrix. The SRMR was less than .09 and RMSEA was less than .06, consistent with recommendations by Hu and Bentler (1999). This suggests that the overall discrepancy between the observed and model-implied covariance matrix was not significant, with or without considerations of simplicity. The incremental fit index, CFI, was larger than .96. This suggested that the proposed model fit the data better compared to the baseline null model. In the model, the variance explained by the exogenous variables was .196, .060, and .243, respectively, for belief boomerang, belief position boomerang, and attitude boomerang; the variance explained by the exogenous variables was .132 and .079 for anger and negative cognitions, respectively.

In Table 14, the solid lines indicate significant path coefficients whereas dashed lines indicate nonsignificant path coefficients. From Table 14, we can see that there were no significant indirect effects of perceived threat on the boomerang variables through anger or negative cognitions. The results did not support H2a. However, there was a significant indirect effect of trait reactance on the belief boomerang through anger, standardized indirect effect = .04, $SE = 1.88, z = 1.60, p < .05$, one-tailed test. As shown in *Figure 11*, trait reactance caused anger ($beta = .36, SE = 0.05, z = 5.00, p < .001$), which subsequently predicted a boomerang on respondents' belief regarding changing the current policy ($beta = .11, SE = 6.54, z = 1.69, p < .05$, one-tailed test). Thus, H2b was partially supported: Anger, but not negative cognitions, mediated the effect of trait reactance on the boomerang effect.

H5: Mediators given a counterattitudinal message. H5 predicted an indirect effect of

argument quality on a boomerang effect through the number of counterarguments given a counterattitudinal message. Among those who received a counterattitudinal message, an SEM (*Figure 9*) tested H5. *Figure 9* models the hypothesized indirect effects. The summary statistics and correlation matrix for the variables in the model are reported in Table 12. Specifically, the endogenous variables were belief boomerang, belief position boomerang, and attitude boomerang. Attitude boomerang was an outcome of belief and belief position boomerang (see *Figure 9*). The mediators were counterarguments and anger. The error terms of two mediators and two belief boomerang variables were set to covary, respectively. The exogenous variables were (1) argument quality, and (2) control variables, including issue type and prior belief strength. All the variables except for anger were specified as observed variables in the model. The control variables were used for predicting both the mediators and the endogenous boomerang variables but were not shown in *Figure 9* for simplicity. The sample size ($N = 149$) was sufficient for the model specified (*Figure 9*). Bentler and Chou (1987) suggested a ratio of at least 5 participants to each free parameter estimated within the model. The counterattitudinal SEM had 28 parameters to be estimated, suggesting a minimum sample size of 140.

The overall model-data fit was good, $\chi^2(7, N = 149) = 8.47, p > .05$, SRMR = 0.03, RMSEA = .04, and CFI = 0.97. Overall, the model fit indices suggested that the overall discrepancy between the observed and model-implied covariance matrix was not significant, recommended by Hu and Bentler (1999). The SRMR was less than .09 and RMSEA was less than .06, consistent with recommendations by Hu and Bentler (1999). This suggests that the overall discrepancy between the observed and model-implied covariance matrix was not significant, with or without considerations of simplicity. The CFI was close to but smaller than 0.96, suggesting that the model did not fit the data better than the null model. In the model, the

variance explained by the exogenous variables was .032, .125, and .074 for belief boomerang, belief position boomerang, and attitude boomerang, respectively; and variance explained by the exogenous variables was .164 and .015 for counterarguments and anger, respectively.

In Figure 12, the solid lines indicate significant path coefficients whereas dashed lines indicate nonsignificant path coefficients. As shown in Table 15, counterarguments were a significant mediator for the indirect effect from argument quality to the belief position boomerang (standardized indirect effect = $-.09$, $SE = 0.10$, $z = -2.62$, $p < .01$). Specifically, argument quality caused generation of counterarguments ($beta = -.31$, $SE = 0.180$, $z = -4.14$, $p < .001$), which subsequently predicted belief position boomerang ($beta = .27$, $SE = 0.11$, $z = 3.39$, $p < .001$; see Figure 12). But the indirect effect from argument quality to belief boomerang through counterarguments was not significant, standardized indirect effect = $-.01$, $SE = 3.49$, $z = -0.36$, $p = .72$. Only the belief position boomerang ($beta = .13$, $SE = 1.92$, $z = 1.61$, $p < .05$, one-tailed test), but not belief boomerang ($beta = .09$, $SE = 0.05$, $z = 1.08$, $p = .28$), predicted attitude boomerang. Therefore, H5 was partially supported.

Relative dominance of mediators (RQ1 & RQ2). RQ1 asked whether anger (vs. negative cognitions) was the dominant mediator of a boomerang effect given a proattitudinal message. RQ2 asked whether counterarguing (vs. anger) was the dominant mediator of a boomerang effect given a counterattitudinal communication. A dominant mediator was operationalized to carry a significant and larger indirect effect (i.e., all the indirect effects traveling through the mediator from the exogenous variables to the endogenous variables in the path model), as compared with the alternative mediator(s). The magnitude of indirect effects in H2 (Figure 8) and H5 (Figure 9) were examined to answer RQ1 and RQ2, respectively.

The aforementioned results on the structural equation models answered both research

questions. Regarding RQ1, given a proattitudinal message (Table 14), the indirect effect between trait reactance and belief boomerang through anger (standardized indirect effect = .04, $SE = 1.88$, $z = 1.60$, $p < .05$, one-tailed test) was larger than through negative cognitions (standardized indirect effect = -.01, $SE = 0.67$, $z = -1.00$, $p = .32$). But the difference was not statistically significant. Thus, anger (vs. negative cognitions) was the dominant mediator for the influence of trait reactance on belief boomerang given a proattitudinal message. Regarding RQ2, given a counterattitudinal message (Table 15), the indirect effect of argument quality on belief position boomerang through counterarguments (standardized indirect effect = -.09, $SE = 0.10$, $z = -2.62$, $p < .01$) was larger than through anger (standardized indirect effect = -.01, $SE = 0.04$, $z = -1.00$, $p = .32$). But the difference was not statistically significant. In conclusion, counterarguments (vs. anger) were the dominant mediator for the influence of argument quality on the boomerang effect given a counterattitudinal message.

Hypothesis Testing: SEM Integrating Proattitudinal and Counterattitudinal Subgroups

H6 predicted that there were indirect effects of both perceived threat (H6a) and trait reactance (H6b) on the boomerang effect through nonrefutational thoughts, and H7 predicted that there were indirect effects of argument quality on the boomerang effect through both counterarguing (H7a) and nonrefutational thoughts (H7b).

Analytical strategy. With all the subjects who received a message ($N = 345$), an SEM integrating the proattitudinal and counterattitudinal subgroups was examined. Those in the two control conditions were not included because they did not receive a message and were not asked to list any message-related thoughts. The integrated model tested the predicted indirect effects in H6 and H7 and provided additional tests for H2 and H5. For example, anger was included as a mediator for further validating the indirect effect of trait reactance on the boomerang effect

through anger in H2. Figure 10 provides a representation of the hypothesized indirect effects.

In the model, the endogenous variables are belief boomerang, belief position boomerang, and attitude boomerang. Attitude boomerang was an outcome of belief and belief position boomerang. The mediators were counterarguments, nonrefutational thoughts, and anger. The error terms of three mediators and two belief boomerang variables were allowed to covary, respectively. In addition, the exogenous variables were (1) argument quality, perceived threat, and trait reactance, and (2) control variables, including issue type, subgroup (i.e., proattitudinal versus counterattitudinal message), belief strength, and perceived competence to exercise belief freedom. Control variables were used for predicting both the mediators and endogenous variables but were not shown in Figure 10 for simplicity. All the variables except for anger were specified as observed variables in the model. The summary statistics and correlation matrix of all variables are reported in Table 13. With an inspection of the missing data (6 data entries), the values appeared to be missing at random (MAR). Thus, the missing data were treated with FIML.

H6 and H7: Differentiating counterarguments and nonrefutational thoughts. As shown in *Figure 13*, the overall model-data fit was good, $\chi^2(17, N = 345) = 17.64, p > .05$, SRMR = 0.02, RMSEA = .01, and CFI = 1.00. The variance explained by the exogenous variables was .113, .384, and .180 for the belief boomerang, belief position boomerang, and attitude boomerang, respectively; and the variance explained were .093, .074, and .158 for counterarguments, nonrefutational thoughts, and anger, respectively.

Nonrefutational thoughts were not a significant mediator for the indirect effects of perceived threat on belief boomerang (standardized indirect effect = .01, $SE = 1.04, z = 1.38, p = .17$) or belief position boomerang (standardized indirect effect = .01, $SE = 0.02, z = 1.10, p = .27$). Similarly, nonrefutational thoughts were not a significant mediator for the indirect effects

of trait reactance on belief boomerang (standardized indirect effect = .01, $SE = 0.51$, $z = 1.44$, $p = .15$) or belief position boomerang (standardized indirect effect = .01, $SE = 0.01$, $z = 1.01$, $p = .31$). Thus, H6a and H6b were rejected.

In Table 16, the indirect effect of argument quality on belief boomerang through counterarguments were significant, standardized indirect effect = - .03, $SE = 1.84$, $z = -2.44$, $p < .05$. Similarly, the indirect effect of argument quality on belief position boomerang through counterarguments were also significant, standardized indirect effect = - .02, $SE = 0.03$, $z = -2.17$, $p < .05$. In Figure 13, the solid lines indicate significant path coefficients whereas dashed lines indicate nonsignificant path coefficients. As shown in Figure 13, we can see that argument quality predicted counterarguments ($beta = -.18$, $SE = 0.11$, $z = -3.42$, $p < .001$), which subsequently predicted belief boomerang ($beta = 0.17$, $SE = 3.61$, $z = 3.41$, $p < .001$) and belief position boomerang ($beta = 0.11$, $SE = 0.08$, $z = 2.57$, $p < .01$). And both belief boomerang ($beta = 0.29$, $SE = 0.04$, $z = 4.47$, $p < .001$) and belief position boomerang ($beta = 0.25$, $SE = 1.41$, $z = 3.84$, $p < .001$) significantly predicted attitude boomerang. But there were no significant indirect effects of argument quality on belief boomerang (standardized indirect effect = -.02, $SE = 1.93$, $z = -1.51$, $p = .13$) or belief position boomerang (standardized indirect effect = -.01, $SE = 0.03$, $z = -1.19$, $p = .24$) through nonrefutational thoughts. Thus, H7 was partially supported: Only counterarguments (H7a), rather than nonrefutational thoughts (H7b), mediated the indirect effect between argument quality and the boomerang effect.

Furthermore, as shown in Table 16, there were significant indirect effects of trait reactance on the belief boomerang (standardized indirect effect = 0.04, $SE = 1.29$, $z = 2.15$, $p < .05$) and belief position boomerang (standardized indirect effect = 0.03, $SE = 0.03$, $z = 2.07$, $p < .05$) through anger. The results provided additional evidence for H2.

Summary

Overall, the results from SEMs provided support for H2, H5, and H7, but not H6. Given a proattitudinal message, anger mediated the indirect effect between trait reactance and the boomerang effect on belief and belief position; given a counterattitudinal message, counterarguments mediated the indirect effect between argument quality and the boomerang effect on belief and belief position. Nonrefutational thoughts did not explain any mechanism of a boomerang effect. Additionally, these results provided predictive validity for counterarguments, nonrefutational thoughts, and anger. Counterarguments and nonrefutational thoughts appear to be different types of negative cognitions.

Chapter 5: Discussion

This dissertation examined and differentiated two types of boomerang effects: a boomerang effect under a proattitudinal message and a boomerang effect under a counterattitudinal message. By employing a 2 (Message valence: antipolicy vs. propolicy) \times 2 (Issues: legal age for drinking vs. legal age of marriage) \times 2 (Threat to freedom: low threat vs. high threat) \times 2 (Argument quality: low quality vs. high quality) plus 2 (Control groups: no-message control for the two issues) factorial design (18 conditions total), antecedents and mediators that bring about the two types of boomerang effect were examined. The dissertation is among the first studies to systematically examine the mechanisms underlying boomerang effects given different types of messages.

First, a boomerang effect was observed on belief and attitude given either a proattitudinal or counterattitudinal message with distinct message characteristics. Under a counterattitudinal message, both argument quality and prior belief strength predicted a boomerang effect: Those receiving a low-quality argument or those who had a stronger prior belief, as compared with the control group for the specific issue, exhibited a boomerang effect. Under a proattitudinal message, perceived threat to attitudinal freedom unexpectedly did not predict a boomerang effect. The findings were consistent regardless of issue (i.e., the drinking age vs. the marriage age) and the message advocated position (i.e., propolicy vs. antipolicy), suggesting some generalizability of the results. There has been controversy on the existence and measurement of a boomerang effect (e.g., Cho & Salomon, 2007; Pechmann & Slater, 2005), and there have been few efforts theorizing or examining the mechanism of a boomerang effect (Byrne & Hart, 2009). This dissertation contributes to persuasion research by showing that a boomerang effect occurs in a predictable manner and can be measured. The results expand the theoretical scope of

persuasion research emphasizing message effectiveness and reveal new research opportunities. For example, given the direct effect of prior belief strength on the boomerang effect, more research should be conducted on persuasive appeals that mitigate the cognitive or affective process resulting in the boomerang effect among those with a strong belief for a specific issue (e.g., social norm appeal; see Schultz et al., 2007).

Second, the results support the idea that there are two types of boomerang effects with different mediators and antecedents. Specifically, counterarguments (vs. anger) were found to be the dominant mediator for the effect of argument quality on a boomerang effect given a counterattitudinal message, whereas anger (vs. negative cognitions) was the dominant mediator for the effect of trait reactance on a boomerang effect given a proattitudinal message. These findings provide evidence for the dual path boomerang framework and advance research on persuasion and attitude change by separating the cognitive and affective mechanisms for the boomerang effects: There was predominantly a cognitive process for a boomerang effect given a counterattitudinal message and predominantly an affective process for a boomerang effect given a proattitudinal message.

Last, this dissertation refines the construct of negative cognitions and integrates the two long-standing lines of research on the theory of reactance (e.g., S. Brehm & Brehm, 1981) and the cognitive response perspective (e.g., Petty & Cacioppo, 1984). The results support two types of negative cognitions: Counterarguments and nonrefutational thoughts. Counterarguments and nonrefutational thoughts were caused by different sets of antecedents and had different boomerang outcomes. It was found that counterarguments (vs. nonrefutational thoughts) mediated the relationship between argument quality and the boomerang effect. But perceived

threat and trait reactance caused only nonrefutational thoughts, which did not predict the boomerang effect. These results are discussed below.

H1 tested the prediction of a boomerang effect given a proattitudinal message based on psychological reactance theory (e.g., S. Brehm & Brehm, 1981). The result did not confirm a boomerang effect caused by a high threat to attitudinal freedom for both the issues, which is inconsistent with previous reactance studies that observed a boomerang effect caused by a high threat induction (Bessarabova et al., 2013; Wicklund, 1974; Worchel & Brehm, 1970). Instead of questioning the theoretical association between perceived threat and a boomerang effect, our unexpected result is more likely to be explained by the multiple manipulations in the experiment. In previous studies on reactance, only perceived threat, rather than other message features, was manipulated. In this study, the manipulation of perceived threat to attitudinal freedom was placed at the end of an essay in a single paragraph and conveyed by more general (vs. issue-specific) arguments (i.e., *you have no choice but to agree with the reasons*). The purpose of the manipulation was to ensure that the manipulation of perceived threat did not interfere with that of argument quality. This procedure was recommended by Silvia (2006), who found that respondents generated counterarguments toward a message (regardless of the argument quality) when the perceived threat manipulation was placed at the beginning of the message. Thus, it is possible that respondents only perceived threat to their general attitudinal freedom (as supported by the successful manipulation check on perceived threat) but not to their issue-specific attitudinal freedom. Respondents may fail to link their issue-specific belief and attitude with the attitudinal freedom threat and subsequently do not experience any boomerang effect on an issue-related belief and attitude.

Another possible explanation for the nonsignificant relationship between perceived threat and a boomerang effect is the relative length of the two manipulations. The manipulation of argument quality used three to four paragraphs, but the manipulation of perceived threat to attitudinal freedom only had one paragraph. Although the manipulation checks for both perceived threat and argument quality were significant, the effect of argument quality might cause a discounting of the effect of perceived threat, because respondents may have paid greater attention to the argument quality induction. Furthermore, the finding for H2 that trait reactance had a significant effect on a boomerang through anger supports the role of reactance in the boomerang process under proattitudinal communication, because anger constitutes the dominant indicator of reactance (Bessarabova et al., 2013; Quick & Kim, 2009; Rains & Tuner, 2007). Therefore, the nonsignificant relationship between perceived threat and the boomerang effect may be attributed to our treatment of multiple manipulations rather than to the lack of the theoretical link between reactance and a boomerang effect.

H3 predicted a boomerang effect given a counterattitudinal message, based on the cognitive response perspective (e.g., Petty & Cacioppo, 1984). Argument quality was found to predict the boomerang effect on belief and attitude across issue types, message valence, and perceived threat, given a counterattitudinal message. This finding provides little support for the cognitive response perspective, which suggests that argument quality should interact with issue involvement to influence message receivers' attitude (e.g., B. Johnson et al., 2004; Petty et al., 1981). For the two issues employed in the main experiment, participants apparently perceived the legal age for drinking (vs. the legal age of marriage) more important and involving, as suggested by summary statistics in multiple pilot studies and the main experiment. But a boomerang occurred for both issues. This was consistent with Park and her colleagues' (2007)

finding that low-quality arguments (as compared to high-quality arguments) are sufficient to yield a boomerang effect regardless of the level of ego-involvement, message involvement, or message type. Furthermore, previous studies (e.g., Neimeyer et al., 1991) found that low-quality arguments were associated with reduced persuasion (i.e., low-quality arguments are less persuasive than strong arguments) but not with a boomerang effect (i.e., those who receive low-quality arguments have a boomerang effect as compared with their prior belief or a control group). One reason for such a finding may be the lack of a measure of the boomerang effect in previous studies. Our finding that a low-quality argument was associated with a boomerang effect emphasized the detrimental effect of weak arguments in persuasion.

H4 predicted a boomerang effect caused by prior belief strength given a counterattitudinal message. Consistent with predictions based on motivated reasoning theory (Hart & Nisbet, 2011; Redlawsk, 2006), biased assimilation theory (Lord et al., 1979), and cognitive dissonance theory (Cohen, 1962), prior belief strength was also found to predict a boomerang effect given a counterattitudinal message under all experimental conditions (i.e., for both issue types, both advocated positions, and both levels of argument quality). This finding was consistent with previous studies that indirectly observed the potential effect of belief and attitude strength on a boomerang effect (Hovland et al., 1957; Kelley & Volkart, 1952; N. Miller, 1965). One argument based on biased assimilation theory and motivated reasoning theory is that given a counterattitudinal message, strong belief or attitude holders may perceive argument quality in a biased manner. Therefore, those with strong prior belief may perceive lower argument quality, generate more counterarguments, and have a boomerang effect. The finding that prior belief strength was a significant and positive predictor of a boomerang effect strengthened support for this line of reasoning.

H2 and H5 tested the mediators for the two types of boomerang effects; RQ1 and RQ2 tried to separate the two processes by assessing the relative dominance of the mediators. It was expected that reactance, a combination of anger and negative thoughts, could explain the boomerang effect given a proattitudinal message (Dillard & Shen, 2005; Rains & Turner, 2007) and anger was expected to be the dominant mediator (Bessarabova et al., 2013; Quick & Kim, 2009; Rains & Tuner, 2007). On the other hand, counterarguments, as compared with anger, could explain the boomerang effect given a counterattitudinal message (B. Johnson, et al., 2004). The results from three SEMs confirmed our hypotheses. Among the proattitudinal message subjects, anger (vs. negative cognitions) mediated the influence of trait reactance on belief boomerang, a boomerang on the belief toward changing the current policy, for both issues. However, among the counterattitudinal message subjects, counterarguments (vs. anger) mediated the influence of argument quality on belief position boomerang for both issues. In addition, results from the SEM integrating the proattitudinal and counterattitudinal subgroups provided additional evidence for the dual path boomerang framework. Among those who received a message, anger mediated the effect of trait reactance on the belief boomerang and the belief position boomerang, whereas counterarguments mediated the effect of argument quality on the belief boomerang and the belief position boomerang. And respondents' attitude boomerang was predicted by their belief and belief position boomerang.

These findings support the dual path framework by empirically differentiating the antecedents and mediators for the two mechanisms underlying boomerang effects. The boomerang effect under a proattitudinal message is predominantly an affective process driven by psychological reactance; the boomerang effect under a counterattitudinal message is predominantly a cognitive process driven by the generation of counterarguments. Thus, this

study advances the research on both reactance and cognitive responses by integrating the two mechanisms in a dual-path framework. In addition, this study advances the research on attitude change by redefining the boomerang effect (originally defined by its outcome) into a reactance boomerang and a counterarguing boomerang (defined by its processes). Last, the results that subjects' attitude boomerang was predicted by their belief or belief position boomerang extended the scope of theory of reasoned action (Ajzen & Fishbein, 1980) and summative model of attitude (Fishbein, 1967).

Last, H6 and H7 were proposed to differentiate two types of negative thoughts by examining their antecedents and outcomes. Synthesizing the literature on cognition and attitude change (Brock, 1967; Jacks & Cameron, 2003; Osterhouse & Brock, 1970; Wright, 1986), negative thoughts were categorized into two types: counterarguments and nonrefutational thoughts. By counterarguing, one directly refutes or attacks one or more arguments in a message (Brock, 1967); by generating nonrefutational thoughts, one does not directly refute the communication (Cameron et al., 2002). Instead, one may generate thoughts favorable toward one's prior attitude (attitude bolstering) or insult the communication or communicator (derogation). By identifying the specific type of negative thoughts underlying reactance, this study furthers reactance research. Among those who received a message, both perceived threat to attitudinal freedom and trait reactance were found to predict the generation of nonrefutational thoughts (vs. counterarguments). But nonrefutational thoughts did not mediate the effect of trait reactance on belief or belief position boomerang. On the other hand, argument quality predicted the generation of counterarguments (vs. nonrefutational thoughts), which subsequently predicted the belief boomerang and the belief position boomerang. Therefore, this study advances cognitive response research by demonstrating counterarguing as the direct cause of one type of a

boomerang effect. But it is doubtful whether nonrefutational thoughts may cause a boomerang. In the main experiment, there was no relationship between perceived threat and a boomerang effect, perhaps because perceived threat was manipulated and placed at the end of the message. If the relationship between perceived threat and a boomerang effect was observed in our experiment as was found in previous studies (e.g., Dillard & Shen, 2005; Rains & Turner, 2007), nonrefutational thoughts may be the mediator between the effect of perceived threat and a boomerang effect.

In summary, this dissertation provided evidence that a boomerang effect can be predicted by manipulating message features and measuring individual traits. Based on the results supportive of differentiating the antecedents and mediators of the boomerang effect, the concept of the boomerang effect needs to be redefined. There is a reactance boomerang effect (given a proattitudinal message) and counterarguing boomerang effect (given a counterattitudinal message). Most research efforts in attitude change center on message effectiveness and persuasive appeals. And most research on a boomerang effect do so from a reactance standpoint. This dissertation redefines the phenomenon of a boomerang, establishes a theoretical framework for the boomerang, and empirically examined the antecedents and mediators for the two types of boomerang effects. This study is a starting point for research on the two types of boomerang effect. For example, more research should be conducted on the persuasive appeals for mitigating the cognitive or affective process resulting in the boomerang effect. In addition, among those who are more prone to boomerang on certain issues, the boomerang can be employed as an innovative persuasive appeal. More implications are discussed below.

Implications

Theoretical implications. This dissertation has several theoretical implications for future directions. First, given the two types of boomerang effects observed in this study, future studies should explore additional antecedents that bring about boomerang effects. The variance of the boomerang effect explained by the antecedents in the main experiment was not large, suggesting that there may be other important predictors. For example, misperceived norms may be a predictor of the boomerang effect, particularly in health promotion campaigns among teenagers (Fortier, 2011; Hornik et al., 2008). The relationship between misperceived norms and the boomerang effect is still unclear. Future studies should examine whether an affective or a cognitive mechanism accounts for a boomerang effect caused by misperceived norms. Additionally, it is likely that there are different moderators for the reactance boomerang and the counterarguing boomerang. By establishing boundary conditions for the two boomerang effects, we will generate greater understanding regarding the groups of people who are prone to a boomerang effect given a certain issue.

Second, the long-term consequence of a boomerang effect should be another important topic. Researchers who examined the nationwide anti-marijuana campaign sponsored by the Partnership for Drug-Free Kids (PDFA) found a lagged boomerang effect for anti-marijuana public service announcements: Youth with more exposure to the antidrug message in the previous year had less intention to avoid drug use and weaker antidrug social norms in the subsequent year (Hornik et al., 2008). Thus, the boomerang effect may grow stronger over time. However, it is unknown whether the reactance boomerang and the counterarguing boomerang have different long-term consequences. It seems that the reactance boomerang, given a freedom threatening proattitudinal message, dissipates quickly in a laboratory (Bessarabova et al., 2013).

But the decay of a boomerang may be much slower or even become stronger outside the laboratory because of other factors, such as information seeking or interpersonal communication (Hornik, 2006). If so, there may be both short-term and long-term consequences of a boomerang effect in strategic communication campaigns. More research should be conducted to examine the time course of a boomerang.

Third, more research should examine the two types of boomerang effects with regard to the structure and dynamics of beliefs and attitudes (Dinauer & Fink, 2005). How an antecedent affects a concept related to the focal concept (i.e., the issue in the message) may be different based on the two types of boomerang effects. Bessarabova et al. (2013) found that high-threat induction resulted in persuasion on a related concept but a boomerang on the focal concept given a proattitudinal message. Perhaps the reactance boomerang caused by perceived threat through anger does not motivate individuals to change the cognitive configuration in their belief and attitude space. However, it seems plausible that a cognitive boomerang caused by counterarguments may force individuals to adjust their belief and attitude structure. Thus, people experiencing a cognitive boomerang may exhibit the boomerang effect on both a focal concept (i.e., the issue in the message) and a related concept.

A related important question is the relationship between a belief or attitude boomerang and a behavioral boomerang: Does a belief or attitude boomerang predict a behavioral boomerang in a positive or negative manner? It is possible that a belief boomerang is negatively associated with a behavioral boomerang given a reactance boomerang, because the individual has restored the attitudinal freedom through the belief boomerang and thus should be less motivated to show a behavioral boomerang. On the other hand, for the cognitive boomerang, a

belief boomerang may positively predict the behavioral boomerang, based on the theory of reasoned action (Fishbein & Ajzen, 1975) and the integrative model (Fishbein, 2000).

Fourth, more studies should be conducted to identify different types of negative thoughts in the boomerang process and to examine their attitudinal and behavioral consequences. There are different kinds of nonrefutational thoughts, such as self-bolstering, message derogation, and suggestions of alternative solutions or evidence. Of particular relevance to the boomerang effect may be self-bolstering. As described by Cohen (1962), people with a strong attitude on an issue may bolster their initial attitude (e.g., reduce dissonance) by adding consonant cognitions. A consonant cognition may be self-bolstering, one type of nonrefutational thoughts. And the attitudinal and behavioral consequences associated with different types of negative thoughts should be investigated. Additionally, developing a typology of negative thoughts and a reliable measure of different types of negative thoughts would also advance the research on the boomerang effect, reactance, and cognitive response. By comparing models with different types of negative thoughts and anger, reactance may be more precisely captured.

Last, the nonsignificant relationship between perceived threat and a boomerang effect did not disconfirm the effect of reactance on a boomerang effect given a proattitudinal message. Given that our manipulation of perceived threat was embedded in a short paragraph at the end of the stimulus and was separated from the argument quality manipulation by several paragraphs, it is possible that argument quality discounts the effect of perceived threat on belief and attitude change. Future studies should make the two manipulations of equal length and counterbalance the sequence of the two manipulations to further demonstrate that there are two types of boomerang effects and to investigate the specific mediators that go beyond anger and general

negative thoughts in the process. More evidence is needed before any conclusion can be made regarding the existence of a boomerang effect given a proattitudinal message.

Practical implications. This dissertation also has important practical implications. First, the predictability of a boomerang effect in this study speaks to the importance of considering and managing potential boomerang effects in communication campaigns. A typical communication campaign does not include a measure of a boomerang effect because some scholars considered the boomerang effect to be accidental (e.g., Cho & Salomon, 2007; Pechmann & Slater, 2005). However, given the potential negative consequence of a boomerang effect (Fishbein et al., 2002; Hornik et al., 2008), practitioners should evaluate the possibility and consequence of potential boomerang effects in anti-drug, health promotion, or prosocial campaigns, particularly among message recipients who are prone to boomerang (e.g., those with a strong prior belief on an issue). Such an evaluation should inform practitioners on content tailoring and selection of a distribution channel. In terms of content tailoring, a practitioner who does not desire a boomerang effect should not target a strong belief held by a group of individuals, which might lead to a boomerang effect. Instead, a gateway belief that is relevant, moveable, and changeable should be chosen (see a discussion on gateway belief in Yzer et al., 2003). In terms of channel, anticipating a boomerang effect, a practitioner who does not desire a boomerang effect could consider the bystander campaign, which emphasizes indirect influence through significant others (e.g., family, friends) of the targeted subjects (Nan, 2007).

Second, more research should be conducted on the persuasive appeals for mitigating the cognitive or affective process resulting in the boomerang effect targeting those with certain individual traits (e.g., trait reactance). In Schultz et al.'s (2007) study on a campaign promoting household energy conservation, it was found that a message with the descriptive norm depicting

average neighborhood energy use produced a boomerang effect among those who were already saving energy, but conveying an injunctive norm (social approval) eliminated the boomerang effect. But it is unclear how social approval mitigated the boomerang effect in this study. More research should be conducted to explore how different mechanisms in the two types of boomerang can be reduced by different persuasive appeals. For example, previous research supports the effectiveness of narrative on reducing the number of counterarguments (e.g., Moyer-Gusé & Nabi, 2010). Assuming that the mechanisms of a boomerang effect are predominantly counterarguments, the message producer should focus on eliminating counterarguments by employing narratives in a health promotion story. Assuming that the mechanisms of a boomerang effect are predominantly anger, the message should integrate arguments that explicitly discuss the behavioral autonomy and attitudinal freedom of individuals (e.g., “you have a choice”).

Last but not least, among those who are more prone to boomerang on certain issues, a boomerang can be employed as an innovative persuasive appeal in future strategic communication campaigns. If a campaign planner aims to target those who hold strong beliefs and show disagreement with the message’s advocated position, or those who have high trait reactance and are in agreement with the message’s advocated position, a boomerang may be an alternative persuasive technique. The message producer may intentionally create a message that appears to be trying to move people away from the advocated position. For example, for those teenagers who believe that the legal drinking age should be 18, the practitioner can produce a message advocating decreasing the legal drinking age to 18. Using explicit and intense language in this proattitudinal message, these teenagers are expected to experience a reactance boomerang, moving their belief closer to 21, a desirable outcome for the practitioner. Thus, a boomerang

appeal may help message producers achieve their persuasive goal. But the boomerang appeal should only be employed after a careful assessment of its ethical implications.

Limitations

There are a few limitations of this study. First, following previous research (Fishbein et al., 2002; Hovland et al., 1957; Kelley & Volkart, 1952), two policy issues were employed in the main experiment for improving the external validity of the results. The use of actual issues about which participants may feel strongly could help to achieve psychological realism (i.e., the extent to which subjects in the experiment experience psychological processes similar to those in their real life) and mundane realism (i.e., the extent to which the tasks in the experiment are similar to mundane activities; Aronson, Wilson, & Akert, 1994). But such a design may compromise the internal validity of the experiment: The prior belief on the actual issue was not manipulated, and thus subjects were not randomly assigned to a proattitudinal or counterattitudinal message condition. The lack of random assignment could bring certain threats to internal validity, such as selection. The nonequivalence between the experimental conditions may confound the effect of the treatment on the dependent variable. Thus, the observed outcome may be attributed to the variation of a third unmeasured variable and the relationship between the cause and effect could be spurious. In addition, those who received a counterattitudinal message as compared with those who received a proattitudinal message might have more extreme belief scores and may be more prone to statistical regression, a potential threat to internal validity. Because of the trade-off between external validity and internal validity, future experiments should ensure the internal validity of the design by manipulating whether a message is perceived as proattitudinal or counterattitudinal. A fictitious issue can be employed and the experimenter can prime respondents with pro-issue or counter-issue arguments before the stimulus manipulating their

prior belief on the issue.

Second, many variables were measured by single items in this study, including belief, attitude, belief position, and negative cognitions. The single-item measure does not account for measurement errors and prevents us from testing a measurement model in the structural equation model. Future research should employ multi-item measurement for these variables to address measurement errors and possible bias. In addition, the fit of the model used here was good but the variance of the outcome variables explained by the predictors was relatively low. One possible reason for the relatively small R^2 s is that there may be additional antecedents of a boomerang effect (e.g., misperceived norms, Fortier, 2011). Future studies should explore these predictors of a boomerang effect.

Third, the boomerang effect was measured through an indirect method in this dissertation. Namely, a control group's position was used as the baseline for determining a boomerang effect for easier experiment administration and avoidance of potential testing effects from using participants' initial positions as the baseline. Future studies can use subjects' initial positions as the baseline for method triangulation. In addition, future studies should try developing a direct scale of a boomerang effect with desirable psychometric properties.

Last, college students constituted the sample in the experiment. The results should be generalized to other groups with caution. For example, college students may have higher trait reactance (Bessarabova et al., 2013), an antecedent of reactance boomerang in this dissertation. Future studies should replicate the effects in this study with other samples. Moreover, a large quantity of independent sample t tests was used as exploratory post hoc tests. Multiple t tests may inflate the probability of Type I error, and these results should be interpreted with caution. Last, only a boomerang on belief and attitude was measured and explored in this study. There

may have been different results if a boomerang is assessed on behavioral intention or behavior. It is not known whether anger or counterarguments predict any boomerang on behavior. The inclusion of behavioral measures would enable researchers to assess the relationship between attitudinal and belief boomerang and behavioral boomerang.

Conclusion

This study provides a complementary perspective for the attitude change research emphasizing message effectiveness and persuasion. This dissertation establishes a theoretical framework for the boomerang effect and redefines the phenomena of a boomerang. Through an experiment, two types of boomerang effects with distinct antecedents and mediators were successfully differentiated. Under a counterattitudinal message, both argument quality and prior belief strength predicted a boomerang effect. Under a proattitudinal message, perceived threat to attitudinal freedom unexpectedly did not predict a boomerang effect. The findings were consistent regardless of issue (i.e., the drinking age vs. the marriage age) and message advocated position (i.e., propolicy vs. antipolicy), suggesting some generalizability. This study also contributes to attitude change research by empirically separating cognitive and affective mechanisms for boomerang effects in a dual path framework. There was a predominantly cognitive process for a boomerang effect given a counterattitudinal message and a predominantly affective process for a boomerang effect given a proattitudinal message. Last, this dissertation refines the construct of negative cognitions by integrating two long-standing lines of persuasion research on the theory of reactance and the cognitive response perspective. Counterarguments and nonrefutational thoughts were two types of negative cognitions. The two constructs were caused by different sets of antecedents and had different outcomes on belief and attitude.

Table 1

Studies with the Observation of a Boomerang Effect

Author & Year	Title	Sample	Type	Design and Conditions	Message	Findings
Abelson & Miller, 1967	Negative persuasion via personal insult	80 New Yorkers who were pro the African Americans' protest against job discrimination	Field E	2 (<i>Remark type: insulting/neutral</i>) × 2 (<i>Crowd presence: yes/no</i>) × 2 (<i>Opponent status: leave/stay</i>) + 2 control groups	The demonstration by African American for job discrimination	Personal insults (e.g., "That's ridiculous") during intended persuasion produced a boomerang effect. When a crowd was present, there was as much boomerang in the neutral as in the insulting condition.
Berscheid, 1966, Experiment 2	Opinion change and communicator-communicatee similarity and dissimilarity	40 undergraduates	E	2 (<i>Irrelevant/relevant dissimilar values between the communicator and the communicatee</i>)	International monetary system (the relevant message) /education (the irrelevant message)	Communicator-communicatee dissimilarity on values relevant to the communication produced a boomerang effect.
Bessarabova, Fink, & Turner, 2013	Reactance, restoration, and cognitive structure: Comparative statics	143 undergraduates	E	2 (<i>Freedom Threat: H/L</i>) × 2 (<i>Postscript: restoration/filler</i>) + 1 control	Pro-recycling message	High freedom threat created a boomerang effect for the targeted attitude (recycling) as the attitude and behavioral intention changed in the opposite direction to the one advocated in the message compared to the control group.
Bolten, Cohen, & Bloom, 2006, Experiment 1	Does Marketing Products as Remedies Create "Get Out of Jail Free Cards"?	97 college students	E	2 (<i>Message remedy: yes/no</i>) × 3 (<i>Problem Status: never/occasional/everyday smoker</i>)	Remedy message about the benefits and features of the Nicotrol inhaler as a smoking cessation aid	Compared to the control message, smokers who read the remedy message had lower stop-smoking intentions as they perceive relatively low risks of smoking, when they evaluated the other smokers (versus self-evaluation).
Cohen, 1961	A dissonance analysis of the boomerang effect	64 undergraduates who objected to the message	E	2 (<i>Dissonance: H/L</i>) For example, in high dissonance condition, Ss saw the partner move away from her own position after the persuasion attempt)	Admit women undergraduate to Yale	High dissonance leads to self-bolstering of the initial attitudes. The effect is confined and exaggerated to the Ss who liked their partners more.
Dean, Austin, & Watts, 1971, Experiment 1	Forewarning effects in persuasion: Field and classroom experiments	88 undergraduates	Field E	2 (<i>Ego involvement: H/L</i>) × 2 (<i>Forewarning: yes/no</i>) × 2 (<i>Source status: H/L</i>)	Election of the new U.S. Senator from California	Subjects who were highly involved showed a boomerang effect, compared to those who were lowly involved. Subject who were warned showed a boomerang effect, compared to those who were not

						warned.
Fishbein et al., 2002	Avoiding the Boomerang: Testing the Relative Effectiveness of Antidrug Public Service Announcements Before a National Campaign	3608 students in grade 5 through 12 in 10 schools	E	5 (Type of PSAs: negative consequences of using marijuana and inhalant/ bolstering self-efficacy for the 2 nd and 3 rd condition/ negative consequence of using heroin for 4 th and 5 th condition/control group)	Antidrug PSAs	Of the 30 PSAs, 6 PSAs (“Just say no” efficacy PSA; general talk about drug use; negative consequences of using marijuana) were seen as significantly less effective than the control program.
Gollust, Lantz, & Ubel, 2009	The polarizing effect of news media messages about the social determinants of health	2490 US adults (23.3% reported they were strong or moderate Republicans)	E	4 (<i>Attribution frames: genetic predisposition/behavioral choices/ social determinants/no causal language</i>)	Attributing type-2 diabetes to social determinants	Republicans reported a lower level of support for public health policies compared to the control condition, after they read a counterattitudinal message that attributed type-2 diabetes to social determinants.
Hart & Nisbet, 2011	Boomerang effects in science communication: How motivated reasoning and identity cues amplify opinion polarization about climate mitigation policies	240 adults in an upstate, rural New York state community	E	3 (<i>Social distance: H/L</i>) + 1 control	Simulated new story about climate mitigation policies	For Republicans, message exposure significantly decreased support for climate mitigation policies compared with control (i.e., a boomerang effect).
Heller, Pallak, & Picek, 1973	The interactive effects of intent and threat on boomerang attitude change	153 undergraduates who were asked to write attitude-consistent essay)	E	3 (<i>Intent: H/L/no</i>) × 2 (<i>Threat: H/L/no</i>)	Establish nuclear power plants near populated areas	Both intent alone and threat alone led to boomerang effects. On the interaction term, a boomerang effect occurred only if the inference about the motivation and behavior of the confederate was correspondent and implied limitation of attitudinal freedom.
Hovland, Harvey, & Sherif, 1957	Assimilation and contrast effects in reactions to communication and attitude change	498 mixed sample (183 dry Ss from two groups; 25 wet Ss; 290 moderately wet college students)	E	3 (<i>Message type: dry/wet/moderately wet</i>)	The prohibition of alcohol	Among partisan subjects, those who held extremely dry position exposed to extremely wet communication had a boomerang effect compared to the control participants.
Johnson, Smith-McLallen, Killea, & Levin, 2004	Truth or Consequences: Overcoming resistance to persuasion with positive thinking	N/A	Meta-analyses	3 (<i>Involvement level: H/L/Others</i>) × 2 (<i>Argument quality: H/L</i>)	N/A	Among the highly involved Ss, weak arguments caused the boomerang effect following the receipt of a counterattitudinal message.

Johnson & Steiner, 1968	The effects of source on response to negative information about one's self	144 male Ss (7 out of 14 pairs of fraternities are antagonistic)	E	2 (<i>Source: same fraternity/other fraternity</i>) × 4 (<i>Severity of criticism</i>)	Self-rating from the pair	When low credible source (other-fraternity) was present, participants showed a boomerang effect at large discrepancy levels of critics.
Kelley & Volkart, 1952	The resistance to change of group-anchored attitudes	260 Boy Scouts (18 troops)	Field E	2 (<i>Expression of attitude: public/private</i>) × 5 (Degree of valuation of membership)	Scout's attitudes toward camping and forest activities	A boomerang of the advocated position occurred for those who placed highest valuation upon the membership of the group.
Miller, 1965	Involvement and Dogmatism as Inhibitors of Attitude Change	40 high school students who fall above and below 75 th and 25 th percentile on both dogmatism and extremity of initial attitude	E	2 (<i>Involvement in a relevant/irrelevant message</i>) × 2 (Dogmatism: H/L) × 2 (Initial position: pro/con)	Fluoridation of public drinking water (the relevant message) /amount of Math and Science in high school curriculum (the irrelevant message)	After receiving a counterattitudinal speech, people who are highly dogmatic and ego-involved in the message showed a boomerang effect.
Na, 1999	Is biased processing of strong attitudes peripheral? An extension of the dual process models of attitude change	106 college students in Korea	E	3 (Attitude strength: weak/moderate/strong) × 2 (<i>Argument quality: H/L</i>)	Attitude toward the president	Holders of strong attitudes showed the boomerang effect by producing greater counterarguments.
Nyhan & Reifler, 2010, Experiment 1	When corrections fail: The persistence of political misperceptions	130 adults (convenient sampling; balanced on ideology and partisanship)	E	2 (<i>Correction: yes/no</i>) × 2 (<i>Mortality salience: yes/no</i>) + 1 control	The misperception that Iraq had WMD in its country	Conservatives who received a correction message telling them Iraq did not have WMD were more likely to believe that Iraq had WMD than those in the control condition.
Park, Levine, Westerman, Orfgen, & Foregger	The effects of argument quality and involvement type on attitude formation and attitude change: A test of dual-process and social judgment predictions	684 undergraduates	E	2 (<i>Outcome-relevant involvement: H/L</i>) × 2 (<i>Argument quality: H/L</i>) × 2 (<i>Message: pro/con</i>) × 3 (<i>Topic</i>)	Green space on campus; banning cell phones from class; affirmative action	Recipients of low-quality arguments showed a boomerang effect regardless of involvement level, and topic type (pro and con)
Petty & Cacioppo, 1979a	Effects of Forewarning of Persuasive Intent and Involvement on Cognitive Responses and Persuasion	116 undergraduates	E	2 (<i>Warning of the persuasive intent: yes/no</i>) × (<i>Message involvement: H/L</i>)	Senior should be required to take a comprehensive exam	Subjects who were forewarned of the communicator's persuasive intent had more number of counterarguments, fewer favorable thoughts, and a boomerang effect, compared to unwarned subjects.
Petty, Caioppo,	Personal involvement as	145	E	2 (<i>Message involvement: H/L</i>) × 2	Senior should be	There is a boomerang effect when

& Goldman, 1981	determinant of argument-based persuasion	undergraduates		$(Argument\ quality: H/L) \times 2$ $(Source\ expertise: H/L)$	required to take a comprehensive exam	low quality arguments were presented by a nonexpert source.
Schultz, Nolan, Cialdini, Goldstein, & Grisevicius, 2007	The constructive, destructive, and reconstructive power of social norms	290 households in San Marcos, CA, with visible energy meters	Field E	$2 (Energy\ consumption: above/below\ average) \times 3$ (time: baseline/short-term follow-up/longer-term follow-up)	Energy saving	Among households that were already increasing energy efficiency, there was a boomerang effect after their exposure to the message that advocated increasing energy efficiency.
Sensenig & Brehm, 1968	Attitude change from an implied threat to attitudinal freedom	99 female undergraduates	E	$3 (Implied\ threat: H/L) + 1$ control	Federal aid to church-run schools should be discontinued	Those that went through the high-implied threat (the decision of writing a pro or counter-attitudinal essay was made without considering their preferences) showed attitude change away from the position they originally supported
Silvia, 2006	Reactance and the dynamics of disagreement: Multiple paths from threatened freedom to resistance to persuasion	131 undergraduates	E	$3 (Threat: no\ threat/threat\ at\ start/threat\ at\ end)$	Adding a major in advertising	Threat caused a boomerang effect. The location of the appearance of threat does not affect attitude change. But in the threat at start condition (vs. the threat at end condition), counterarguing mediated the effect of threat on attitude change
Smith, M. J., 1977	The effects of threats to attitudinal freedom as a function of message quality and initial receiver attitude	191 undergraduates	E	$2 (Initial\ attitude: agree/disagree) \times 2 (Threat\ level: H/L) \times 2 (Message\ quality: H/L)$	Amnesty for Vietnam war resisters	Participants in the high threat/low quality/disagreement condition had a boomerang effect.
Smith, M. J., 1978	Discrepancy and the importance of attitudinal freedom	143 undergraduates	E	$2 (Threat\ level: H/L) \times 4$ (Strength of initial attitude: extreme agreement/moderate agreement/moderate disagreement/extreme disagreement)	Unconditional amnesty for Vietnam draft resisters	Regardless of the threat level, participants in the moderate agreement and extreme disagreement condition had a boomerang effect.
Strack, Schwarz, Bless, Kubler, & Wanke, 1993	Awareness of the influence as a determinant of assimilation versus contrast	83 students	E	$2 (Reminding: yes/no)$	Evaluative judgment about a target person	Reminding of the priming events was related to the contrast effect (evaluation of the target person should go in the opposite direction when Ss were reminded of the priming episode).
Snyder & Wicklund, 1976, Experiment 1	Prior exercise of freedom and reactance	180 undergraduates	E	$2 (Prior\ exercise\ of\ freedom: yes/no) \times 2 (Threat: H/L) \times 2 (Message\ type:$	Opinions about two candidates for appointment to the	In the proattitudinal condition, participants who did not exercised prior freedom and received a high

				<i>proattitudinal/counterattitudinal</i>)	Texas Marijuana Commission	threat communication had a boomerang effect.
Walster & Festinger, 1962, Experiment 2	The effectiveness of “overheard” persuasive communications	41 wives of college students and 40 women students who lived in dormitories	E	2 (<i>Issue type: involving/non-involving</i>) × 2 (<i>Message condition: regular/overheard</i>)	For married women, “students husbands should spend a great deal more time at home”, for the students, “Junior and Senior women should be allowed to live off campus”	Among the married women regarding the involving issue (“students husbands should spend a great deal more time at home”), there was a boomerang effect in the participants’ responses in regular persuasive communication condition, compared to the overheard condition.
Werle & Cuny, 2012	The boomerang effect of mandatory sanitary messages to prevent obesity	131 undergraduates	E	2 (<i>Type of advertisement for a hedonic product: With a sanitary message/ Without a sanitary message</i>)	Reactions toward advertisement about a hedonic food advertisement	In the absence of sanitary Message in the advertisement, the choice of a healthy snack doubled. Whereas the advertisement with a sanitary message increased choice of an unhealthy snack.
Wicklund & Brehm, 1968	Attitude change as a function of felt competence and threat to attitudinal freedom	141 male and 52 female college students	E	2 (<i>Threat: H/L</i>) × 2 (<i>Felt competence: H/L</i>)	Evaluations of two applicants for the dormitory advisor at a large university	Participants in the high competence/high threat condition had a boomerang effect, compared to the other conditions.
Worchel & Brehm, 1970	Effects of threats to attitudinal freedom as a function of agreement with the communicator	73 undergraduates (53 male and 20 female)	E	2 (<i>Threat: H/L</i>) × 2 (<i>Message type: proattitudinal/counterattitudinal</i>)	Appropriate treatment of the communist party in US	Subjects who received freedom-threatening communication in agreement with their own position (small discrepancy) showed a boomerang effect.
Wright, 1986	Attitude change as a function of threat to attitudinal freedom and extent of agreement with a communicator	37 male and 19 female undergraduates	E	2 (<i>Threat: H/L</i>) × 2 (<i>Attitude strength: moderate/extreme</i>)	A message that advocated the free availability of contraceptives through the student health center	Participants who had extreme initial agreement with the issue and received a high threat had a boomerang effect.
Wright, Wadley, Danner, & Phillips, 1992	Persuasion, reactance, and judgments of interpersonal appeal	21 female undergraduates	E	3 (<i>Threat: H/L/no</i>)	Attractiveness of two male dating candidates	Participants who received a high threat communication had a boomerang effect, compared to the control group.

Note. E = experimental study; Field E = Field experimental study; H/L = high/low. The italicized part indicates the manipulated variable in the study. A study is included in this list if: After receiving a message, participants show attitude change in a direction that is opposite to the one advocated in a message, either within subjects or in comparison to other participants exposed to an alternative message or to those exposed to no message at all (Byrne & Hart, 2009; Hovland et al., 1957).

Table 2

Summary Statistics of Transformed Dependent Variables in the Main Experiment

	Drinking age ($N = 238$)			Marriage age ($N = 220$)		
	1. Belief: The extent to which the drinking age should be decreased	2. Attitude: The extent to which Ss like the current drinking age	3. Belief position for the legal drinking age	1. Belief: The extent to which the marriage age should be increased	2. Attitude: The extent to which Ss like the current marriage age	3. Belief position for the legal marriage age
Transformation Strategy	Winsorizing; Exponentiation (0.5)	Winsorizing; Exponentiation (0.75)	NA	Winsorizing	Winsorizing	NA
Mean (SD)	10.38 (0.47)	20.62 (1.08)	19.41 (0.37)	94.57 (7.11)	69.07 (3.64)	18.16 (0.12)
Skewness	0.01 (0.16)	0.61 (0.16)	11.84 (0.16)	1.62 (0.17)	0.68 (0.17)	0.56 (0.17)
Kurtosis	-0.78 (0.31)	-0.49 (0.31)	168.51 (0.31)	2.33 (0.33)	0.20 (0.33)	0.71 (0.33)

Note. Winsorizing strategy: The values above 95% value were recoded to be equal to the 95% value. Belief and attitude were measured on amount scales where 100 indicates “a moderate amount.” The belief variable measures the extent to which the policy should be changed for the legal drinking [marriage] age. For the belief position on the drinking [marriage] age, subjects indicated their answers to the question “What do you think Maryland’s legal drinking [marriage] age should be?”

Table 3

Recoding Strategies in ANOVAs for the Dependent Variables of Subjects' Belief for Both Issues and Their Belief Position on the Marriage Age

		Prior Belief: Antipolicy		Prior Belief: Propolicy	
		Message valence: Anti-policy	Message valence: Pro-policy	Message valence: Anti-policy	Message valence: Pro-policy
Low Threat	Low Argument Quality	N (6)	B (3)	B (1)	N (4)
	High Argument Quality	N (6)	N (4)	N (6)	N (4)
High Threat	Low Argument Quality	B (1)	B (3)	B (1)	B (3)
	High Argument Quality	B (1)	N (4)	N (6)	B (3)

Note. “B” indicates a predicted boomerang whereas “N” indicates a predicted nonboomerang. The number in the parentheses (1-3) indicates the recoded boomerang groups for examining the linear or polynomial contrast in the linear models. Those in the recoded group 1 are expected to show a boomerang effect by scoring lower than the mean of control participants (Group 2). Those in the recoded group 3 are expected to show a boomerang effect by scoring higher than the mean of control participants (Group 2). Similarly, group numbers 4, 5, and 6 recode the cells where nonboomerang is expected to occur. Groups 2 and 5 represent the same control group for the specific issue. The belief variable measures the extent to which the policy should be changed for both issues; for the belief position on the marriage age, subjects indicated their answers to the question “What do you think Maryland’s legal marriage age should be?”

Table 4

Recoding Strategies in ANOVAs for the Dependent Variables of Subjects' Attitude for Both Issues and their Belief Position on the Drinking Age

		Prior Belief: Antipolicy		Prior Belief: Propolicy	
		Message valence: Anti-policy	Message valence: Propolicy	Message valence: Anti-policy	Message valence: Propolicy
Low Threat	Low Argument Quality	N (4)	B (1)	B (3)	N (6)
	High Argument Quality	N (4)	N (6)	N (4)	N (6)
High Threat	Low Argument Quality	B (3)	B (1)	B (3)	B (1)
	High Argument Quality	B (3)	N (6)	N (4)	B (1)

Note. “B” indicates a predicted boomerang whereas “N” indicates a predicted nonboomerang. The number in the parentheses (1-3) indicates the recoded boomerang groups for examining the linear or polynomial contrast in the linear models. Those in the recoded group 1 are expected to show a boomerang effect by scoring lower than the mean of control participants (Group 2). Those in the recoded group 3 are expected to show a boomerang effect by scoring higher than the mean of control participants (Group 2). Similarly, group numbers 4, 5, and 6 recode the cells where nonboomerang is expected to occur. Groups 2 and 5 represent the same control group for the specific issue. The attitude variable measures the extent to which the policy were liked for both issues; for the belief position on the drinking age, subjects indicated their answers to the question “What do you think Maryland’s legal marriage age should be?”

Table 5

Proattitudinal Subgroup ANOVAs with Coded Boomerang Groups Based on High Perceived Threat

Topic: Drinking	DV1: Belief toward lowering the drinking age	DV2: Attitude regarding the extent to which the drinking age was liked	DV3: Belief position on the drinking age
<i>F</i> value	$F(2, 116) = 17.58^{**}$	$F(2, 116) = 21.22^{**}$	$F(2, 116) = 0.86$
Linear contrast estimate (<i>SE</i>)	-7.65(1.29)**	-18.90(2.93)**	.29(1.60)
Polynomial contrast estimate (<i>SE</i>)	-1.10(0.99)	4.51(2.25)	1.61(1.23)
Mean (<i>SD</i>): Group 1	14.12 (5.07) <i>n</i> = 32	38.77 (12.15) <i>n</i> = 20	21.00 (1.49) <i>n</i> = 20
Mean (<i>SD</i>): Group 2	10.05 (7.30) <i>n</i> = 64	19.89 (16.99) <i>n</i> = 64	18.83 (2.90) <i>n</i> = 64
Mean (<i>SD</i>): Group 3	3.29 (5.02) <i>n</i> = 20	12.05 (9.62) <i>n</i> = 32	18.25 (1.37) <i>n</i> = 32
Topic: Marriage	DV1: Belief toward raising the marriage age	DV2: Attitude regarding the extent to which the marriage age was liked	DV3: Belief position on the age
<i>F</i> value	$F(2, 87) = 11.27^{**}$	$F(2, 87) = 16.15^{**}$	$F(2, 85) = 21.02^{**}$
Linear contrast estimate (<i>SE</i>)	-96.28(20.96)**	-55.48(9.96)**	-1.62(0.30)**
Polynomial contrast estimate (<i>SE</i>)	-16.38(16.74)	6.08(7.99)	.93(0.24)**
Mean (<i>SD</i>): Group 1	156.57 (136.79) <i>n</i> = 21	111.56 (45.72) <i>n</i> = 25	19.67 (1.43) <i>n</i> = 21
Mean (<i>SD</i>): Group 2	108.55 (101.29) <i>n</i> = 49	64.88 (52.26) <i>n</i> = 49	17.38 (1.42) <i>n</i> = 47
Mean (<i>SD</i>): Group 3	20.42 (35.20) <i>n</i> = 24	33.10 (36.69) <i>n</i> = 21	17.37 (1.41) <i>n</i> = 24

Note. *N* = 196. Respondents' belief indicates the extent to which the legal drinking [marriage] age should be changed. The belief position indicates respondents' response to the question "What do you think Maryland's legal drinking [marriage] age should be?" *F* value refers to the *F* value of the recoded boomerang groups. The ANOVAs tested H1a: Those who receive a proattitudinal message that has a high threat to their attitudinal freedom (vs. the control participants) would exhibit a boomerang effect. See Table 2 for how these dependent variables were transformed.

* $p < .05$. ** $p < .01$

Table 6

Proattitudinal Subgroup ANOVAs with Coded Nonboomerang Groups Based on Low Perceived Threat

Topic: Drinking	DV1: Belief toward lowering the drinking age	DV2: Attitude regarding the extent to which the drinking age was liked	DV3: Belief position on the drinking age
<i>F</i> value	$F(2, 115) = 21.42^{**}$	$F(2, 115) = 18.69^{**}$	$F(2, 115) = 11.25^{**}$
Linear contrast estimate (<i>SE</i>)	8.42(1.29)**	18.03(2.95)**	-2.12(0.46)**
Polynomial contrast estimate (<i>SE</i>)	-0.67(0.99)	2.22(2.28)	0.55(0.35)
Mean (<i>SD</i>): Group 4	3.29 (5.08) <i>n</i> = 22	9.87 (8.27) <i>n</i> = 29	18.00 (0.60) <i>n</i> = 29
Mean (<i>SD</i>): Group 5	10.05 (7.30) <i>n</i> = 64	19.89 (16.99) <i>n</i> = 64	18.83 (2.90) <i>n</i> = 64
Mean (<i>SD</i>): Group 6	15.19 (5.11) <i>n</i> = 29	35.56 (14.39) <i>n</i> = 22	21.00 (1.57) <i>n</i> = 22
Topic: Marriage	DV1: Belief toward raising the marriage age	DV2: Attitude regarding the extent to which the marriage age was liked	DV3: Belief position on the marriage age
<i>F</i> value	$F(2, 96) = 9.04^{**}$	$F(2, 96) = 19.53^{**}$	$F(2, 94) = 13.07^{**}$
Linear contrast estimate (<i>SE</i>)	87.32(20.77)**	58.07(9.31)**	1.28(0.32)**
Polynomial contrast estimate (<i>SE</i>)	-11.77(16.78)	-2.54(7.53)	0.82(0.26)**
Mean (<i>SD</i>): Group 4	32.39 (53.49) <i>n</i> = 23	20.71 (29.33) <i>n</i> = 24	17.48 (1.50) <i>n</i> = 23
Mean (<i>SD</i>): Group 5	108.55 (101.29) <i>n</i> = 49	64.88 (52.26) <i>n</i> = 49	17.38 (1.42) <i>n</i> = 47
Mean (<i>SD</i>): Group 6	155.88 (129.65) <i>n</i> = 24	102.83 (41.88) <i>n</i> = 23	19.29 (1.83) <i>n</i> = 24

Note. *N* = 196. Respondents' belief indicates the extent to which the legal drinking [marriage] age should be changed. The belief position indicates respondents' response to the question "What do you think Maryland's legal drinking [marriage] age should be?" *F* value refers to the *F* value of the recoded nonboomerang groups. The ANOVAs tested H1b: those who receive a proattitudinal message that has a low threat to their attitudinal freedom (vs. the control participants) would exhibit no boomerang effect. See Table 2 for how these dependent variables were transformed.

* *p* < .05. ** *p* < .01.

Table 7

Counterattitudinal Subgroup ANOVAs with Coded Boomerang Groups Based on Low-quality Arguments

Topic: Drinking	DV1: Belief toward lowering the drinking age	DV2: Attitude regarding the extent to which the drinking age was liked	DV3: Belief position on the drinking age
<i>F</i> value	$F(2, 97) = 6.94^{**}$	$F(2, 97) = 6.20^{**}$	$F(2, 97) = 3.71^*$
Linear contrast estimate (<i>SE</i>)	6.41(1.77)**	-13.99(3.98)**	-2.28(0.72)**
Polynomial contrast estimate (<i>SE</i>)	0.01(1.24)	2.64(2.79)	0.80(0.51)
Mean (<i>SD</i>): Group 1	5.54 (6.04) <i>n</i> = 12	13.23 (11.61) <i>n</i> = 21	18.19 (0.51) <i>n</i> = 21
Mean (<i>SD</i>): Group 2	10.05 (7.30) <i>n</i> = 64	19.89 (16.99) <i>n</i> = 64	18.83 (2.90) <i>n</i> = 64
Mean (<i>SD</i>): Group 3	14.60 (5.97) <i>n</i> = 21	33.01 (12.97) <i>n</i> = 12	20.58 (1.78) <i>n</i> = 12
Topic: Marriage	DV1: Attitude toward raising the marriage age	DV2: Attitude regarding the extent to which the marriage age was liked	DV3: Belief position on the marriage age
<i>F</i> value	$F(2, 87) = 2.40$	$F(2, 87) = 3.43^*$	$F(2, 85) = 5.03^{**}$
Linear contrast estimate (<i>SE</i>)	36.18(21.71)	28.25(10.91)*	.45(0.33)
Polynomial contrast estimate (<i>SE</i>)	-25.77(16.66)	5.02(8.37)	0.71(0.26)**
Mean (<i>SD</i>): Group 1	51.41 (50.11) <i>n</i> = 17	51.05 (37.25) <i>n</i> = 21	17.94 (1.35) <i>n</i> = 17
Mean (<i>SD</i>): Group 2	108.55 (101.29) <i>n</i> = 49	64.88 (52.26) <i>n</i> = 49	17.38 (1.42) <i>n</i> = 47
Mean (<i>SD</i>): Group 3	102.57 (102.72) <i>n</i> = 21	91.00 (42.48) <i>n</i> = 17	18.57 (1.51) <i>n</i> = 21

Note. *N* = 149. Respondents' belief indicates the extent to which the legal drinking [marriage] age should be changed. The belief position indicates respondents' response to the question "What do you think Maryland's legal drinking [marriage] age should be?" *F* value refers to the *F* value of the recoded boomerang groups. The ANOVAs tested H3a: Those who receive a counterattitudinal message that has low quality arguments (vs. the control participants) would exhibit a boomerang effect. See Table 2 for how these dependent variables were transformed.

* $p < .05$. ** $p < .01$.

Table 8

Counterattitudinal Subgroup ANOVAs with Coded Nonboomerang Groups Based on High-quality Arguments

Topic: Drinking	DV1: Belief toward lowering the drinking age	DV2: Attitude regarding the extent to which the drinking age was liked	DV3: Belief position on the drinking age
<i>F</i> value	$F(2, 102) = 1.89$	$F(2, 102) = 4.99^{**}$	$F(2, 102) = 1.04$
Linear contrast estimate (<i>SE</i>)	-2.93(1.65)	-12.36(3.92)**	0.83(0.58)
Polynomial contrast estimate (<i>SE</i>)	0.37(1.18)	1.82(2.80)	0.10(0.41)
Mean (<i>SD</i>): Group 4	12.58 (5.03) <i>n</i> = 25	30.86 (8.27) <i>n</i> = 13	18.36 (0.76) <i>n</i> = 25
Mean (<i>SD</i>): Group 5	10.05 (7.30) <i>n</i> = 64	19.89 (16.99) <i>n</i> = 64	18.83 (2.90) <i>n</i> = 64
Mean (<i>SD</i>): Group 6	8.44 (7.38) <i>n</i> = 13	13.38 (12.67) <i>n</i> = 25	19.54 (1.45) <i>n</i> = 13
Topic: Marriage	DV1: Belief toward raising the marriage age	DV2: Attitude regarding the extent to which the marriage age was liked	DV3: Belief position on the marriage age
<i>F</i> value	$F(2, 89) = 0.20$	$F(2, 89) = 3.93^*$	$F(2, 87) = 5.38^{**}$
Linear contrast estimate (<i>SE</i>)	-11.38(22.26)	-31.27(12.31)*	-0.58(0.36)
Polynomial contrast estimate (<i>SE</i>)	-5.38(17.23)	8.50(9.53)	0.84(0.28)**
Mean (<i>SD</i>): Group 4	110.00 (100.93) <i>n</i> = 17	97.39 (61.79) <i>n</i> = 23	18.82 (1.85) <i>n</i> = 17
Mean (<i>SD</i>): Group 5	108.55 (101.29) <i>n</i> = 49	64.88 (52.26) <i>n</i> = 49	17.38 (1.42) <i>n</i> = 47
Mean (<i>SD</i>): Group 6	93.91 (89.78) <i>n</i> = 23	53.18 (49.72) <i>n</i> = 17	19.29 (1.83) <i>n</i> = 23

Note. *N* = 149. Respondents' belief indicates the extent to which the legal drinking [marriage] age should be changed. The belief position indicates respondents' response to the question "What do you think Maryland's legal drinking [marriage] age should be?" *F* value refers to the *F* value of the recoded nonboomerang groups. The ANOVAs tested H3b: those who receive a counterattitudinal message that has high quality arguments (vs. the control participants) would not exhibit a boomerang effect. See Table 2 for how these dependent variables were transformed.
* *p* < .05. ** *p* < .01.

Table 9

Counterattitudinal Subgroup ANOVAs with Coded Boomerang Groups Based on Strong Prior Belief

Topic: Drinking	DV1: Belief toward lowering the drinking age	DV2: Attitude regarding the extent to which the drinking age was liked	DV3: Belief position on the drinking age
<i>F</i> value	$F(2, 91) = 12.63^{**}$	$F(2, 91) = 15.40^{**}$	$F(2, 91) = 2.58$
Linear contrast estimate (<i>SE</i>)	9.39(1.94)**	23.80(4.39)**	1.54(0.69)*
Polynomial contrast estimate (<i>SE</i>)	0.82(1.33)	6.05(3.01)	0.37(0.47)
Mean (<i>SD</i>): Group 1	4.42 (6.90) <i>n</i> = 11	10.47 (13.47) <i>n</i> = 16	18.19 (0.40) <i>n</i> = 16
Mean (<i>SD</i>): Group 2	10.05 (7.30) <i>n</i> = 64	19.89 (16.99) <i>n</i> = 64	18.83 (2.90) <i>n</i> = 64
Mean (<i>SD</i>): Group 3	17.69 (5.74) <i>n</i> = 16	44.13 (11.12) <i>n</i> = 11	20.36 (1.21) <i>n</i> = 11
Topic: Marriage	DV1: Belief toward raising the marriage age	DV2: Attitude regarding the extent to which the marriage age was liked	DV3: Belief position on the marriage age
<i>F</i> value	$F(2, 87) = 0.63$	$F(2, 87) = 5.38^{**}$	$F(2, 85) = 7.59^{**}$
Linear contrast estimate (<i>SE</i>)	24.32(23.39)	40.04(12.29)**	0.91(0.35)*
Polynomial contrast estimate (<i>SE</i>)	-11.02(17.72)	9.64(9.31)	0.62(0.27)*
Mean (<i>SD</i>): Group 1	77.86 (64.11) <i>n</i> = 14	48.38 (38.90) <i>n</i> = 24	17.50 (1.09) <i>n</i> = 14
Mean (<i>SD</i>): Group 2	108.55 (101.29) <i>n</i> = 49	64.88 (52.53) <i>n</i> = 49	17.38 (1.42) <i>n</i> = 47
Mean (<i>SD</i>): Group 3	112.25 (107.74) <i>n</i> = 24	105.00 (67.11) <i>n</i> = 14	18.79 (1.74) <i>n</i> = 24

Note. *N* = 149. Respondents' belief indicates the extent to which the legal drinking [marriage] age should be changed. The belief position indicates respondents' response to the question "What do you think Maryland's legal drinking [marriage] age should be?" *F* value refers to the *F* value of the recoded nonboomerang groups. The ANOVAs tested H4a: Those who receive a counterattitudinal message that has strong prior belief (vs. the control participants) would exhibit a boomerang effect. For drinking age, those with belief strength larger than 100 were recoded as high on belief strength; those with belief strength not larger than 100 were recoded as low on belief strength. For marriage age, those with belief strength higher or equal to 80 were recoded as high on belief strength; those with belief strength lower than 80. See Table 2 for how these dependent variables were transformed.

* $p < .05$. ** $p < .01$.

Table 10

Counterattitudinal Subgroup ANOVAs with Coded Non-boomerang Groups Based on Weak Prior Belief

Topic: Drinking	DV1: Belief toward lowering the drinking age	DV2: Attitude regarding the extent to which the drinking age was liked	DV3: Belief position on the legal drinking age
<i>F</i> value	$F(2, 105) = .39$	$F(2, 105) = 1.51$	$F(2, 105) = 2.88$
Linear contrast estimate (<i>SE</i>)	-1.30(1.51)	-5.35(3.54)	-1.53(0.65)*
Polynomial contrast estimate (<i>SE</i>)	-0.02(1.09)	-1.14(2.56)	0.48(0.47)
Mean (<i>SD</i>): Group 4	10.95 (4.00) <i>n</i> = 27	22.28 (11.32) <i>n</i> = 14	20.50 (4.36) <i>n</i> = 14
Mean (<i>SD</i>): Group 5	10.05 (7.30) <i>n</i> = 64	19.89 (16.99) <i>n</i> = 64	18.83 (2.90) <i>n</i> = 64
Mean (<i>SD</i>): Group 6	9.11 (6.18) <i>n</i> = 14	14.72 (11.86) <i>n</i> = 27	18.33 (0.78) <i>n</i> = 27
Topic: Marriage	DV1: Belief toward raising the marriage age	DV2: Attitude regarding the extent to which the drinking age was liked	DV3: Belief position on the age
<i>F</i> value	$F(2, 89) = 1.07$	$F(2, 89) = 2.53$	$F(2, 87) = 4.22^*$
Linear contrast estimate (<i>SE</i>)	-14.31(22.31)	-21.85(11.73)	-0.19(0.36)
Polynomial contrast estimate (<i>SE</i>)	-19.32(17.01)	7.18(8.94)	0.80(0.28)**
Mean (<i>SD</i>): Group 4	95.00 (89.85) <i>n</i> = 14	89.12 (45.79) <i>n</i> = 26	18.50 (1.61) <i>n</i> = 14
Mean (<i>SD</i>): Group 5	108.55 (101.29) <i>n</i> = 49	64.88 (52.26) <i>n</i> = 49	17.38 (1.42) <i>n</i> = 47
Mean (<i>SD</i>): Group 6	74.77 (85.24) <i>n</i> = 26	58.21 (49.37) <i>n</i> = 14	18.23 (1.68) <i>n</i> = 26

Note. *N* = 149. Respondents' belief indicates the extent to which the legal drinking [marriage] age should be changed. The belief position indicates respondents' response to the question "What do you think Maryland's legal drinking [marriage] age should be?" *F* value refers to the *F* value of the recoded nonboomerang groups. The ANOVAs tested H4b: Those who receive a counterattitudinal message that has weak prior belief (vs. the control participants) would not exhibit a boomerang effect. For drinking age, those with belief strength larger than 100 were recoded as high on belief strength; those with belief strength not larger than 100 were recoded as low on belief strength. For marriage age, those with belief strength higher or equal to 80 were recoded as high on belief strength; those with belief strength lower than 80. See Table 2 for how these dependent variables were transformed.

* $p < .05$. ** $p < .01$.

Table 11

Descriptive Statistics and Correlation Matrix for Variables in the Proattitudinal SEM

	Pearson Correlations												
	<i>M</i>	<i>SD</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
(1) Issue type	1.50	0.50	1.00										
(2) Prior belief strength	103.5	72.43	-.42**	1.00									
(3) Competence to exercise attitudinal freedom	123	112.47	-.28**	.57**	1.00								
(4) Perceived threat	1.5	0.50	-.01	-.03	.01	1.00							
(5) Trait Reactance	0.09	1.00	-.04	.02	.00	-.04	1.00						
(6) Anger	1.70	0.81	-.02	.02	.07	.01	.34**	1.00					
(7) Negative Cognition	0.74	1.06	-.19**	.07	.09	.06	.09	.22**	1.00				
(8) Belief Boomerang	-33.71	73.86	-.41**	.12	.02	-.02	.11 [†]	.10	.15*	1.00			
(9) Attitude Boomerang	-25.65	31.33	-.45**	.10	.03	.02	.08	-.04	.08	.33**	1.00		
(10) Belief Position Boomerang	-1.16	1.67	.09	-.21*	-.17*	.01	0	.09	.02	-.03	-.03	1.00	

Note. $N = 196$. Full information maximum likelihood (FIML) was used for computing missing values. Issue type: 1 = Drinking age; 2 = Marriage age. Prior belief strength and competence to exercise attitudinal freedom were transformed scores measured on magnitude scales (100 = moderate amount). For perceived threat: 1 = Low, 2 = High. Trait reactance was the standardized principal component score. The three boomerang variables were continuous variables. Belief (e.g., the extent to which the legal drinking age should be decreased) is different from belief position (e.g., the legal age for drinking). For definitions of belief boomerang, belief position boomerang, and attitude boomerang, see Section of “computing individual boomerang scores” on p. 64. See Table 2 for how these dependent variables were transformed; see Instrumentation section for how the independent variables were transformed.

[†] $p < .10$. * $p < .05$. ** $p < .01$.

Table 12

Descriptive Statistics and Correlation Matrix for Variables in the Counterattitudinal SEM

	Pearson Correlations									
	<i>M</i>	<i>SD</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Issue type	1.50	0.50	1.00							
(2) Prior belief strength	101.7	88.40	-.48**	1.00						
(3) Argument quality	1.52	0.50	-.02	-.09	1.00					
(4) Counterarguments	0.93	1.18	-.15 [†]	.26**	-.33**	1.00				
(5) Anger	2.01	0.90	.06	-.02	-.11	.15 [†]	1.00			
(6) Belief Boomerang	9.67	65.87	.09	-.01	-.06	.04	.15 [†]	1.00		
(7) Attitude Boomerang	15.33	37.25	.18*	.04	.02	.09	.16*	.12	1.00	
(8) Belief Position Bommerang	0.54	1.57	-.14 [†]	.18*	-.10	.32**	.16 [†]	.13	.13	1.00

Note. $N = 149$. FIML was used for computing missing values. Issue type: 1 = Drinking age; 2 = Marriage age. For both argument quality: 1 = Low, 2 = High. Prior belief strength was a transformed score measured on the magnitude scale (100 = moderate amount). The three boomerang variables were continuous variables. Belief (e.g., the extent to which the legal drinking age should be decreased) is different from belief position (e.g., the legal age for drinking). For definitions of belief boomerang, belief position boomerang, and attitude boomerang, see Section of “computing individual boomerang scores” on p. 64. See Table 2 for how these dependent variables were transformed; see Instrumentation section for how the independent variables were transformed.

[†] $p < .10$. * $p < .05$. ** $p < .01$.

Table 13

Descriptive Statistics and Correlation Matrix for the Variables in the Integrated SEM

	Pearson Correlations														
	<i>M</i>	<i>SD</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Issue type	1.50	0.50	1.00												
(2) Prior belief strength	102.7	79.60	-.44**	1.00											
(3) Subgroup	1.43	0.25	.10	.04	1.00										
(4) Competence to exercise attitudinal freedom	120.2	109.8	-.31**	.61**	-.03	1.00									
(5) Argument quality	1.51	0.50	0	-.09	.03	-.03	1.00								
(6) Perceived threat	1.50	0.50	0	-.05	-.01	-.01	.01	1.00							
(7) Trait Reactance	0.07	0.99	-.02	-.03	-.09	-.03	.07	-.03	1.00						
(8) Counterarguments	0.63	1.03	.12*	.18**	.17**	.09	-.18**	-.06	-.05	1.00					
(9) Nonrefutational thoughts	0.51	0.80	-.10 [†]	.12*	.15**	.14*	-.04	.10 [†]	.09 [†]	.07	1.00				
(10) Anger	1.83	0.86	.02	.01	0.05	-.02	-.09	.07	.26**	.22**	.14**	1.00			
(11) Belief Boomerang	-14.92	73.63	.18**	.07	-.11**	.02	-.05	.07	.02	.19**	.10 [†]	.16**	1.00		
(12) Attitude Boomerang	-7.95	39.58	-.11*	.08	.04	-.02	.03	0	.07	.18**	.19**	.14**	.34**	1.00	
(13) Belief Position Boomerang	-0.42	1.83	.02	.01	.55**	-.05	.02	.02	.01	.26**	.16**	.19**	.16**	.27**	1.00

Note. *N* = 345. FIML was used for computing missing values. Issue type: 1 = Drinking age; 2 = Marriage age. Subgroup: 1 = Proattitudinal message; 2 = Counterattitudinal message. For definitions of belief boomerang, belief position boomerang, and attitude boomerang, see Section of “computing individual boomerang scores” on p. 64. See Table 2 for how these dependent variables were transformed; see Instrumentation section for how the independent variables were transformed.

[†]*p* < .10. **p* < .05. ***p* < .01.

Table 14

Significance of Indirect Effects in the Proattitudinal SEM

Indirect Effects in H2	Standardized Estimate	Unstandardize -d Estimate	Standard Errors	z score
Antecedent: Perceived threat (H2a)				
Mediator: Anger				
Indirect effect from perceived threat on belief boomerang through anger ($a1 \times b1$)	0	.38	1.21	0.31
Indirect effect from perceived threat on belief position boomerang through anger ($a1 \times b3$)	0	.01	0.03	-0.05
Mediator: Negative Cognition (NC)				
Indirect effect from perceived threat on belief boomerang through NC ($a2 \times b2$)	-.01	-1.55	1.48	0.79
Indirect effect from perceived threat on belief position boomerang through NC ($a2 \times b4$)	.01	0.02	0.03	-0.46
Antecedent: Trait reactance (H2b)				
Mediator: Anger				
Indirect effect from trait reactance on belief boomerang through anger ($a3 \times b1$)	.04	3.01	1.88	1.60 [†]
Indirect effect from trait reactance on belief position boomerang through anger ($a3 \times b3$)	.04	0.06	.05	1.35
Mediator: Negative Cognition (NC)				
Indirect effect from trait reactance on belief boomerang through NC ($a4 \times b2$)	-.01	-0.67	.67	-1.00
Indirect effect from trait reactance on belief position boomerang through NC ($a4 \times b4$)	.01	0.01	.01	0.57

Note. $N = 196$. $R^2 = .195$ and $.180$ for the belief boomerang and belief position boomerang, respectively. $R^2 = .175$ and $.062$ for anger and negative cognitions, respectively. See Figure 8 for the model of the indirect effects in H2.

[†] $p < .10$. * $p < .05$. ** $p < .01$.

Table 15

Significance of Indirect Effects in the Counterattitudinal SEM

Indirect Effects in H5	Standardized Estimate	Unstandardized Estimate	Standard Errors	z score
Mediator: Counterarguments				
Indirect effect from argument quality on belief boomerang through counterarguments ($a1 \times b1$)	-.01	-1.24	3.49	-0.36
Indirect effect from argument quality on belief position boomerang through counterarguments ($a1 \times b3$)	-.09	-0.27	0.10	-2.62**
Mediator: Anger				
Indirect effect from argument quality on belief boomerang through anger ($a2 \times b2$)	-.02	-2.10	2.04	-1.03
Indirect effect from argument quality on belief position boomerang through anger ($a2 \times b4$)	-.01	-0.04	0.04	-1.00

Note. $N = 149$. $R^2 = .032, .125$ for belief boomerang and belief position boomerang, respectively; $R^2 = .164$ and $.015$ for counterarguments and anger. See Figure 9 for the model of the indirect effects in H5.

[†] $p < .10$. * $p < .05$. ** $p < .01$.

Table 16

Significance of Indirect Effects in the Integrated SEM

Indirect Effects	Standardized Estimate	Unstandardized Estimate	Standard Errors	z score
Mediator: Nonrefutational thoughts (NT)				
H6a. Indirect effect from perceived threat on belief boomerang through NT ($a1 \times b2$)	.01	1.43	1.04	1.38
H6a. Indirect effect from perceived threat on belief position boomerang through NT ($a1 \times b5$)	.01	0.02	0.02	1.10
H6b. Indirect effect from trait reactance on belief boomerang through NT ($a2 \times b2$)	.01	0.73	0.51	1.44
H6b. Indirect effect from trait reactance on belief position boomerang through NT ($a2 \times b5$)	.01	0.01	0.01	1.01
H7b. Indirect effect from argument quality on belief boomerang through NT ($a4 \times b2$)	-.02	-2.92	1.93	-1.51
H7b. Indirect effect from argument quality on belief position boomerang through NT ($a4 \times b5$)	-.01	-0.04	0.03	-1.19
Mediator: Counterarguments				
H7a. Indirect effect from argument quality on belief boomerang through counterarguments ($a3 \times b1$)	-.03	-4.50	1.84	-2.44*
H7a. Indirect effect from argument quality on belief position boomerang through counterarguments ($a3 \times b4$)	-.02	-0.07	0.03	-2.17*
Mediator: Anger				
H2b. Indirect effect from trait reactance on belief boomerang through anger ($a6 \times b3$)	.04	2.77	1.29	2.15*
H2b. Indirect effect from trait reactance on belief position boomerang through anger ($a6 \times b6$)	.03	0.05	0.03	2.07*

Note. $N = 345$. $R^2 = .113$ and $.384$ for belief boomerang and belief position boomerang, respectively; $R^2 = .093$, $.074$ and $.158$ for counterarguments, nonrefutational thoughts, and anger. 1. See Figure 10 for the model of the indirect effects in H6 and H7.

† $p < .10$. * $p < .05$. ** $p < .01$.

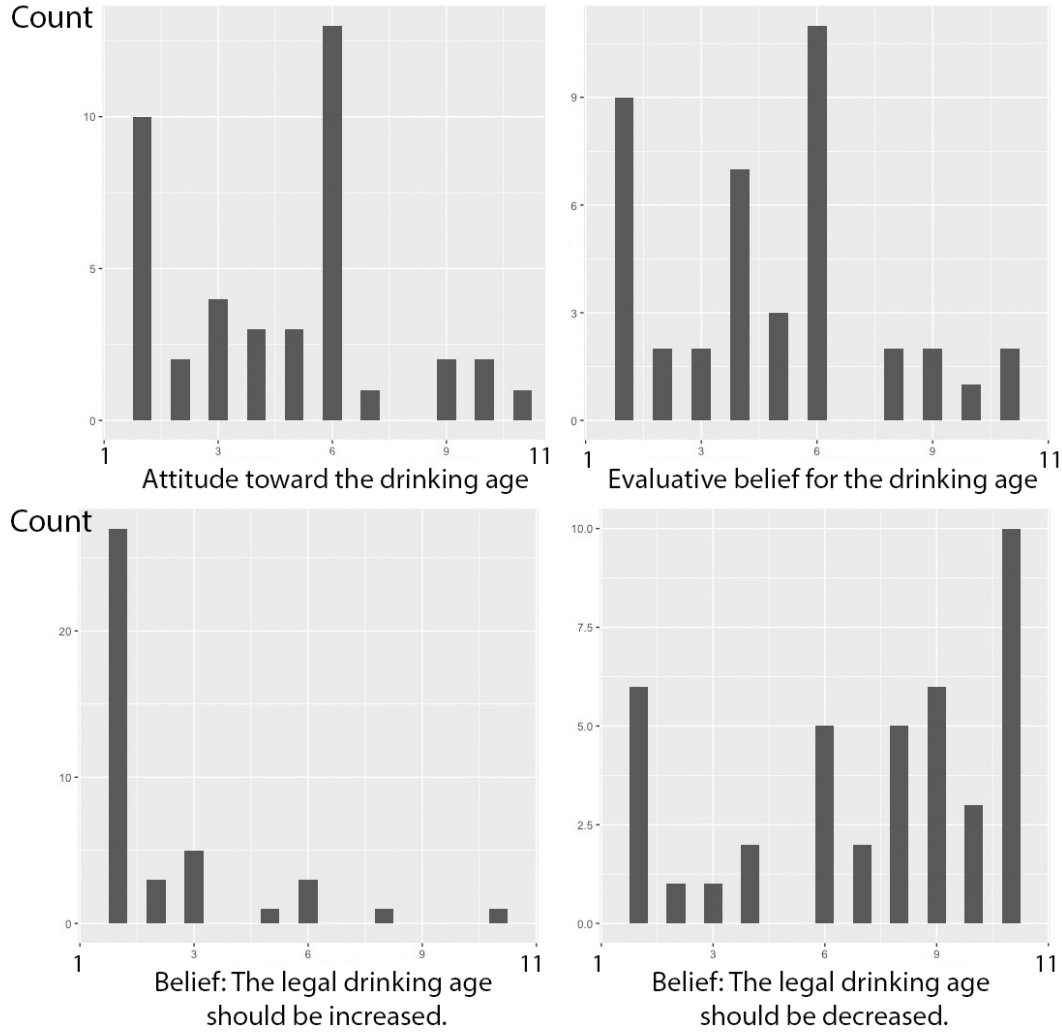


Figure 1. The frequency distributions of the belief and attitude scores on the legal drinking age, $N = 41$. The y-axis stands for frequency. For the legal drinking age, four outcome variables were: (1) Attitude toward the drinking age: The extent to which the drinking age was liked; (2) evaluative belief: The extent to which the drinking age was good; (3) belief toward increasing the legal drinking age; (4) belief toward decreasing the legal drinking age. These four outcome variables were measured on 11-point scales.

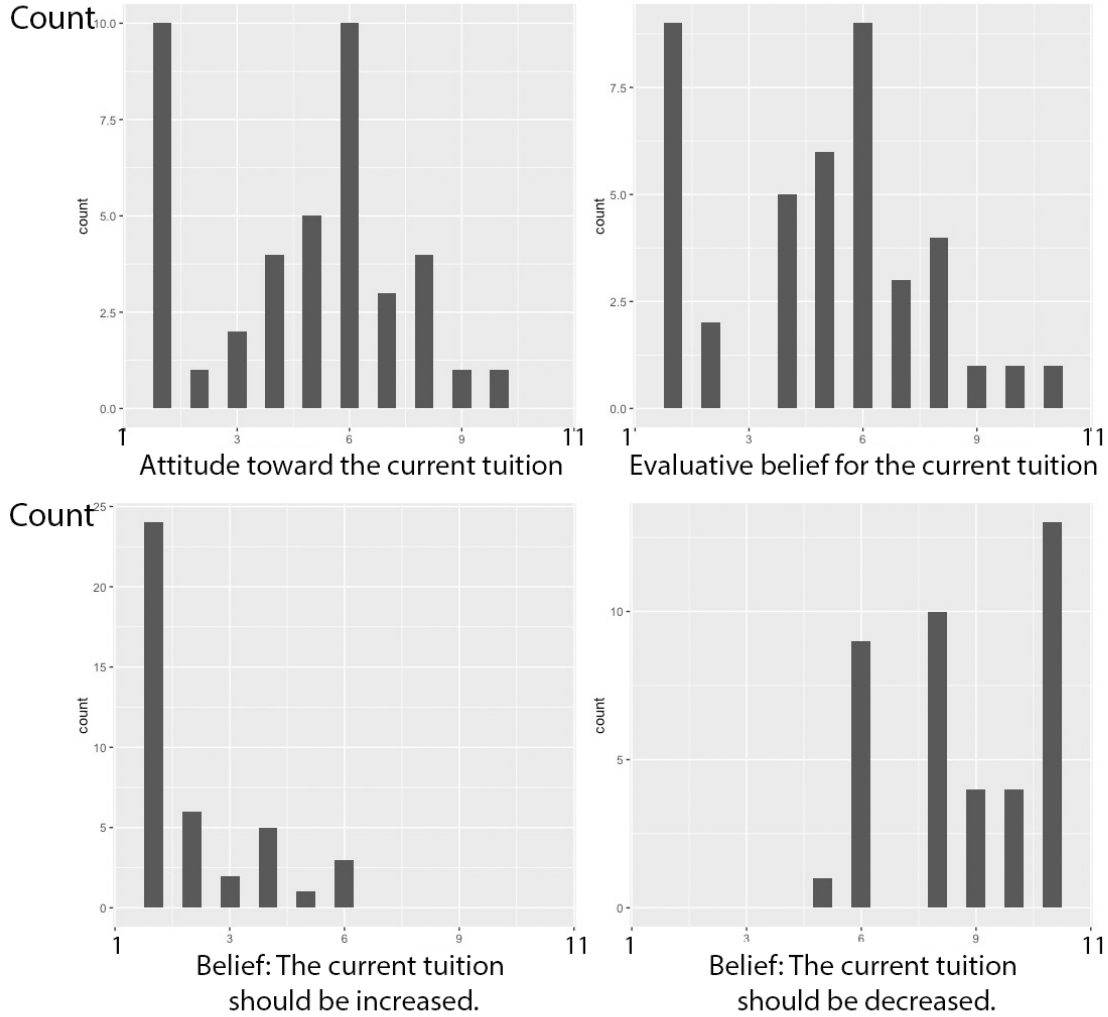


Figure 2. The frequency distributions of the belief and attitude scores for tuition (spring 2015), $N = 41$. The y-axis stands for frequency. For the current tuition, four outcome variables were: (1) Attitude toward the current tuition: The extent to which the current tuition was liked; (2) evaluative belief: The extent to which the current tuition was good; (3) belief toward increasing the current tuition; (4) belief toward decreasing the current tuition. These four outcome variables were measured on 11-point scales.

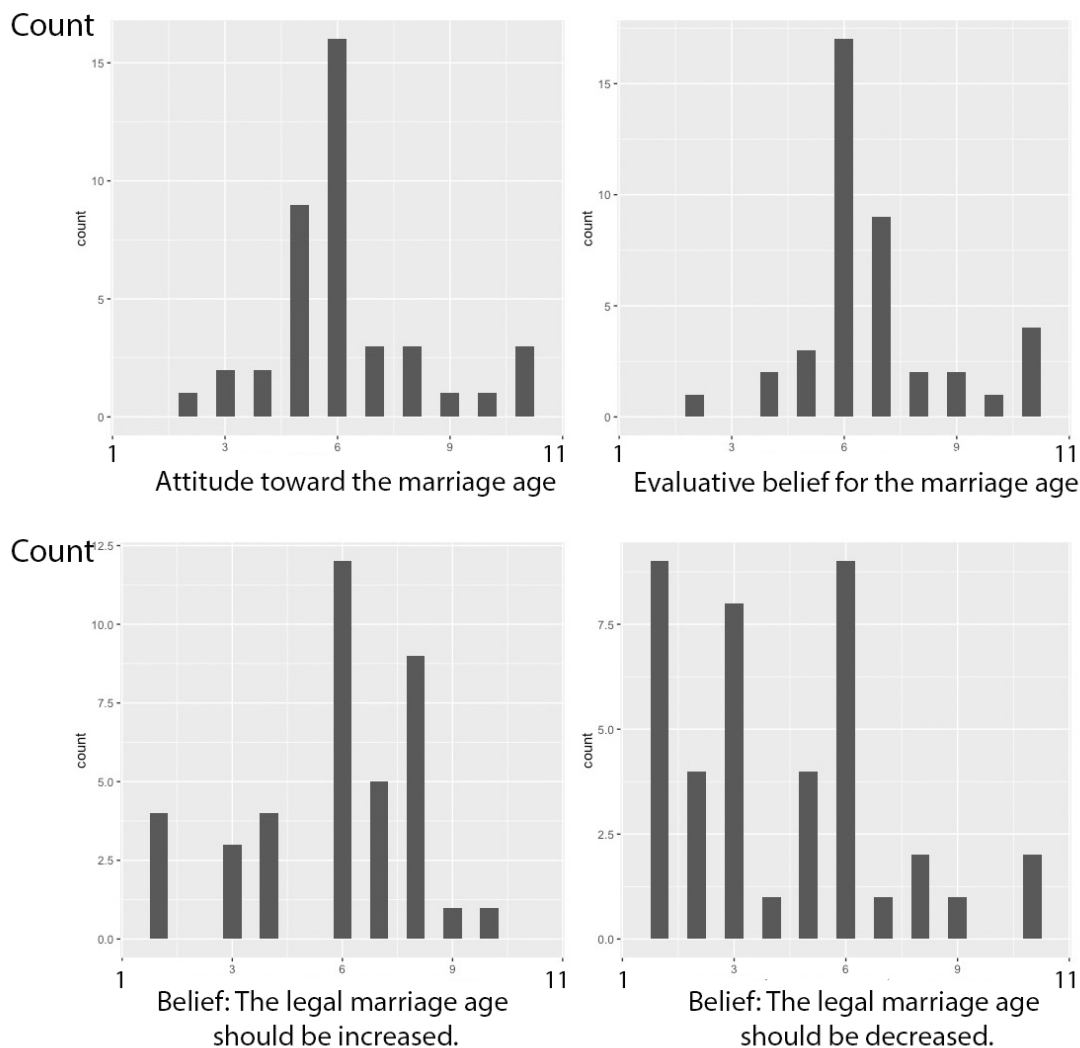


Figure 3. The frequency distributions of the belief and attitude scores on the legal marriage age, $N = 41$. The y-axis stands for frequency. For the legal marriage age, four outcome variables were: (1) Attitude toward the marriage age: The extent to which the marriage age was liked; (2) evaluative belief: The extent to which the marriage age was good; (3) belief toward increasing the marriage age; (4) belief toward decreasing the marriage age. These four outcome variables were measured on 11-point scales.

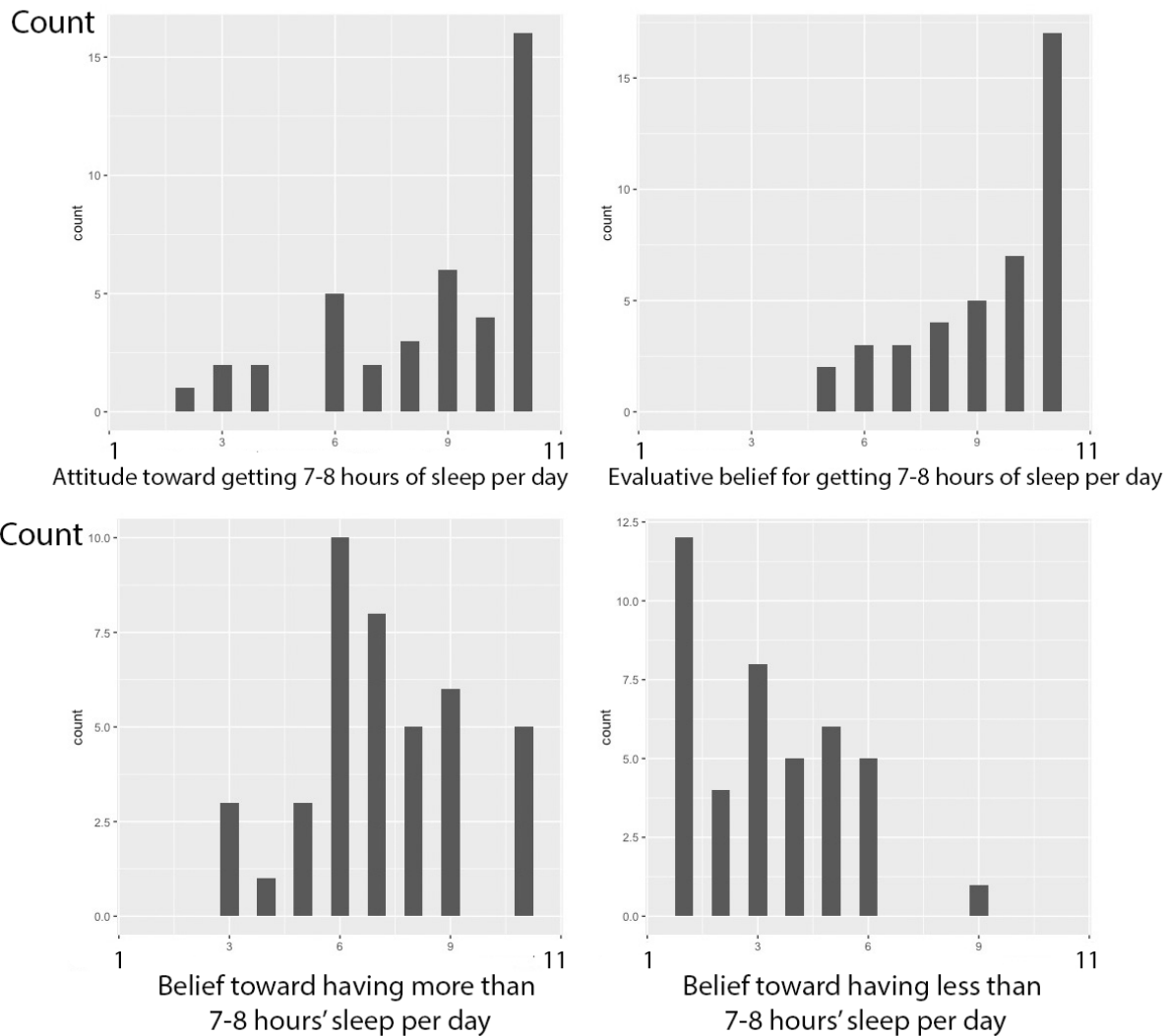


Figure 4. The frequency distributions of belief and attitude scores on the hours of sleep per day, $N = 41$. The y-axis stands for frequency. For the amount of sleep each day, four outcome variables were: (1) Attitude toward the amount of sleep each day: The extent to which having 7-8 hours of sleep each day was liked; (2) evaluative belief: The extent to which having 7-8 hours of sleep each day was good; (3) belief toward having more than 7-8 hours of sleep each day; (4) belief toward having less than 7-8 hours of sleep each day. These four outcome variables were measured on 11-point scales.

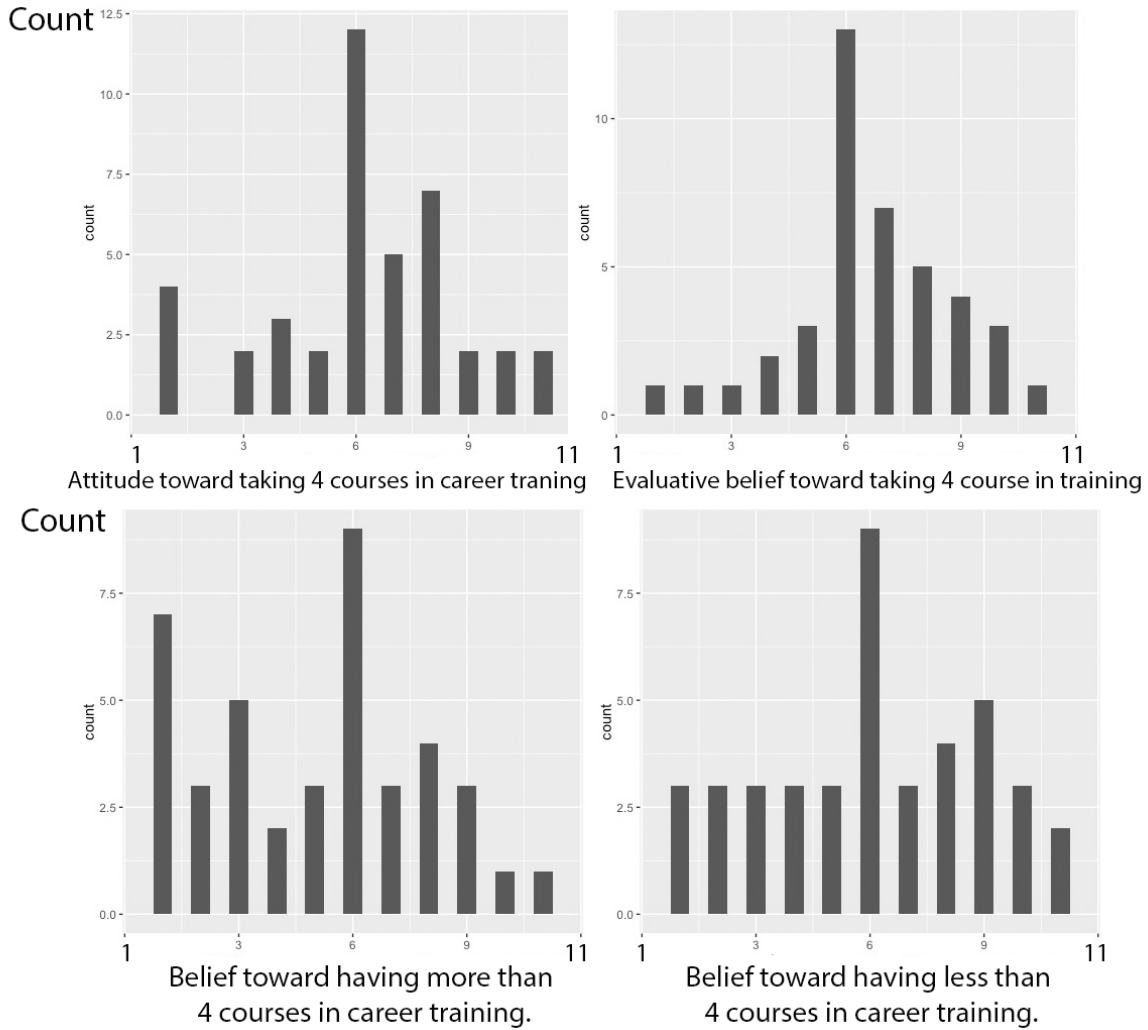


Figure 5. The frequency distributions of belief and attitude scores on taking four courses in career training during undergraduate studies, $N = 41$. The y-axis stands for frequency. The four outcome variables measured on 11-point scales were: (1) Attitude toward which taking four courses in career training: The extent to which taking four courses in career training was liked; (2) evaluative belief: The extent to which taking four courses in career training was good; (3) belief toward taking more than four courses in career training; (4) belief toward taking less than four courses in career training.

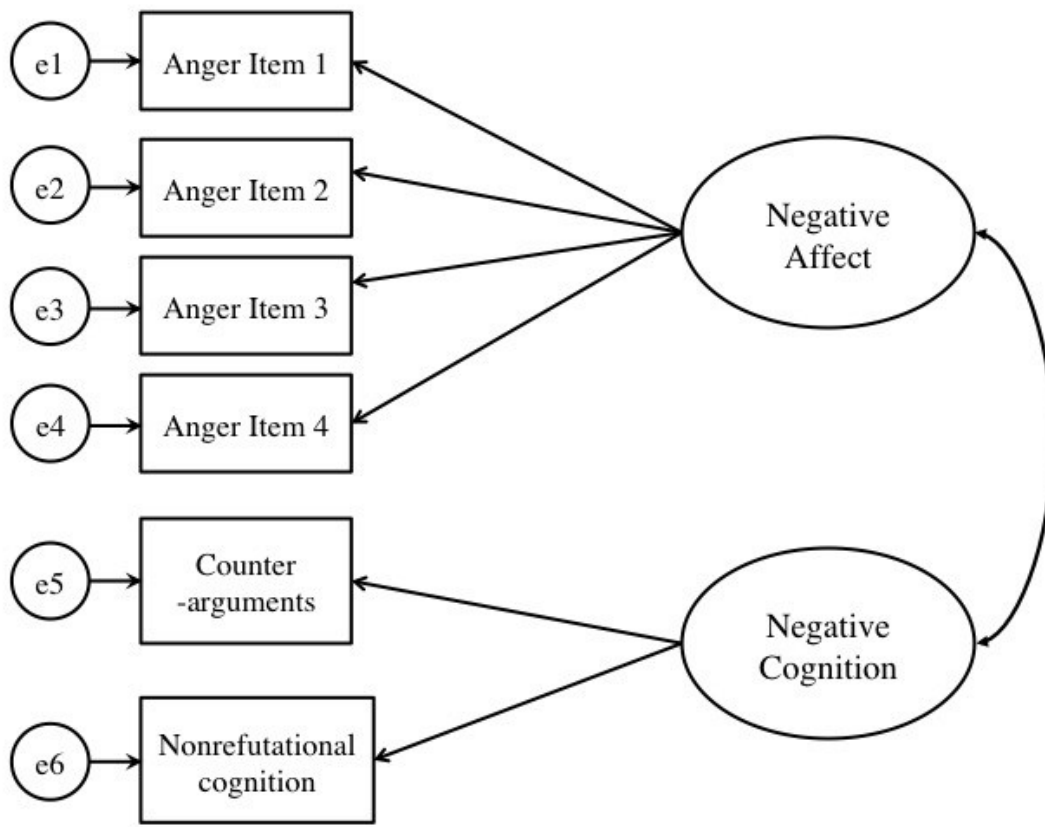


Figure 6. Representation of the two-factor confirmatory factor analysis (CFA). The error terms of the latent variables were set to covary. The error terms of items were not allowed to covary.

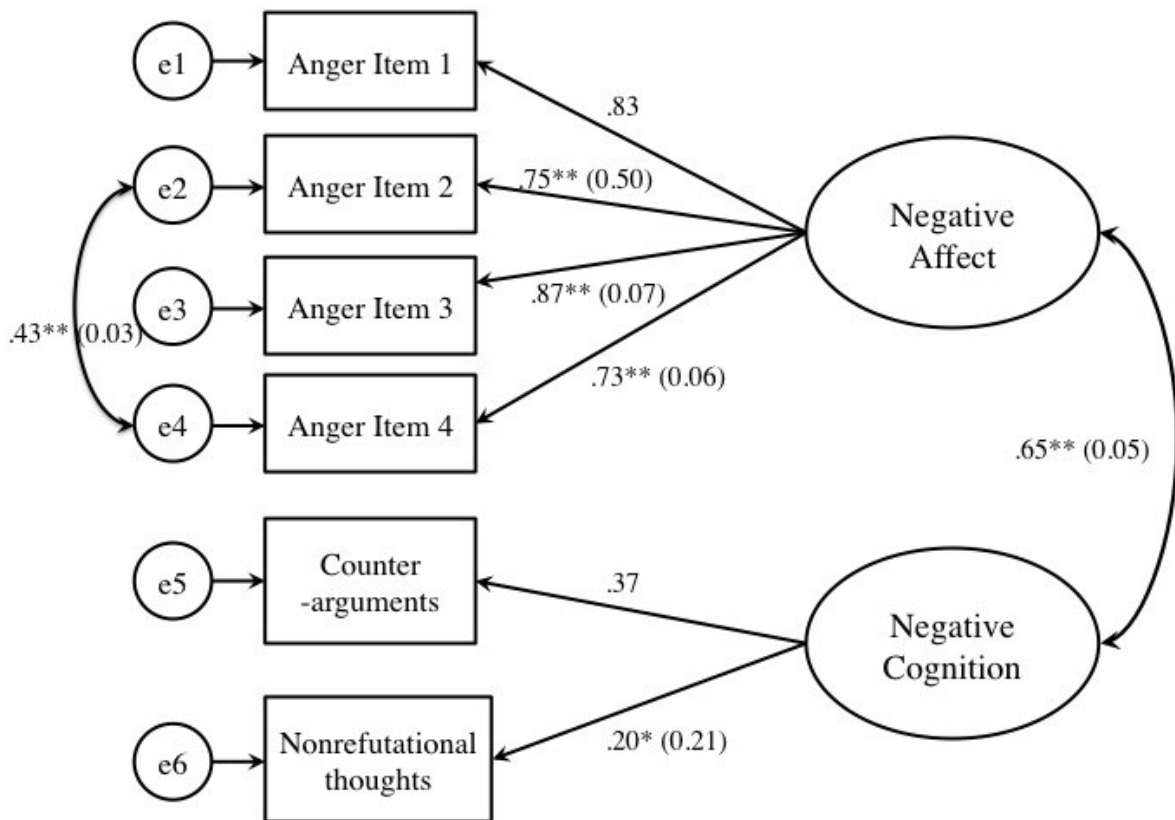


Figure 7. Estimated parameters for the modified CFA model. Standardized path coefficients are reported. The standard errors are reported in the parentheses. The model was based on the modification indices in R “lavaan” package. $N = 349$. The unstandardized factor loading of the first indicator of each factor was fixed to be 1. The other factor loadings were free to be estimated. The error terms of the latent variables were allowed to covary. The model fit indices: $\chi^2(7, N = 349) = 53.86, p > .05$, SRMR = 0.02, RMSEA = .05, and CFI = 0.99. $R^2 = .68, .56, .75$, and $.54$ for anger item 1, 2, 3, and 4. $R^2 = .14$ and $.04$ for counterarguments and nonrefutational thoughts.

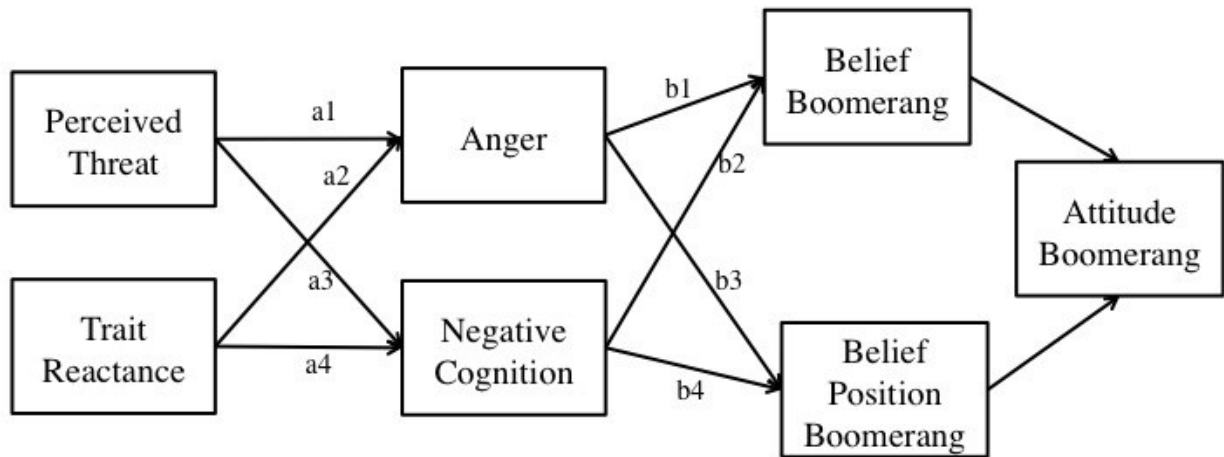


Figure 8. Representations for the indirect effects from perceived threat and trait reactance to boomerang through reactance in H2, $N = 196$. Control variables were issue type, prior belief strength, and perceived competence to exercise belief freedom. Control variables were used for predicting both the mediators and endogenous variables but were not shown in the figure for simplicity. All variables (except for anger) were specified as observed variables. Anger was assessed by multiple items. For correcting the measurement error, anger was treated as a latent variable with one indicator (i.e., the averaged composite) and the error term of the indicator fixed at $(1 - \alpha)$ times the indicator's variance. The error terms of the two mediators and the two belief boomerang variables were set to covary, respectively.

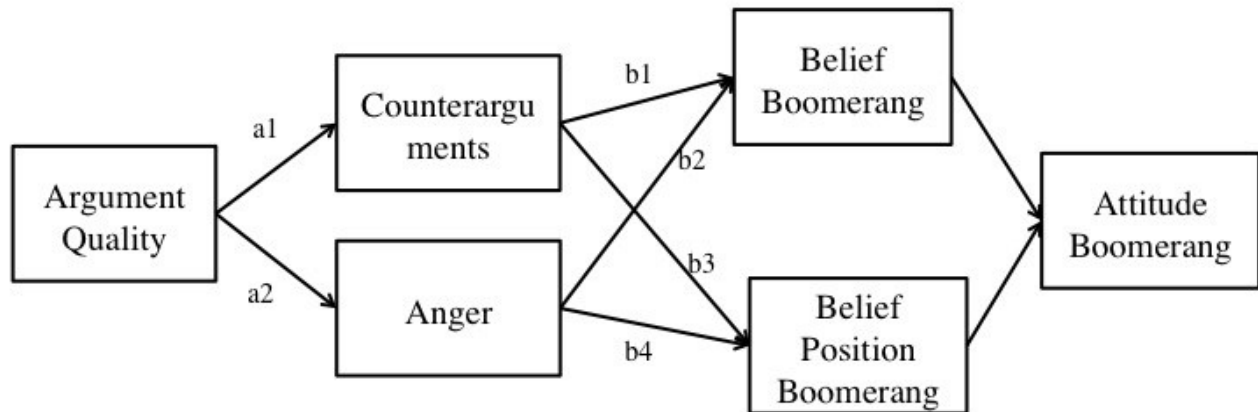


Figure 9. Representations for the indirect effects from argument quality to boomerang through counterarguing (vs. anger) in H5, $N = 149$. Control variables were issue type and prior belief strength. Control variables were used for predicting both the mediators and endogenous variables but were not shown in the figure for simplicity. All variables (except for anger) were specified as observed variables. Anger was assessed by multiple items. For correcting the measurement error, anger was treated as a latent variable with one indicator (i.e., the averaged composite) and the error term of the indicator fixed at $(1 - \alpha)$ times the indicator's variance. The error terms of the two mediators and the two belief boomerang variables were set to covary, respectively.

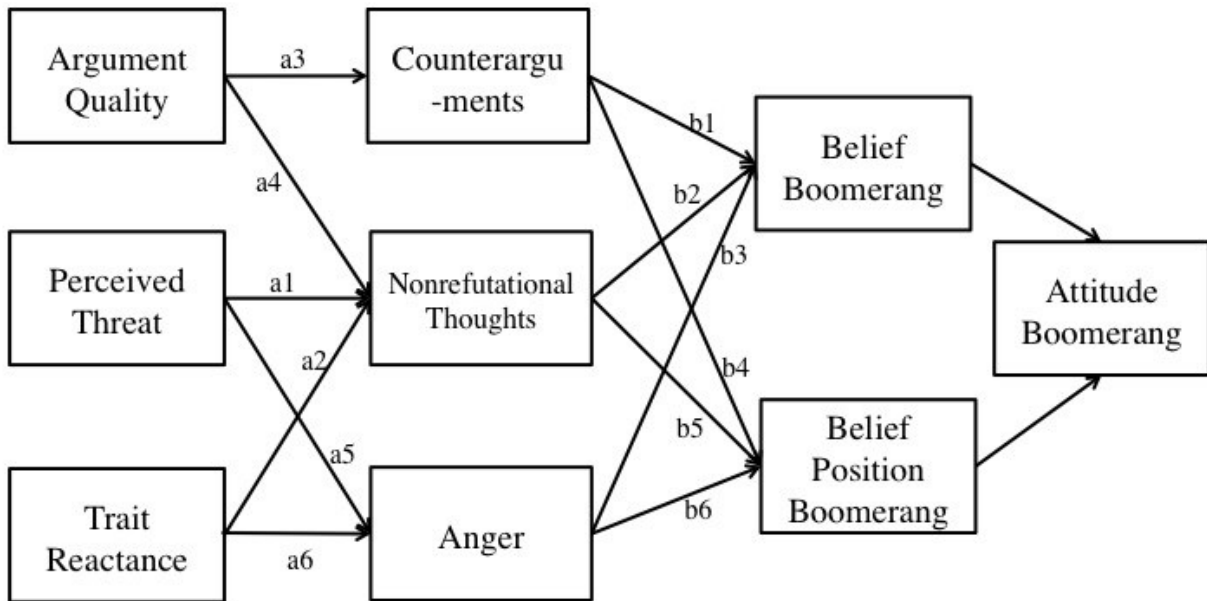


Figure 10. Representations of the indirect effects in the integrated SEM (H6 & H7), $N = 345$. Control variables were issue type, proattitudinal versus counterattitudinal message, prior belief strength, and perceived competence to exercise belief freedom. Control variables were used for predicting both the mediators and endogenous variables but were not shown in the figure for simplicity. All variables (except for anger) were specified as observed variables. Anger was assessed by multiple items. For correcting the measurement error, anger was treated as a latent variable with one indicator (i.e., the averaged composite) and the error term of the indicator fixed at $(1 - \alpha)$ times the indicator's variance. The error terms of the two mediators and the two belief boomerang variables were set to covary, respectively. The estimation method was maximum likelihood. Standard errors were estimated by the Delta method (see R "lavaan", Rosseel, 2001).

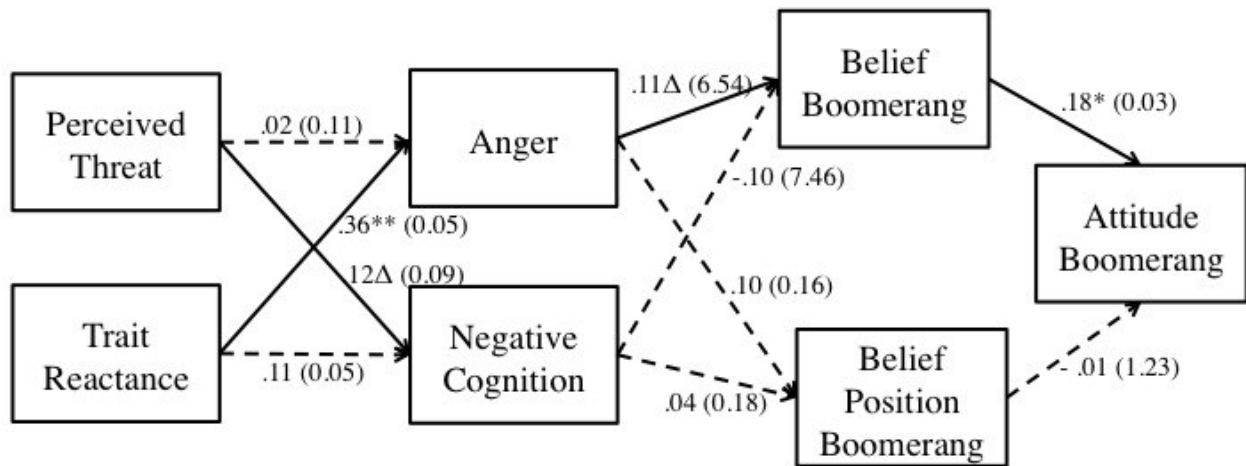


Figure 11. Estimated Parameters for the Proattitudinal SEM.

Standardized path coefficients were reported. Standard errors were reported in the parentheses. The solid lines indicate significant path coefficients, whereas dashed lines indicate nonsignificant path coefficients. The model tested H2 and RQ1 in R “lavaan” package. All variables (except for anger) were specified as observed variables. The estimation method was maximum likelihood. The error terms of the two mediators and the two belief boomerang variables were set to covary, respectively. Control variables were issue type, prior belief strength, and perceived competence to exercise belief freedom. Control variables were used for predicting both the mediators and endogenous variables but were not shown in the figure for simplicity. The model fit indices: χ^2 (6, $N = 196$) = 5.13, $p > .05$, SRMR = 0.017, RMSEA = .00, and CFI = 1.00. $R^2 = .196$, .060, and .243, respectively for the belief boomerang, belief position boomerang, and attitude boomerang, respectively. $R^2 = .132$ and .079 for anger and negative cognitions, respectively. For definitions of belief boomerang, belief position boomerang, and attitude boomerang, see Section of “computing individual boomerang scores” on p. 64. See Table 2 for how these dependent variables were transformed; see Instrumentation section for how the independent variables were transformed.

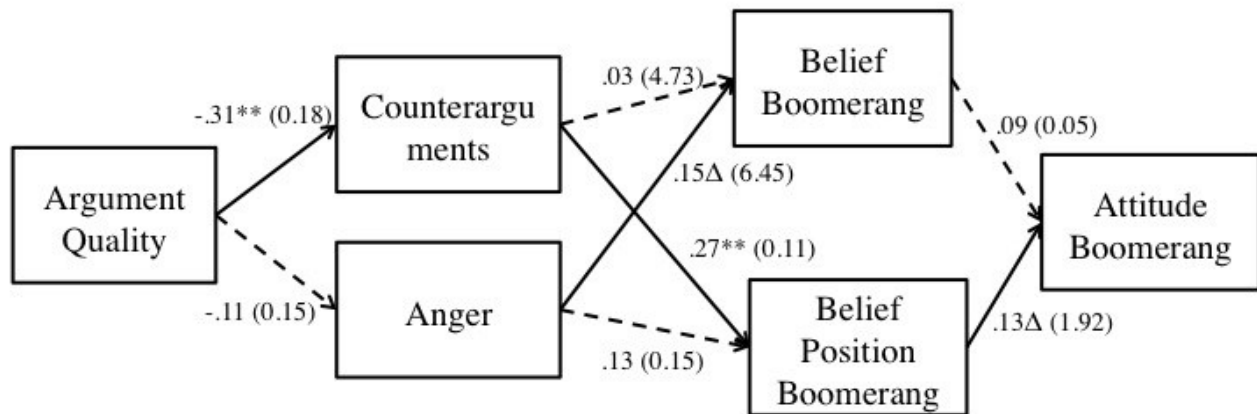


Figure 12. Estimated Parameters for the Counterattitudinal SEM.

Standardized path coefficients were reported. Standard errors were reported in the parentheses. The solid lines indicate significant path coefficients, whereas dashed lines indicate nonsignificant path coefficients. The model tested H5 and RQ2 in R “lavaan” package. All variables (except for anger) were specified as observed variables. The estimation method was maximum likelihood. The error terms of the two mediators and the two belief boomerang variables were set to covary, respectively. Control variables were issue type and prior belief strength. Control variables were used for predicting both the mediators and endogenous variables but were not shown in the figure for simplicity. They were not shown in the figure for simplicity. The model fit indices: χ^2 (7, $N = 149$) = 8.47, $p > .05$, SRMR = 0.03, RMSEA = .04, and CFI = 0.97. $R^2 = .032$, .125, and .074 for the belief boomerang, belief position boomerang, and attitude boomerang, respectively. $R^2 = .164$ and .015 for counterarguments and anger, respectively. For definitions of belief boomerang, belief position boomerang, and attitude boomerang, see Section of “computing individual boomerang scores” on p. 64. See Table 2 for how these dependent variables were transformed; see Instrumentation section for how the independent variables were transformed.

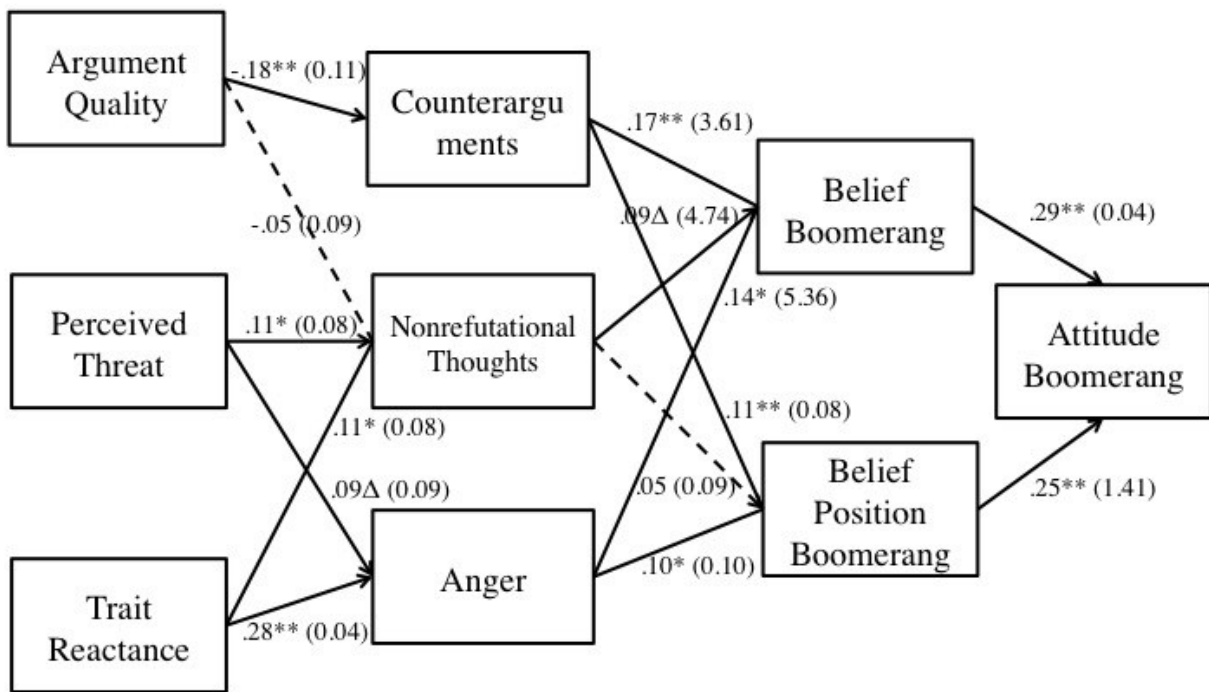


Figure 13. Estimated Parameters for the Integrated SEM.

Standardized path coefficients were reported. Standard errors were reported in the parentheses. The solid lines indicate significant path coefficients, whereas dashed lines indicate nonsignificant path coefficients. The model tested H6 and H7 in R “lavaan” package. All variables (except for anger) were specified as observed variables. The estimation method was maximum likelihood. The error terms of the two mediators and the two belief boomerang variables were set to covary, respectively. Control variables were issue type, proattitudinal versus counterattitudinal message, prior belief strength, and perceived competence to exercise belief freedom. Control variables were used for predicting both the mediators and endogenous variables but were not shown in the figure for simplicity. The model fit indices: $\chi^2(17, N = 345) = 17.64, p > .05$, SRMR = 0.02, RMSEA = .01, and CFI = 1.00. $R^2 = .113, .384$, and $.180$ for the belief boomerang, belief position boomerang, and attitude boomerang, respectively. $R^2 = .093, .074$, and $.158$ for counterarguments, nonrefutational thoughts, and anger, respectively. For definitions of belief boomerang, belief position boomerang, and attitude boomerang, see Section of “computing individual boomerang scores” on p. 64. See Table 2 for how these dependent variables were transformed; see Instrumentation section for how the independent variables were transformed.

Appendix A: The Questionnaire for Pilot Study 1

Researchers at the University of Maryland are studying what issues young people on campus perceive to be exposed to. The word “**EXPOSED**” in this context means that **you hear about them from parents, media, your friends, or other sources**. We would like you to answer the questions that follow to help us to learn about those issues. There are no right or wrong answers; we are interested in your views.

Remember that you cannot proceed to the next question if you do not provide a complete description of the issue. If you provide answers that are not meaningful to researchers (e.g., type the same word for every question), you **will not receive any credit** for participation.

Please list the first issue you hear about from any source.

What is your opinion or position on this issue?

Please list the second issue you hear about from any source.

What is your opinion or position on this issue?

Please list the third issue you hear about from any source.

What is your opinion or position on this issue?

Please list the fourth issue you hear about from any source.

What is your opinion or position on this issue?

Please list the fifth issue you hear about from any source.

What is your opinion or position on this issue?

Finally, please provide the following demographic information.

1. Please indicate your age: _____

2. Please indicate your gender:

Female Male

3. Please indicate your ethnicity:

- White
- Black, or African American
- Latino, or Hispanic American
- American Indian or Alaska Native
- Pacific Islander
- Asian, or Asian American
- Middle Eastern
- Other

4. Please indicate what year you are in college: _____

- Freshman
- Sophomore
- Junior
- Senior
- Graduate
- Other

Please provide your SONA ID code (the code assigned to you by the SONA system when you signed up for the study), so that the researchers can grant you the credit: _____.

Thank you!

Appendix B: The Questionnaire for Pilot Study 2

Researchers at the University of Maryland are studying young people's attitudes and beliefs towards a variety of social and health issues. We would like you to answer the questions that follow to help us to learn about those issues. There are no right or wrong answers; we are interested in your views.

Remember that researchers have ways to check whether your answers are meaningful and thoughtful. For example, if you select the same answer for all the questions in a very short time, you **will not receive any credit** for participation.

The current legal age for drinking alcoholic beverages in Maryland is 21 years old.

1. What do you think Maryland's legal drinking **age** should be?

2. How much do you **like** the current legal drinking age? Indicate the extent to which like the current legal age on a 11-point scale where 1 indicates "Not at all", 6 indicates "Moderate", and 11 indicates "Extremely".

3. How **good** is the current legal drinking age? Indicate the extent to which you think the current legal age is good on a 11-point scale where 1 indicates "Not at all", 6 indicates "Moderate", and 11 indicates "Extremely".

4. The current legal drinking age should be **increased**. Indicate the extent to which you agree with the statement on a 11-point scale where 1 indicates "Strongly Disagree", 6 indicates "Neither Agree or Disagree", and 11 indicates "Strongly Agree".

5. The current legal drinking age should be **decreased**. Indicate the extent to which you agree with the statement on a 11-point scale where 1 indicates "Strongly Disagree", 6 indicates "Neither Agree or Disagree", and 11 indicates "Strongly Agree".

Due to a tuition increase and one-time surcharge, the tuition of full-time resident undergraduates at the University of Maryland is \$4865.93 for Spring 2015 semester.

1. How much do you think the tuition should be in Spring 2015?

2. How much do you **like** the current tuition for Spring 2015? Indicate the extent to which like the current legal age on a 11-point scale where 1 indicates "Not at all", 6 indicates "Moderate", and 11 indicates "Extremely".

3. How **good** is the current tuition for Spring 2015? Indicate the extent to which you think the current legal age is good on a 11-point scale where 1 indicates "Not at all", 6 indicates "Moderate", and 11 indicates "Extremely".

4. The current tuition for Spring 2015 should be increased. Indicate the extent to which you agree with the statement on a 11-point scale where 1 indicates “Strongly Disagree”, 6 indicates “Neither Agree or Disagree”, and 11 indicates “Strongly Agree”.

5. The current tuition for Spring 2015 should be decreased. Indicate the extent to which you agree with the statement on a 11-point scale where 1 indicates “Strongly Disagree”, 6 indicates “Neither Agree or Disagree”, and 11 indicates “Strongly Agree”.

The age of marriage in the United States varies by state, but is generally 18. However, with parental and/or judicial consent, most states allow parties of lower ages to marry. For example, in Maryland, parties can marry at age sixteen with parental consent.

1. What do you think Maryland’s legal **age** of marriage with parental and/or judicial consent should be?

2. How much do you **like** the current age of marriage with parental and/or judicial consent in Maryland? Indicate the extent to which you think the current legal age is good on a 11-point scale where 1 indicates “Not at all”, 6 indicates “Moderate”, and 11 indicates “Extremely”.

3. How **good** is the current age of marriage with parental and/or judicial consent in Maryland? Indicate the extent to which you think the current legal age is good on a 11-point scale where 1 indicates “Not at all”, 6 indicates “Moderate”, and 11 indicates “Extremely”.

4. The current age of marriage with parental and/or judicial consent in Maryland should be increased. Indicate the extent to which you agree with the statement on a 11-point scale where 1 indicates “Strongly Disagree”, 6 indicates “Neither Agree or Disagree”, and 11 indicates “Strongly Agree”.

5. The current age of marriage with parental and/or judicial consent in Maryland should be decreased. Indicate the extent to which you agree with the statement on a 11-point scale where 1 indicates “Strongly Disagree”, 6 indicates “Neither Agree or Disagree”, and 11 indicates “Strongly Agree”.

The amount of sleep one needs each day changes over the course of one’s life. The National Heart, Lung, and Blood Institute recommends that an adult needs 7-8 hours of sleep a day.

1. How many **hours** of sleep do you think that an undergraduate should have each day?

2. How much do you **like** to get 7-8 hours of sleep per day? Indicate the extent to which you think the current legal age is good on a 11-point scale where 1 indicates “Not at all”, 6 indicates “Moderate”, and 11 indicates “Extremely”.

3. How **good** is it to get 7-8 hours of sleep per day? Indicate the extent to which you think the current legal age is good on a 11-point scale where 1 indicates “Not at all”, 6 indicates “Moderate”, and 11 indicates “Extremely”.

4. An undergraduate should sleep **more** than 7-8 hours per day. Indicate the extent to which you agree with the statement on a 11-point scale where 1 indicates “Strongly Disagree”, 6 indicates “Neither Agree or Disagree”, and 11 indicates “Strongly Agree”.

5. An undergraduate should sleep **less** than 7-8 hours per day. Indicate the extent to which you agree with the statement on a 11-point scale where 1 indicates “Strongly Disagree”, 6 indicates “Neither Agree or Disagree”, and 11 indicates “Strongly Agree”.

The Department of Communication at the University of Maryland may impose a new policy that undergraduates need to take four courses in career training in their four years of undergraduate study.

1. How many courses in career training in four years do you think undergraduates should take?

2. How much do you **like** that that undergraduates need to take four courses in career training in their four years of undergraduate study? Indicate the extent to which you think the current legal age is good on a 11-point scale where 1 indicates “Not at all”, 6 indicates “Moderate”, and 11 indicates “Extremely”.

3. How **good** is it that undergraduates need to take four courses in career training in their four years of undergraduate study? Indicate the extent to which you think the current legal age is good on a 11-point scale where 1 indicates “Not at all”, 6 indicates “Moderate”, and 11 indicates “Extremely”.

4. The new policy should require that undergraduates take **more** than four courses in career training in their four years of undergraduate study. Indicate the extent to which you agree with the statement on a 11-point scale where 1 indicates “Strongly Disagree”, 6 indicates “Neither Agree or Disagree”, and 11 indicates “Strongly Agree”.

5. The new policy should require that undergraduates take **less** than four courses in career training in their four years of undergraduate study. Indicate the extent to which you agree with the statement on a 11-point scale where 1 indicates “Strongly Disagree”, 6 indicates “Neither Agree or Disagree”, and 11 indicates “Strongly Agree”.

Finally, please provide the following demographic information.

1. Please indicate your age: _____

2. Please indicate your gender:

Female Male

3. Please indicate your ethnicity:

- White
- Black, or African American
- Latino, or Hispanic American
- American Indian or Alaska Native
- Pacific Islander
- Asian, or Asian American
- Middle Eastern
- Other

4. Please indicate what year you are in college: _____

- Freshman
- Sophomore
- Junior
- Senior
- Graduate
- Other

Please provide your SONA ID code (the code assigned to you by the SONA system when you signed up for the study), so that the researchers can grant you the credit: _____.

Thank you!

Appendix C: The Questionnaire for Pilot Study 3

Researchers at the University of Maryland are studying college students' views towards about social issues. Today we would like you to tell us your views about two particular issues, Maryland's legal drinking age and legal marriage age. There are no right or wrong answers; we are interested in your views. We will also ask you to provide us with arguments pro and con about these issues.

It is **important** that you provide meaningful and thoughtful answers. To receive credit for your participation in this research project, you will need to answer carefully, clearly, and thoughtfully.

1. The current legal age for drinking alcoholic beverages in Maryland is 21 years old.

Please indicate your position toward this issue.

What do you think Maryland's legal drinking **age** should be?

Now, think about your position toward this issue, Maryland's legal drinking age. You will be asked to generate arguments that **support** your position.

1. _____
2. _____
3. _____
4. _____

Now, you will be asked to generate arguments **opposite** to your position toward this issue, Maryland's legal drinking age.

1. _____
2. _____
3. _____
4. _____

2. The age of marriage in the United States varies by state, but is generally 18. However, with parental and/or judicial consent, most states allow younger people to marry. For example, in Maryland, parties can marry at age sixteen with parental consent.

Please indicate your position toward the issue.

What do you think Maryland's legal **age** of marriage with parental and/or judicial consent should be?

Now think about your position toward this issue, the legal age of marriage. You will be asked to generate arguments that **support** your position.

1. _____

2. _____
3. _____
4. _____

Now, you will be asked to generate arguments **opposite** to your position toward this issue, Maryland's legal age of marriage.

1. _____
2. _____
3. _____
4. _____

Finally, please provide the following demographic information.

1. Please indicate your age: _____

2. Please indicate your gender:

Female Male

3. Please indicate your ethnicity:

- White
- Black, or African American
- Latino, or Hispanic American
- American Indian or Alaska Native
- Pacific Islander
- Asian, or Asian American
- Middle Eastern
- Other

4. Please indicate what year you are in college: _____

- Freshman
- Sophomore
- Junior
- Senior
- Graduate
- Other

Please provide your SONA ID code (the code assigned to you by the SONA system when you signed up for the study), so that the researchers can grant you the credit: _____.

Thank you!

Appendix D: The Questionnaire for Pilot Study 5

Before you continue, we want to make sure you are familiar with the scales you will be using throughout the study. For every question you will be asked to use a specific number from 0 (zero) on up. Zero means **not at all**, 100 means **a moderate amount**, and you may use any number from zero on up. For example, suppose the question asked “How much do you like ice cream?”

- If you don’t like ice cream at all, you would answer 0.
- If you like ice cream moderately, you would answer 100.
- If you like ice cream only a little bit (less than moderately), you could answer 20 or 40 (again, the choice of what number to use is yours).
- If you really liked ice cream, you may answer something like 300 or 400, depending on how much you really like it.

So, let’s practice this scale a little bit:

1. How much do you like the food offered in the Stamp Student Union?

0 = not at all 100 = moderate amount

Use any number from zero on up:

2. How important is it for you to do well on your next COMM exam?

0 = not at all 100 = moderately important

Use any number from zero on up:

3. What’s the lowest number you can use for answering questions according to this scale? Please use a number to answer this question.

4. What does 100 indicate when using this scale? (An incorrect answer will not allow you to proceed to the next question)

- The lowest amount that you can use.
- A moderate amount of a variable.
- A larger-than-moderate amount of a variable.
- The highest value you can use.

5. Can you use a number such as 375 to answer a question? (An incorrect answer will not allow you to proceed to the next question)

- Yes
- No

Now that you have learned how to use the magnitude scales, please click the button below to continue.

Researchers at the University of Maryland are studying young people's attitudes towards various arguments on social issues. We would like you to answer the questions that follow to help us to

learn about your evaluation of arguments on social issues. There are no right or wrong answers; we are interested in your views. Remember that researchers have ways to check whether your answers are meaningful and thoughtful. For example, if you select the same answer for all the questions in a very short time, you will not receive any credit for participation.

I. The current legal age for drinking alcoholic beverages in Maryland is 21 years old. You will read 5 arguments on why Maryland's legal drinking age should be lowered. You are going to rate the quality of those arguments. Considering, how strong is the argument you just read?

0 = not at all 100 = moderately strong

Use any number from zero on up

(Participants were randomly assigned to condition 1 or 2)

1a. A 2013 Youth Risk Behavior Survey revealed that over half of high school students drank some amount of alcohol during the past month. Further, binge drinking among Greek members contributes to the highest rates of car accidents, sexual assaults, and emergency room visits on college campuses. Because the majority of teenagers under 21 consume alcoholic beverages and the current legal drinking age of 21 is ineffective, Maryland's legal drinking age should be lowered.

0 = not at all 100 = moderately strong

Use any number from zero on up

1b. The current legal drinking age has pushed underage drinking into private and less controlled environments, where young adults may be more prone to binge drinking and other unsafe behaviors. What we need is a normal environment of parental and community supervision so that drinking behavior can occur in a responsible way. Teaching responsible drinking at an earlier age can help to control possible binge drinking in the future. So we suggest lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong

Use any number from zero on up

1c. The government should regulate the consumption of alcohol based on different ages rather than set 21 as a legal age for drinking. Most countries in the world have regulations rather than laws on alcohol consumption. For example, in Germany, there is a tiered system involving alcohol, such that alcohols of different contents (beer, wine and liquor) can be consumed at different ages progressively. So we suggest lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong

Use any number from zero on up

1d. There are fewer drunk driving traffic accidents and fatalities in many European countries that have a lower legal drinking age. For example, alcohol-related traffic accidents and fatalities decreased by 57% between 1975 and 1990 in Germany where the drinking age is 16. One reason may be that teenagers are familiar with the influence of alcohol on their behavior (e.g., driving)

at an earlier age. This may lead to fewer cases of drunk driving. So, we suggest lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong

Use any number from zero on up

1e. A legal drinking age of 21 encourages young adults to acquire and use false identification documents to procure alcohol. In this era of national security concerns, including terrorism, illegal immigration, and other threats, it would be better to have fewer fake IDs in circulation and more respect for the law. So, we suggest lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong

Use any number from zero on up

2a. According to Neff, a freshman from Germany, he and his best friends have started consuming various types of alcoholic beverages since high school. Neff concluded that all the teenagers in the United States consumed alcoholic beverages in their high school and college too and the current legal drinking age of 21 was ineffective. Thus, we suggest lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong

Use any number from zero on up

2b. The current legal drinking age has pushed underage drinking into private and less controlled environments, where young adults may be more prone to binge drinking and other unsafe behaviors. A school official advocating the elimination of all the Greek communities believed that binge drinking among Greek members contributes to all the car accidents and sexual assaults in the United States. He believed that teaching responsible drinking at an earlier age could solve all the problems on campus. So we suggest lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong

Use any number from zero on up

2c. The government should regulate the consumption of alcohol based on different ages rather than set 21 as a legal age for drinking. Maurice, a freshman in Salisbury University, strongly believes that he is much more mature than his peers and should be able to drink all types of alcohol because there is no serious health damage on his brain that is brought on by liquor. So we suggest lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong

Use any number from zero on up

2d. There are fewer drunk driving traffic accidents and fatalities in many European countries that have a lower legal drinking age. For example, traffic accidents and fatalities decreased by 57% between 1975 and 1990 in Germany where the drinking age is 16. Tom, a high school graduate

in the United States, believed that there were fewer cases of traffic accidents in Germany in 1990 than in 1975 because the legal drinking age in Germany is 16. So we suggest lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong

Use any number from zero on up

2e. A legal drinking age of 21 encourages young adults to acquire and use false identification documents to procure alcohol. An old man from New York believed that all the social problems, including terrorism, illegal immigration, and severe unemployment, are caused by fake identifications used by young people. Having fewer fake IDs in circulation solves all these threats. So, we suggest lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong

Use any number from zero on up

II. Now, you will read 6 arguments on why Maryland's legal drinking age should not be lowered. You are going to rate the quality of those arguments. Considering, how strong is the argument you just read?

0 = not at all 100 = moderately strong

Use any number from zero on up

(Participants were randomly assigned to condition 3 or 4)

3a. For most 18-year-olds, the frontal lobe of the brain – largely involved in “executive functioning” processes such as judgment, reasoning, self-monitoring, and inhibiting and regulating behavior – is still quite immature. For example, research shows that adolescents are less sensitive to the negative effects of alcohol that normally serve as cues for grown-ups to “slow down.” This is the reason that binge drinking is more common among adolescents. So, we suggest not lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong

Use any number from zero on up

3b. Not only do 18-year-olds usually lack the “mature” brain capacity to make good choices regarding alcohol, but their use of alcohol may actually damage the part of the brain that they need to make such choices. According to several studies, alcohol abuse in adolescence is correlated with reduced volume of the hippocampus, a primary center in the brain for memory. Alcohol also damages the frontal lobe, which contains parts of the brain that involve impulse control. So we suggest not lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong

Use any number from zero on up

3c. A lower drinking age may also be tied to lower grades, poor attendance and increases in dropout rates. The 2000 National Household Survey on Drug Abuse found that as rates of alcohol use by 12- to 17-year-olds increase, grade point averages decrease. Research also has shown that middle school students who avoid using alcohol and other drugs score higher on state reading and math tests than other students. So, we suggest not lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong

Use any number from zero on up

3d. Beginning to drink during high school may be relatively more likely to lead to later abuse and addiction than delaying drinking until adulthood. Data from a survey of 43,000 U.S. adults heighten concerns that early alcohol use, independent of other risk factors, may contribute to the risk of developing future alcohol problems. So we suggest not lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong

Use any number from zero on up

3e. A legal drinking age of 21 reduces traffic accidents and fatalities. A study in 2010 found that a higher legal drinking age was associated with lower rates of traffic accidents. The National Highway Traffic Safety Administration (NHTSA) estimated that a legal drinking age of 21 decreased the number of fatal traffic accidents for young people aged 18-21 by 13%. So we suggest not lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong

Use any number from zero on up

4a. For most 18-year-olds, the frontal lobe of the brain – largely involved in “executive functioning” processes such as judgment, reasoning, self-monitoring, and inhibiting and regulating behavior – is still quite immature. Jennifer, a housewife and a Christian, said that her 16-year-old kid’s brains were not fully developed and thus had a red face after consuming some quantity of alcohol. Thus Jennifer believed that all the adolescents should not drink. So, we suggest not lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong

Use any number from zero on up

4b. Not only do 18-year-olds usually lack the “mature” brain capacity to make good choices regarding alcohol, but their use of alcohol may actually damage the part of the brain that they need to make such choices. Jill was a senior in a college and recently suffered from a severe grade slippage. Her parents were seriously concerned about her grades and suspected that their daughter may be involved in alcohol abuse. Her parents believed drinking led to all the brain problems among teenagers, such as loss of memory and damage of impulse control. So, we suggest not lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong
Use any number from zero on up

4c. A lower drinking age may also be tied to lower grades, poor attendance and increases in dropout rates. Lizzy, a parent of a 17-year-old high school student, said that her son scored lower than the average on the state reading and math tests. Lizzy believed that drinking must have caused this decrease in grade point averages, because most high school students start consuming alcoholic beverages at 17. So we suggest not lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong
Use any number from zero on up

4d. Beginning to drink during high school may be relatively more likely to lead to later abuse and addiction than delaying drinking until adulthood. Douglas was a middle-aged salesperson and had just divorced his wife. He felt depressed and relapsed into alcohol addiction. The only reason that Douglas was addicted to alcohol again was because of his early drinking behavior in high school. So we suggest not lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong
Use any number from zero on up

4e. A legal drinking age of 21 reduces traffic accidents and fatalities. Ashley was a commuter on I-495 and she witnessed that too many people had died in car accidents on the Interstate. Ashley believed that drunk young drivers on the road prevented people from driving safely and caused all the crashes on the Capital Beltway. So we suggest not lowering Maryland's legal drinking age.

0 = not at all 100 = moderately strong
Use any number from zero on up

III. The age of marriage in the United States varies by state, but is generally 18. However, with parental and/or judicial consent, most states allow parties of lower ages to marry. For example, in Maryland, parties can marry at age sixteen with parental consent. You will read 4 arguments on why Maryland's legal drinking age should be increased. You are going to rate the quality of those arguments. Considering, how strong is the argument you just read?

0 = not at all 100 = moderately strong
Use any number from zero on up

(Participants were randomly assigned to condition 5 or 6)

5a. At 16, an individual is not an independent adult and they are not physically and psychologically prepared for the responsibilities regarding their selection of a life-long partner. With limited mental capacity and life experience, teenagers' knowledge and attitudes regarding marriage and significant others may be mercurial. As a result, they need more life

experience before they decide to settle down. So we suggest increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

5b. Marrying at an early age could lead to potential early marriage instability. According to the National Survey of Family Growth in 2009, of the marriages entered into before age 18, nearly 70% end in divorce. It seems that the likelihood of marriages' success and endurance may be improved given that the two people marry at older ages. So we suggest increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

5c. At 16, one lacks the relational skills and emotional maturity required to sustain the marriage. According to a professor who specializes in family communication, younger people have more difficulty controlling their anger and anxiety when they communicate with their partners. As a result, people who marry at a younger age are more likely to experience marriage failure. So we suggest increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

5d. There are severe life consequences for those who marry and give birth to a child at an early age: they are more likely than those who delay their marriage to discontinue their formal educations prematurely, earn low wages, and live in poverty. Those who marry and give birth to a kid at an early age are obliged to more family responsibilities. This is the most important cause of why they are not capable of finishing their college educations and not able to make a living. Teen fathers and mothers are worse off economically than those who enter marriage at an older age because they are forced to concentrate on their babies rather than their careers. So we suggest increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

5e. Besides physical health threats potentially brought by early childbearing (e.g., obstetric fistula), women who marry early may develop more mental health problems than those who marry later. According to a study by CAMH (the Center for Addiction and Mental Health), women who marry as adolescents have higher rates (i.e., a 41% increase) of lifetime mental illness, such as depression, anxiety, and bipolar disorder, than women who marry in adulthood. So we suggest increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

6a. At 16, an individual is not an independent adult and they are not physically and psychologically prepared for the responsibilities regarding their selection of a life-long partner. As a police officer from New York, Adam saw many cases of juvenile delinquency. As a result, he concluded that all teenagers are irresponsible and immature and they need more education before they decide to settle down. So we suggest increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

6b. Marrying at an early age could lead to potential early marriage instability. Annie, a 29-year-old housewife of three children, recalled that one of her best friends in high school was married before she got her high school diploma. The young couple ended up divorcing at age 25.

Therefore, Annie believed that all early marriages are instable and will fall apart sooner or later. So we suggest increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

6c. At 16, one lacks the relational skills and emotional maturity required to sustain the marriage. Thomas married his high school sweetheart at 16. However, due to his bipolar emotional disorder, he had difficulty controlling his emotion during his communication with his partner. Thus, all young people lack emotional management skills and will experience marriage failures. So we suggest increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

6d. There are severe life consequences for those who marry and give birth to a kid at an early age: they are more likely than those who delay their marriage to discontinue their formal educations prematurely, earn low wages, and live in poverty. For example, Jill was not interested in further education after she finished her high school. She worked as a waitress at a local restaurant and got married at the early age of 16 with a guy who worked as a waiter in the same restaurant. Jill soon had her first baby at 17. Thus, it can be concluded that teen fathers and mothers must be worse off economically than those who enter marriage at an older age because they are forced to concentrate on their babies rather than careers. So we suggest increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

6e. Besides physical health threats potentially brought by early childbearing (e.g., obstetric fistula), women who marry early may develop more mental health problems than those who marry later. Marrying at an early age absolutely causes a higher risk of developing all kinds of mental health problems. The mental health problems include coronary disease, breast cancer, and

bipolar disorder. Thus, the older one gets married, the less likely the person develops serious mental disease. So we suggest increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

IV. Now, you will read 4 arguments on why Maryland's legal age of marriage should not be increased. You are going to rate the quality of those arguments. Considering, how strong is the argument you just read?

0 = not at all 100 = moderately strong

Use any number from zero on up

(Participants were randomly assigned to condition 7 or 8)

7a. Marrying at a young age may help teenagers mature. Marriage carries with it a heightened sense of responsibility and obligation, which forces teenagers to grow up. When a woman is committed to marriage, she needs to be responsible for taking care of the family and for nurturing her babies. So, those who get married at an early age have to spend more time planning and pursuing their educational and professional goals and less time partying and drinking. So, we suggest not increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

7b. Parental consent helps those youth who decide to marry at an early age make a right choice. According to Dr. Robert Epstein, a Harvard psychologist, those who had their partner chosen for them by parents tended to feel more in love as time passes. One reason is that parents are able to determine whether the two teenagers' family backgrounds, interests, and life goals are compatible. Further, parents help teenagers decide whether their relationship should be developed into a marriage. So, with parental consent, there is no need to increase Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

7c. Marriage is certainly one route to reduce out-of-wedlock births by those teenagers who become pregnant. Premarital pregnancy causes harmful consequences for both the parents and their children. For instance, in Tennessee, Census Bureau data from 2006-2008 showed that a child had a 43.1% chance of being impoverished if he or she was in a single-parent, female-headed family. So we suggest not increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

7d. A legal marriage age below 16 is prevalent among many countries. For the period 2000-2011, about 12% of women in developing regions were married or in union before age 15. In 2010 this was equivalent to almost 24 million women. As a nation of immigrants, the United States should preserve the right of teenagers from other cultures to get married. So we suggest not increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

8a. Marrying at a young age may help teenagers mature. Marriage carries with it a heightened sense of responsibility and obligation, which forces teenagers to grow up. When a man is committed to marriage, he becomes responsible for providing for his family, making sure the bills are paid, and protecting his wife and future children. Similarly, a woman needs to be responsible for nurturing her babies and taking care of the household. Therefore, 100% of young people who get married at an early age will spend more time planning and pursuing their educational and professional goals and less time partying and drinking. And they will absolutely earn more than those who marry in their 20s or 30s. So we suggest not increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

8b. Parental consent helps those youth who decide to marry at an early age make a right choice. Nadiar got married at the early age of 15 with a guy arranged by her parents in India. She has lived and raised two children with her partner chosen by her parents. For 12 years, Nadiar gradually felt more in love as time passed. Therefore, it should be concluded that all the arranged marriages are more romantic and reliable than the free choice marriages. Parents can always select the right wife/husband for their ignorant and young child. So, with parent consent, there is no need to increase Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

8c. Marriage is certainly one route to reduce out-of-wedlock births by those teenagers who become pregnant. Jenny was a high school teenage girl and got pregnant at 15. Afraid to reveal the fact to her parents, she suffered from psychological disorders and a severe grade slippage. If the legal age of marriage were lowered, Jenny would not suffer from these consequences of pre-marital pregnancy. So we suggest not increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

8d. A legal marriage age below 16 is prevalent among many countries. For example, a Muslim girl can marry when she attains puberty or completes 15 years of age. The same fact applies to all the developing countries in the world. Therefore, this should be applied to the United States

regardless of potential cultural difference. So we suggest not increasing Maryland's legal age of marriage.

0 = not at all 100 = moderately strong

Use any number from zero on up

Finally, please provide the following demographic information.

1. Please indicate your age: _____

2. Please indicate your gender:

Female Male

3. Please indicate your ethnicity:

- White
- Black, or African American
- Latino, or Hispanic American
- American Indian or Alaska Native
- Pacific Islander
- Asian, or Asian American
- Middle Eastern
- Other

4. Please indicate what year you are in college: _____

- Freshman
- Sophomore
- Junior
- Senior
- Graduate
- Other

Please provide your SONA ID code (the code assigned to you by the SONA system when you signed up for the study), so that the researchers can grant you the credit: _____.

Thank you!

Appendix E: The Questionnaire for the Main Study

After signing the consent form, respondents enter the scale training section:

Before you continue, we want to make sure you are familiar with the two types of scales you will be using throughout the study.

For some questions, you will be asked to indicate the extent to which you agree with the statement on a scale, for example, from 1 (Strongly Disagree) to 11 (Strong Agree).

For the other question, you will indicate your answer using a specific number from 0 (zero) on up. Zero means **not at all**, 100 means **a moderate amount**, and you may use any number from zero on up. For example, suppose the question asked “How much do you like ice cream?”

- If you don't like ice cream at all, you would answer 0.
- If you like ice cream moderately, you would answer 100.
- If you like ice cream only a little bit (less than moderately), you could answer 20 or 40 (again, the choice of what number to use is yours).
- If you really liked ice cream, you may answer something like 300 or 400, depending on how much you really like it.

So, let's practice this scale (with which you may be unfamiliar) a little bit:

1. How much do you like the food offered in the Stamp Student Union?

0 = not at all

100 = moderate amount

Use any number from zero on up

2. How important is it for you to do well on your next COMM exam?

0=not at all

100=moderately important

Use any number from zero on up

3. What's the lowest number you can use for answering questions according to this scale? Please use a number to answer this question. Your Answer: _____

4. What does 100 indicate when using this scale? (An incorrect answer will not allow you to proceed to the next question)

Your Answer:

- The lowest amount that you can use.
- A moderate amount of a variable.
- A larger-than-moderate amount of a variable.
- The highest value you can use.

5. Can you use a number such as 375 to answer a question? (An incorrect answer will not allow you to proceed to the next question)

- Yes
- No

There were two versions of questionnaire in the main study, as two issues were employed, legal drinking age and legal marriage age. Although stimulus messages were different in content, the questionnaires were similar except for some minor change in wordings. Thus, all the messages were provided below, but only the questionnaire for the legal drinking age was provided.

Pre-message Survey

Now that you have learned how to use the scales, please click the button below to continue.

Researchers at the University of Maryland are studying young people's attitudes towards various arguments on social issues. We would like you to answer the questions that follow to help us to learn about your evaluation of arguments on social issues. There are no right or wrong answers; we are interested in your views.

Remember that researchers have ways to check whether your answers are meaningful and thoughtful. For example, if you select the same answer for all the questions in a very short time, you will not receive any credit for participation.

The current legal age for drinking alcoholic beverages in Maryland is 21 years old.

Please indicate your answer to the following question as **quickly** as possible, but not so quickly that they might make errors. Click the button when you are ready.

Do you support or oppose the current legal age for drinking (21)?

- Oppose
- Support

Now, pace yourself. Considering the issue of Maryland's legal drinking age, how strongly do you believe in your position?

0 = not at all

100 = moderately strong

Use any number from zero on up

How certain is your belief toward the issue?

0 = not at all

100 = moderately certain

Use any number from zero on up

How important is your belief toward the issue to you personally?

0 = not at all
100 = moderately important
Use any number from zero on up

Eighteen Experimental Conditions:

Participants were randomly assigned to one of the sixteen experimental conditions plus two non-message control conditions

Now you are going to read a message regarding the legal age for drinking/marriage. After reading the message, please answer the questions that follow. (Participants will be randomly assigned to 1 of 9 message conditions)

Message 1

We suggest lowering Maryland's legal drinking age. Here are our reasons:

The current legal drinking age has pushed underage drinking into private and less controlled environments, where young adults may be more prone to binge drinking and other unsafe behaviors. What we need is a normal environment of parental and community supervision so that drinking behavior can occur in a responsible way. Lowering the legal drinking age and teaching responsible drinking at an earlier age can help to control possible binge drinking behavior in the future.

A legal drinking age of 21 also encourages young adults to acquire and use false identification documents to procure alcohol. In this era of national security concerns, including terrorism and illegal immigration, it would be better to have fewer fake IDs in circulation and more respect for the law. If the drinking age is lowered, there will be no need for youth to acquire fake IDs.

What's more, there are fewer drunk driving traffic accidents and fatalities in many European countries that have a lower legal drinking age. For example, alcohol-related traffic accidents and fatalities decreased by 57% between 1975 and 1990 in Germany where the drinking age is 16. One reason may be that teenagers are familiar with the influence of alcohol on their behavior (e.g., driving) at an earlier age. This leads to fewer cases of drunk driving.

Rather than set 21 as a legal age for drinking, the government should regulate the consumption of alcohol based on different ages rather than set 21 as a legal age for drinking. Most countries in the world have regulations rather than laws on alcohol consumption. For example, in Germany, there is a tiered system involving alcohol, such that alcohols of different contents (beer, wine and liquor) can be consumed at different ages progressively.

So these are the reasons for the position we advocated. They are good reasons, so you have no choice but to agree with them. Because when you think about it you are really forced to agree because this is a universal student issue.

In conclusion, the legal drinking age should be lowered.

Message 2

We suggest lowering Maryland's legal drinking age. Here are our reasons:

The current legal drinking age has pushed underage drinking into private and less controlled environments, where young adults may be more prone to binge drinking and other unsafe behaviors. What we need is a normal environment of parental and community supervision so that drinking behavior can occur in a responsible way. Lowering the legal drinking age and teaching responsible drinking at an earlier age can help to control possible binge drinking behavior in the future.

A legal drinking age of 21 also encourages young adults to acquire and use false identification documents to procure alcohol. In this era of national security concerns, including terrorism and illegal immigration, it would be better to have fewer fake IDs in circulation and more respect for the law. If the drinking age is lowered, there will be no need for youth to acquire fake IDs.

What's more, there are fewer drunk driving traffic accidents and fatalities in many European countries that have a lower legal drinking age. For example, alcohol-related traffic accidents and fatalities decreased by 57% between 1975 and 1990 in Germany where the drinking age is 16. One reason may be that teenagers are familiar with the influence of alcohol on their behavior (e.g., driving) at an earlier age. This leads to fewer cases of drunk driving.

Rather than set 21 as a legal age for drinking, the government should regulate the consumption of alcohol based on different ages rather than set 21 as a legal age for drinking. Most countries in the world have regulations rather than laws on alcohol consumption. For example, in Germany, there is a tiered system involving alcohol, such that alcohols of different contents (beer, wine and liquor) can be consumed at different ages progressively.

In conclusion, the legal drinking age should be lowered.

Message 3

We suggest lowering Maryland's legal drinking age. Here are our reasons:

The current legal drinking age has pushed underage drinking into private and less controlled environments, where young adults may be more prone to binge drinking and other unsafe behaviors. A school official advocating the elimination of all the Greek communities believed that binge drinking among Greek members contributes to all the car accidents and sexual assaults in the United States. He believed that teaching responsible drinking at an earlier age could solve all the problems on campus.

What's more, a legal drinking age of 21 encourages young adults to acquire and use false identification documents to procure alcohol. An old man from New York believed that all the social problems, including terrorism, illegal immigration, and severe unemployment, are caused by fake identifications used by young people. Having fewer fake IDs in circulation solves all these threats.

There are fewer drunk driving traffic accidents and fatalities in many European countries that have a lower legal drinking age. For example, traffic accidents and fatalities decreased by 57% between 1975 and 1990 in Germany where the drinking age is 16. Tom, a high school graduate in the United States, believed that there were fewer cases of traffic accidents in Germany in 1990 than in 1975 because the legal drinking age in Germany is 16.

Rather than set 21 as a legal age for drinking, the government should regulate the consumption of alcohol based on different ages. Maurice, a freshman in Salisbury University, strongly believes that he is much more mature than his peers and should be able to drink all types of alcohol because there is no serious health damage on his brain that is brought on by liquor.

So these are the reasons for the position we advocated. They are good reasons, so you have no choice but to agree with them. Because when you think about it you are really forced to agree because this is a universal student issue.

In conclusion, the legal drinking age should be lowered.

Message 4

We suggest lowering Maryland's legal drinking age. Here are our reasons:

The current legal drinking age has pushed underage drinking into private and less controlled environments, where young adults may be more prone to binge drinking and other unsafe behaviors. A school official advocating the elimination of all the Greek communities believed that binge drinking among Greek members contributes to all the car accidents and sexual assaults in the United States. He believed that teaching responsible drinking at an earlier age could solve all the problems on campus.

What's more, a legal drinking age of 21 encourages young adults to acquire and use false identification documents to procure alcohol. An old man from New York believed that all the social problems, including terrorism, illegal immigration, and severe unemployment, are caused by fake identifications used by young people. Having fewer fake IDs in circulation solves all these threats.

There are fewer drunk driving traffic accidents and fatalities in many European countries that have a lower legal drinking age. For example, traffic accidents and fatalities decreased by 57% between 1975 and 1990 in Germany where the drinking age is 16. Tom, a high school graduate in the United States, believed that there were fewer cases of traffic accidents in Germany in 1990 than in 1975 because the legal drinking age in Germany is 16.

Rather than set 21 as a legal age for drinking, the government should regulate the consumption of alcohol based on different ages. Maurice, a freshman in Salisbury University, strongly believes that he is much more mature than his peers and should be able to drink all types of alcohol because there is no serious health damage on his brain that is brought on by liquor.

In conclusion, the legal drinking age should be lowered.

Message 5

We suggest not lowering Maryland's legal drinking age. Here are our reasons:

For most 18-year-olds, the frontal lobe of the brain – largely involved in “executive functioning” processes such as judgment, reasoning, self-monitoring, and inhibiting and regulating behavior – is still quite immature. For example, research shows that adolescents are less sensitive to the negative effects of alcohol that normally serve as cues for grown-ups to “slow down.” This is the reason that binge drinking is more common among adolescents.

Not only do 18-year-olds usually lack the “mature” brain capacity to make good choices regarding alcohol, but their use of alcohol may actually damage the part of the brain that they need to make such choices. According to several studies, alcohol abuse in adolescence is correlated with reduced volume of the hippocampus, a primary center in the brain for memory. Alcohol also damages the frontal lobe, which contains parts of the brain that involve impulse control.

Furthermore, a lower drinking age may be tied to lower grades, poor attendance and increases in dropout rates. The 2000 National Household Survey on Drug Abuse found that as rates of alcohol use by 12- to 17-year-olds increase, grade point averages decrease. Research also has shown that middle school students who avoid using alcohol and other drugs score higher on state reading and math tests than other students.

Last but not least, a legal drinking age of 21 reduces traffic accidents and fatalities. A study in 2010 found that a higher legal drinking age was associated with lower rates of traffic accidents. The National Highway Traffic Safety Administration (NHTSA) estimated that a legal drinking age of 21 decreased the number of fatal traffic accidents for young people aged 18-21 by 13%.

So these are the reasons for the position we advocated. They are good reasons, so you have no choice but to agree with them. Because when you think about it you are really forced to agree because this is a universal student issue.

In conclusion, the legal drinking age should not be lowered.

Message 6

We suggest not lowering Maryland's legal drinking age. Here are our reasons:

For most 18-year-olds, the frontal lobe of the brain – largely involved in “executive functioning” processes such as judgment, reasoning, self-monitoring, and inhibiting and regulating behavior – is still quite immature. For example, research shows that adolescents are less sensitive to the negative effects of alcohol that normally serve as cues for grown-ups to “slow down.” This is the reason that binge drinking is more common among adolescents.

Not only do 18-year-olds usually lack the “mature” brain capacity to make good choices regarding alcohol, but their use of alcohol may actually damage the part of the brain that they need to make such choices. According to several studies, alcohol abuse in adolescence is correlated with reduced volume of the hippocampus, a primary center in the brain for memory. Alcohol also damages the frontal lobe, which contains parts of the brain that involve impulse control.

Furthermore, a lower drinking age may be tied to lower grades, poor attendance and increases in dropout rates. The 2000 National Household Survey on Drug Abuse found that as rates of alcohol use by 12- to 17-year-olds increase, grade point averages decrease. Research also has shown that middle school students who avoid using alcohol and other drugs score higher on state reading and math tests than other students.

Last but not least, a legal drinking age of 21 reduces traffic accidents and fatalities. A study in 2010 found that a higher legal drinking age was associated with lower rates of traffic accidents. The National Highway Traffic Safety Administration (NHTSA) estimated that a legal drinking age of 21 decreased the number of fatal traffic accidents for young people aged 18-21 by 13%.

In conclusion, the legal drinking age should not be lowered.

Message 7

We suggest not lowering Maryland's legal drinking age. Here are our reasons:

For most 18-year-olds, the frontal lobe of the brain – largely involved in “executive functioning” processes such as judgment, reasoning, self-monitoring, and inhibiting and regulating behavior – is still quite immature. Jennifer, a housewife and a Christian, said that her 16-year-old kid’s brains were not fully developed and thus had a red face after consumption some quantity of alcohol. Thus Jennifer believed that all the adolescents should not drink.

Not only do 18-year-olds usually lack the “mature” brain capacity to make good choices regarding alcohol, but their use of alcohol may actually damage the part of the brain that they need to make such choices. Jill was a senior in a college and recently suffered from a severe grade slippage. Her parents suspected that their daughter might be involved in alcohol abuse, because drinking led to all the brain problems among teenagers, such as loss of memory and damage of impulse control.

Furthermore, a lower drinking age may also be tied to lower grades, poor attendance and increases in dropout rates. Lizzy, a parent of a 17-year-old high school student, said that her son scored lower than the average on the state reading and math tests. Lizzy believed that drinking must have caused this decrease in grade point averages, because most high school students start consuming alcoholic beverages at 17.

Last but not least, a legal drinking age of 21 reduces traffic accidents and fatalities. Ashley was a commuter on I-495 and she witnessed that too many people had died in car accidents on the

Interstate. Ashley believed that drunk young drivers on the road prevented people from driving safely and caused all the crashes on the Capital Beltway.

So these are the reasons for the position we advocated. They are good reasons, so you have no choice but to agree with them. Because when you think about it you are really forced to agree because this is a universal student issue.

In conclusion, the legal drinking age should not be lowered.

Message 8

We suggest not lowering Maryland's legal drinking age. Here are our reasons:

For most 18-year-olds, the frontal lobe of the brain – largely involved in “executive functioning” processes such as judgment, reasoning, self-monitoring, and inhibiting and regulating behavior – is still quite immature. Jennifer, a housewife and a Christian, said that her 16-year-old kid’s brains were not fully developed and thus had a red face after consumption some quantity of alcohol. Thus Jennifer believed that all the adolescents should not drink.

Not only do 18-year-olds usually lack the “mature” brain capacity to make good choices regarding alcohol, but their use of alcohol may actually damage the part of the brain that they need to make such choices. Jill was a senior in a college and recently suffered from a severe grade slippage. Her parents suspected that their daughter might be involved in alcohol abuse, because drinking led to all the brain problems among teenagers, such as loss of memory and damage of impulse control.

Furthermore, a lower drinking age may also be tied to lower grades, poor attendance and increases in dropout rates. Lizzy, a parent of a 17-year-old high school student, said that her son scored lower than the average on the state reading and math tests. Lizzy believed that drinking must have caused this decrease in grade point averages, because most high school students start consuming alcoholic beverages at 17.

Last but not least, a legal drinking age of 21 reduces traffic accidents and fatalities. Ashley was a commuter on I-495 and she witnessed that too many people had died in car accidents on the Interstate. Ashley believed that drunk young drivers on the road prevented people from driving safely and caused all the crashes on the Capital Beltway.

In conclusion, the legal drinking age should not be lowered.

Message 9

The age of marriage in the United States varies by state, but is generally 18. However, with parental and/or judicial consent, most states allow parties of lower ages to marry. For example, in Maryland, parties can marry at age sixteen with parental consent. We argue that Maryland's legal age of marriage should be raised.

At 16, an individual is not an independent adult and they are not physically and psychologically prepared for the responsibilities regarding their selection of a life-long partner. With limited mental capacity and life experience, teenagers' knowledge and attitudes regarding marriage and significant others may be mercurial. As a result, they need more life experience before they decide to settle down.

At 16, one lacks the relational skills and emotional maturity required to sustain the marriage. According to a professor who specializes in family communication, younger people have more difficulty controlling their anger and anxiety when they communicate with their partners. As such, people who marry at a younger age are more likely to experience marriage failure.

Marrying at an early age could also lead to potential early marriage instability. According to the National Survey of Family Growth in 2009, of the marriages entered into before age 18, nearly 70% end in divorce. It seems that the likelihood of marriages' success and endurance may be improved given that the two people marry at older ages.

Besides physical health threats potentially brought by early childbearing (e.g., obstetric fistula), women who marry early may develop more mental health problems than those who marry later. According to a study by CAMH (the Center for Addiction and Mental Health), women who marry as adolescents have higher rates (i.e., a 41% increase) of lifetime mental illness, such as depression, anxiety, and bipolar disorder, than women who marry in adulthood.

So these are the reasons for the position we advocated. They are good reasons, so you have no choice but to agree with them. Because when you think about it you are really forced to agree because this is a universal student issue.

In conclusion, the legal age of marriage should be raised.

Message 10

The age of marriage in the United States varies by state, but is generally 18. However, with parental and/or judicial consent, most states allow parties of lower ages to marry. For example, in Maryland, parties can marry at age sixteen with parental consent. We argue that Maryland's legal age of marriage should be raised.

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Message 11

The age of marriage in the United States varies by state, but is generally 18. However, with parental and/or judicial consent, most states allow parties of lower ages to marry. For example, in Maryland, parties can marry at age sixteen with parental consent. We argue that Maryland's legal age of marriage should be raised.

At 16, an individual is not an independent adult and they are not physically and psychologically prepared for the responsibilities regarding their selection of a life-long partner. As a police officer from New York, Adam saw many cases of juvenile delinquency. As a result, he concluded that all teenagers are irresponsible and they need more education before they decide to settle down.

At 16, one lacks the relational skills and emotional maturity required to sustain the marriage. However, due to his bipolar emotional disorder, he had difficulty controlling his emotion during his communication with his partner. Thus, all young people lack emotional management skills and will experience marriage failures.

Marrying at an early age could also lead to potential early marriage instability. Annie, a 29-year-old housewife, recalled that one of her best friends in high school was married before she got her high school diploma. The young couple ended up divorcing at age 25. As such, Annie believed that all early marriages would fall apart sooner or later.

Besides physical health threats potentially brought by early childbearing (e.g., obstetric fistula), women who marry early may develop more mental health problems than those who marry later. Marrying at an early age absolutely causes a higher risk of developing all kinds of mental health problems. The mental health problems include coronary disease, breast cancer, and

bipolar disorder. Thus, the older one gets married, the less likely the person develops serious mental disease.

So these are the reasons for the position we advocated. They are good reasons, so you have no choice but to agree with them. Because when you think about it you are really forced to agree because this is a universal student issue.

In conclusion, the legal age of marriage should be raised.

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Besides physical health threats potentially brought by early childbearing (e.g., obstetric fistula), women who marry early may develop more mental health problems than those who marry later. Marrying at an early age absolutely causes a higher risk of developing all kinds of mental health problems. The mental health problems include coronary disease, breast cancer, and bipolar disorder. Thus, the older one gets married, the less likely the person develops serious mental disease.

In conclusion, the legal age of marriage should be raised.

Message 13

The age of marriage in the United States varies by state, but is generally 18. However, with parental and/or judicial consent, most states allow parties of lower ages to marry. For example, in Maryland, parties can marry at age sixteen with parental consent. We argue that Maryland's legal

age of marriage should not be raised.

Marriage is certainly one route to reduce out-of-wedlock births by those teenagers who become pregnant. Premarital pregnancy causes harmful consequences for both the parents and their children. For instance, in Tennessee, Census Bureau data from 2006-2008 showed that a child had a 43.1% chance of being impoverished if he or she was in a single-parent, female-headed family. In comparison, in a family with married parents, a child had only a 7.5% chance of living in poverty.

What's more, parental consent helps those youth who decide to marry at an early age make a right choice. [According to Dr. Robert Epstein, a Harvard psychologist, those who had their partner chosen for them by parents tended to feel more in love as time passes. One reason is that parents are able to determine whether the two teenagers' family backgrounds, interests, and life goals are compatible. Further, parents help teenagers decide whether their relationship should be developed into a marriage. So, with parental consent, there is no need to increase Maryland's legal age of marriage.

Last but not least, a legal marriage age below 16 is prevalent among many countries. For the period 2000-2011, about 12% of women in developing regions were married or in union before age 15. In 2010 this was equivalent to almost 24 million women. As a nation of immigrants, the United States should preserve the right of teenagers from other cultures to get married.

So these are the reasons for the position we advocated. They are good reasons, so you have no choice but to agree with them. Because when you think about it you are really forced to agree because this is a universal student issue.

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Message 14

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Marriage is certainly one route to reduce out-of-wedlock births by those teenagers who become pregnant. Premarital pregnancy causes harmful consequences for both the parents and their children. Jenny was a high school teenage girl and got pregnant at 15. Afraid to reveal the fact to her parents, she suffered from psychological disorders and a severe grade slippage. If the legal age of marriage were lowered, Jenny would not suffer from these consequences of pre-marital pregnancy.

What's more, parental consent helps those youth who decide to marry at an early age make a right choice. Nadiar got married at the early age of 15 with a guy arranged by her parents in India. She has lived and raised two children with her partner chosen by her parents. For 12 years, Nadiar gradually felt more in love as time passed. So it should be concluded that all the arranged marriages are more romantic and reliable than the free choice marriages. Parents can always select the right wife/husband for their ignorant and young child. So, with parent consent, there is no need to increase Maryland's legal age of marriage.

Last but not least, a legal marriage age below 16 is prevalent among many countries. For example, a Muslim girl can marry when she attains puberty or completes 15 years of age. The same fact applies to all the developing countries in the world. Therefore, this should be applied to the United States regardless of potential cultural difference.

So these are the reasons for the position we advocated. They are good reasons, so you have no choice but to agree with them. Because when you think about it you are really forced to agree because this is a universal student issue.

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In conclusion, the legal marriage age should not be increased.

Condition 17

No message and received the questionnaire for legal drinking age

Condition 18

No message and received the questionnaire for legal marriage age

Survey Questionnaire Block 1: Outcome Variables

Now you are going to indicate your positions, beliefs, and attitudes toward the issue (i.e., Maryland's legal drinking age).

How much do you like the current legal drinking age?

0 = not at all

100 = moderate

Use any number from zero on up

How good is that the legal age for drinking alcoholic beverages is 21?

0 = not at all

100 = moderately good

Use any number from zero on up

What do you think Maryland's legal drinking age should be?

Indicate your agreement with the following three arguments regarding the current legal drinking age:

0 = not at all

100 = moderate amount

You may use any number from zero on up

1. The current legal drinking age should be decreased. _____

2. The current legal drinking age should be increased. _____

3. The current legal drinking age should stay the same. _____

Do you feel that you currently possess sufficient information and knowledge about the issue to make an intelligent decision regarding their position?

0 = not at all

100 = moderate agreement

You may use any number from zero on up

Survey Questionnaire Block 2: Mediators

Each word below describes feelings or mood. Please use the rating scales to describe your feelings while reading the message. Work quickly, but not so quickly that they might make errors. Your **first reaction** is best. This should take a minute or two. On the 4-point scale, 1 means "Definitely Do Not Feel", 2 means "Cannot Decide", 3 means "Feel Slightly", and 4 means "Definitely Feel".

1. I felt irritated.

2. I felt angry.

3. I felt annoyed.

4. I felt aggravated.

Please continue to choose the answer you wish to select for the following feelings with the 4-point scale where 1 means "Definitely Do Not Feel", 2 means "Cannot Decide", 3 means "Feel Slightly", and 4 means "Definitely Feel".

1. active
2. placid
3. sleepy
4. jittery
5. energetic
6. intense
7. calm
8. tired
9. vigorous
10. at-rest
11. drowsy
12. fearful
13. lively
14. still
15. wide-awake
16. clutched-up
17. quiet
18. full-of-pep
19. tense
20. wakeful

Now **list** all the **thoughts** you had while reading the message. You have three to five minutes. After you list a thought, you will be instructed to determine the valence (positive vs. negative vs. neutral) of your thought.

1. _____
2. _____
3. _____
4. _____

5. Do you have any additional thought? If not, you can neglect this question and continue.

Survey Questionnaire Block 3: Manipulation Check and other individual trait variables

Now you are going to indicate your agreement with eight statements regarding your perceptions of the message on 11-point scales where 1 indicates “Strongly Disagree”, 6 indicates “Neither Agree nor Disagree”, and 11 indicates “Strongly Agree”.

1. The message made sense.
2. The message covered all relevant aspects necessary for evaluating the topic.
3. The message was easy to understand.
4. The message was reasonable.
5. The message was well-written.
6. The message was convincing.
7. I like the message.
8. The message was interesting.

Below are six questions regarding your perceptions on the source of the message. Indicate your agreement with these statements regarding your perceptions of the message on 11-point scales where 1 indicates “Strongly Disagree”, 6 indicates “Neither Agree nor Disagree”, and 11 indicates “Strongly Agree”.

1. The communicator was sincere.
2. The communicator was competent.
3. The communicator was trustworthy.
4. The communicator was intelligent.
5. The communicator was credible.
6. The communicator was knowledgeable.

Please indicate your agreement with following four statements on 11-point scales where 1 indicates “Strongly Disagree”, 6 indicates “Neither Agree nor Disagree”, and 11 indicates “Strongly Agree”.

1. The message threatened my freedom to choose.
2. The message tried to manipulate me.
3. The message tried to pressure me.
4. The message tried to make a decision for me.

Below are seven questions regarding your evaluations of the message quality. Indicate your agreement with these statements regarding your perceptions of the message on 11-point scales where 1 indicates “Strongly Disagree”, 6 indicates “Neither Agree nor Disagree”, and 11 indicates “Strongly Agree”.

1. The message was smart.
2. The message was well-supported.
3. The message was compelling.
4. The message was effective.
5. The message was informative.
6. The message was detailed.
7. The message was weak.

The following questions help us to learn about you. Please indicate the extent to which you agree with the following statements on 11-point scales where 1 indicates “Strongly Disagree”, 6 indicates “Neither Agree nor Disagree”, and 11 indicates “Strongly Agree”.

1. I become frustrated when I am unable to make free and independent decisions.
2. It irritates me when someone points out things which are obvious to me.
3. I become angry when my freedom of choice is restricted.
4. Regulations trigger a sense of resistance in me.
5. I find contradicting others stimulating.
6. When something is prohibited, I usually think, “That’s exactly what I am going to do.”
7. I resist the attempts of others to influence me.
8. It makes me angry when another person is held up as a role model for me to follow.
9. When someone forces me to do something, I feel like doing the opposite.
10. I consider advice from others to be an intrusion.
11. Advice and recommendations usually induce me to do just the opposite.

Demographic Variables

Finally, please provide the following demographic information.

Please indicate your age: ___

Please indicate your gender: ___

Please indicate your ethnicity:

- White
- Black, or African American
- Latino, or Hispanic American
- American Indian or Alaska Native
- Pacific Islander
- Asian, or Asian American
- Middle Eastern
- Other

Q18 Please indicate what year you are in college:

- Freshman
- Sophomore
- Junior
- Senior
- Graduate
- Other

Debriefing (for Drinking Issue)

This has been a study about how people react to particular kinds of arguments. There were 8 message conditions plus 1 control condition in the study, and you were only in one of them. These messages were related to the legal age for drinking. Under each issue, these messages varied based on (1) argument quality; (2) perceived threat; (3) valence (pro vs. anti). For example, regarding argument quality, one group only got what is called “weak” arguments – the arguments that were based on personal anecdotes, illogical reasoning, and invalid evidence. The people in the other condition got the “strong” arguments, which were characterized by sound reasoning, accurate statistics, and justifiable evidence.

The groups who received the message that contained (1) weak arguments; (2) perceived threat are hypothesized to move their belief position away from the advocated position in the message. We will test these hypotheses.

These messages were made up for this study. However, most of the statistics were accurate and came from newspapers and magazines. The report on the alcohol-related traffic accidents and fatalities decrease by 57% between 1975 and 1990 in Germany came from U.S. Department of transportation (http://www.nhtsa.gov/people/injury/research/AlcoholHighway/4_drinking_drivers.htm). Other arguments were generated by students from previous pilot studies and revised by the researcher in this main study.

We appreciate your participation in this study. Much of what we have learned in the social sciences in the last century is due to the participation of students like you in various studies.

Thank you. Feel free to print off this sheet if you like.

Debriefing (for Marriage Issue)

This has been a study about how people react to particular kinds of arguments. There were 9 message conditions in the study, and you were only in one of them. These messages were related to the legal age of marriage; Under each issue, these messages varied based on (1) argument quality; (2) perceived threat; (3) valence (pro vs. anti). For example, regarding argument quality, one group only got what is called “weak” arguments – the arguments that were based on personal anecdotes, illogical reasoning, and invalid evidence. The people in the other condition got the “strong” arguments, which were characterized by sound reasoning, accurate statistics, and justifiable evidence.

The groups who received the message that contained (1) weak arguments; (2) perceived threat are hypothesized to move their belief position away from the advocated position in the message. We will test these hypotheses.

These messages were made up for this study. However, most of the statistics were accurate and came from newspapers and magazines. The report that women who marry as adolescents have higher rates (i.e., a 41% increase) of lifetime mental illness than women who marry in adulthood came from a study by CAMH (the Center for Addiction and Mental Health; <http://www.monwho.org/wp-content/uploads/2012/10/MonWHO-2015-Mental-Health-Theme-Guide.pdf>). Other arguments were generated by students from previous pilot studies and revised by the researcher in this main study. For example, parental consent helps those youth who decide to marry at an early age make a right choice. However, most anecdotes in the study were made up to construct weak arguments. For example, Annie, a 29-year-old housewife,

recalled that one of her best friends in high school was married before she got her high school diploma. The young couple ended up divorcing at age 25.

We appreciate your participation in this study. Much of what we have learned in the social sciences in the last century is due to the participation of students like you in various studies.

Thank you. Feel free to print off this sheet if you like.

Appendix F: Sample R Code for Recoding Boomerang

Below is the sample R code for recoding a new variable of boomerang for each respondent on the attitude toward changing the policy on the issue of legal drinking age.

Step 1: Create an empty vector for coding the belief boomerang variable
`belief_boomerang <- vector(mode="numeric", length = nrow(drink_data))`

Step 2: Compute the mean score of the control group for the drinking age
`control_group <- filter(drink_data, anti.pro == 0)`
`summarise(control_group, belief_control_mean = mean(belief_decrease, na.rm = TRUE))`

Step 3: Compute the belief boomerang score for each person conditionally based on the message valence (i.e., `msg_valence`: `antipolicy[1]` vs. `propolicy[2]`).

```
for (i in 1: nrow(drink_data)) {  
  if (is.na( drink_data$attitude_decrease[i]) == "TRUE") {  
    belief_boomerang[i] <- NA  
  } else {  
    if (drink_data $msg_valence[i] == 1) {  
      belief_boomerang[i] <- belief_control_mean - drink$attitude_decrease  
    }  
    if (marriage$ msg_valence [i] == 2) {  
      belief_boomerang[i] <- drink$attitude_decrease - belief_control_mean  
    }  
    if ((marriage$ msg_valence [i] == 0) {  
      belief_boomerang[i] <- NA  
    }  
  }  
}
```

Apply similar codes to recode other outcome variables.

Appendix G: Results from the Exploratory Post Hoc Tests for ANOVAs

Table G1

Results of Post Hoc t Tests on the Belief toward Lowering the Legal Drinking Age

<i>DVI</i> : Belief toward increasing the age of <u>drinking</u>		Prior Belief: Oppose the policy		Prior Belief: Support the policy	
		1. Message valence: Anti-policy	2. Message valence: Pro-policy	3. Message valence: Anti-policy	4. Message valence: Pro-policy
Low Threat	Low Argument Quality	16.31 (5.64)** <i>n</i> = 14	B 15.31 (5.38)* <i>n</i> = 9	B 4.65 (6.52)* <i>n</i> = 8	1.74 (4.09)*** <i>n</i> = 14
	High Argument Quality	14.14 (4.50)* <i>n</i> = 15	10.88 (5.25) <i>n</i> = 13	8.46 (7.52) <i>n</i> = 7	5.99 (5.77) <i>n</i> = 8
High Threat	Low Argument Quality	14.82 (5.51)* <i>n</i> = 16	B 14.07 (6.57) [†] <i>n</i> = 12	7.33 (5.33) <i>n</i> = 4	2.33 (3.81)** <i>n</i> = 9
	High Argument Quality	13.41 (4.67) [†] <i>n</i> = 16	U 14.42 (4.25)* <i>n</i> = 12	8.41 (7.94) <i>n</i> = 6	4.08 (5.89)* <i>n</i> = 11

Note. *N* = 238. The mean of the control participants = 10.05 (7.30), *n* = 64. **B** indicates a predicted boomerang in the cell. **U** indicated that an unexpected boomerang in the cell. See Table 2 for how these dependent variables were transformed.
[†]*p* < .10. **p* < .05. ***p* < .01.

Table G2

Results of Post Hoc t Tests on the Belief toward Increasing the Legal Marriage Age

DVI: Belief toward increasing the age of <u>marriage</u>		Prior Belief: Oppose the policy		Prior Belief: Support the policy	
		1. Message valence: Anti-policy	2. Message valence: Pro-policy	3. Message valence: Anti-policy	4. Message valence: Pro-policy
Low Threat	Low Argument Quality	105.21 (114.44) <i>n</i> = 14	72.22 (93.11) <i>n</i> = 9	80.57 (62.15) <i>n</i> = 7	23.33 (34.79)** <i>n</i> = 12
	High Argument Quality	226.8 (120.24)** <i>n</i> = 10	79.09 (44.60) <i>n</i> = 11	104.17 (105.44) <i>n</i> = 12	42.27 (68.97)* <i>n</i> = 11
High Threat	Low Argument Quality	192.09 (149.25)* <i>n</i> = 11	125.33 (107.53) <i>n</i> = 12	B 31.00 (27.67)* <i>n</i> = 10	38.89 (48.59)* <i>n</i> = 9
	High Argument Quality	117.50 (116.60) <i>n</i> = 10	166.67 (150.55) <i>n</i> = 6	82.73 (72.40) <i>n</i> = 11	9.33 (18.31)*** <i>n</i> = 15

Note. *N* = 219. The mean of the control participants = 108.55 (101.29), *n* = 49. **B** indicates a predicted boomerang in the cell. **U** indicated that an unexpected boomerang in the cell. See Table 2 for how these dependent variables were transformed.

† *p* < .10. **p* < .05. ***p* < .01.

Table G3

Results of Post Hoc t Tests on the Attitude toward Legal Drinking Age

DV2: The extent to which Ss like the current <u>drinking age</u>		Prior Belief: Oppose the policy		Prior Belief: Support the policy	
		1. Message valence: Anti-policy	2. Message valence: Pro-policy	3. Message valence: Anti-policy	4. Message valence: Pro-policy
Low Threat	Low Argument Quality	10.05 (10.64)* <i>n</i> = 14	13.00 (13.04) <i>n</i> = 9	B 35.67 (14.62)* <i>n</i> = 8	37.00 (14.07)** <i>n</i> = 14
	High Argument Quality	9.69 (5.63)* <i>n</i> = 15	11.90 (12.28) <i>n</i> = 13	26.73 (16.44) <i>n</i> = 7	32.50 (15.45)* <i>n</i> = 8
High Threat	Low Argument Quality	11.99 (9.39) [†] <i>n</i> = 16	13.40 (11.01) <i>n</i> = 12	27.69 (7.86) <i>n</i> = 4	45.27 (10.86)*** <i>n</i> = 9
	High Argument Quality	12.11 (10.16) [†] <i>n</i> = 16	15.00 (13.43) <i>n</i> = 12	U 35.68 (20.41)* <i>n</i> = 6	33.46 (10.82)* <i>n</i> = 11

Note. *N* = 238. The mean of the control participants = 19.89 (16.99), *n* = 64. **B** indicates a predicted boomerang in the cell. **U** indicated that an unexpected boomerang in the cell. See Table 2 for how these dependent variables were transformed.
[†]*p* < .10. **p* < .05. ***p* < .01.

Table G4

Results of Post Hoc t Tests on the Attitude toward Legal Marriage Age

DV2: The extent to which Ss like the current <u>marriage age</u>		Prior Belief: Oppose the policy		Prior Belief: Support the policy	
		1. Message valence: Anti-policy	2. Message valence: Pro-policy	3. Message valence: Anti-policy	4. Message valence: Pro-policy
Low Threat	Low Argument Quality	23.57 (29.18)** <i>n</i> = 14	47.67 (40.70) <i>n</i> = 9	82.43 (45.44) <i>n</i> = 7	95.83 (34.34) [†] <i>n</i> = 12
	High Argument Quality	16.70 (30.62)** <i>n</i> = 10	H 55.36 (54.21) <i>n</i> = 11	U 102.92 (41.48)* <i>n</i> = 12	110.45 (41.14)** <i>n</i> = 11
High Threat	Low Argument Quality	38.18 (38.94) <i>n</i> = 11	53.58 (36.07) <i>n</i> = 12	B 97.00 (41.65) [†] <i>n</i> = 10	133.33 (56.79)** <i>n</i> = 9
	High Argument Quality	27.50 (35.22)* <i>n</i> = 10	49.17 (44.77) <i>n</i> = 6	L 91.36 (80.19) <i>n</i> = 11	99.31 (34.34)** <i>n</i> = 16

Note. *N* = 220. The mean of the control participants = 64.88 (52.26), *n* = 49. **B** indicates a predicted boomerang in the cell. **U** indicated that an unexpected boomerang in the cell. See Table 2 for how these dependent variables were transformed.

[†]*p* < .10. **p* < .05. ***p* < .01.

Table G5

Results of Post Hoc t Tests on the Belief Position for Drinking Age

DV3: Belief position on <u>drinking age</u>		Prior Belief: Oppose the policy		Prior Belief: Support the policy	
		1. Message valence: Anti-policy	2. Message valence: Pro-policy	3. Message valence: Anti-policy	4. Message valence: Pro-policy
Low Threat	Low Argument Quality	18.14 (0.36) <i>n</i> = 14	18.33 (0.71) <i>n</i> = 9	20.38 (1.06) <i>n</i> = 8	21.50 (1.51)** <i>n</i> = 14
	High Argument Quality	17.87 (0.74) <i>n</i> = 15	18.46 (0.97) <i>n</i> = 13	19.43 (1.51) <i>n</i> = 7	20.13 (1.36) <i>n</i> = 8
High Threat	Low Argument Quality	17.94 (0.68) <i>n</i> = 16	B 18.08 (0.29)* <i>n</i> = 12	23.50 (7.77) <i>n</i> = 4	21.22 (0.83)* <i>n</i> = 9
	High Argument Quality	18.56 (1.79) <i>n</i> = 16	18.25 (0.45) <i>n</i> = 12	19.67 (1.51) <i>n</i> = 6	20.82 (1.89)* <i>n</i> = 11

Note. *N* = 238. The mean of the control participants = 18.83 (2.90), *n* = 64. **B** indicates a predicted boomerang in the cell. **U** indicated that an unexpected boomerang in the cell. See Table 2 for how these dependent variables were transformed.

†*p* < .10. **p* < .05. ***p* < .01.

Table G6

Results of Post Hoc t Tests on the Belief Position for Marriage Age

DV3: Belief position on <u>marriage age</u>		Prior Belief: Oppose the policy		Prior Belief: Support the policy	
		1. Message valence: Anti-policy	2. Message valence: Pro-policy	3. Message valence: Anti-policy	4. Message valence: Pro-policy
Low Threat	Low Argument Quality	19.07 (1.90)** <i>n</i> = 14	B 18.78 (1.48)** <i>n</i> = 9	18.14 (1.35) <i>n</i> = 7	17.58 (1.51) <i>n</i> = 12
	High Argument Quality	19.60 (1.78)*** <i>n</i> = 10	U 18.36 (1.63)* <i>n</i> = 11	17.92 (1.78) <i>n</i> = 12	17.36 (1.57) <i>n</i> = 11
High Threat	Low Argument Quality	20.09 (1.22)*** <i>n</i> = 11	B 18.42 (1.68)* <i>n</i> = 12	17.80 (1.40) <i>n</i> = 10	18.22 (1.48) <i>n</i> = 9
	High Argument Quality	19.20 (1.55) <i>n</i> = 10	14.42 (4.25)* <i>n</i> = 6	18.09 (1.64) <i>n</i> = 11	16.87 (1.13) <i>n</i> = 15

Note. *N* = 217. Mean of Control Group = 17.38 (1.42), *n* = 47. **B** indicates a predicted boomerang in the cell. **U** indicated that an unexpected boomerang in the cell. See Table 2 for how these dependent variables were transformed.

† *p* < .10. **p* < .05. ***p* < .01.

Appendix H: Number of Subjects who had a Boomerang in Each Experimental Condition

Table H1

Number of Subjects who had a Belief Boomerang per Message Condition for Each Issue

<i>DVI</i> : Boomerang on Belief toward changing the age policy		Prior Belief: Oppose the policy		Prior Belief: Support the policy	
		1. Message valence: Anti-policy	2. Message valence: Pro-policy	3. Message valence: Anti-policy	4. Message valence: Pro-policy
Low Threat	Low Argument Quality	55.6% <i>n</i> = 15 of 27	22.2% <i>n</i> = 4 of 18	40% <i>n</i> = 6 of 15	3.8% <i>n</i> = 1 of 26
	High Argument Quality	28% <i>n</i> = 7 of 25	13% <i>n</i> = 3 of 23	26.3% <i>n</i> = 5 of 19	21.1% <i>n</i> = 4 of 19
High Threat	Low Argument Quality	40.7% <i>n</i> = 11 of 27	33.3% <i>n</i> = 8 of 24	28.6% <i>n</i> = 4 of 14	0% <i>n</i> = 0 of 18
	High Argument Quality	46.2% <i>n</i> = 12 of 26	27.8% <i>n</i> = 5 of 18	23.5% <i>n</i> = 4 of 17	11.5% <i>n</i> = 3 of 26

Table H2

Number of Subjects who had an Attitude Boomerang per Message Condition for Each Issue

<i>DV2: Boomerang on Attitude toward the policy</i>		Prior Belief: Oppose the policy		Prior Belief: Support the policy	
		1. Message valence: Anti-policy	2. Message valence: Pro-policy	3. Message valence: Anti-policy	4. Message valence: Pro-policy
Low Threat	Low Argument Quality	11.1% <i>n</i> = 3 of 27	11.1% <i>n</i> = 2 of 18	6.7% <i>n</i> = 1 of 15	15.4% <i>n</i> = 4 of 26
	High Argument Quality	8% <i>n</i> = 2 of 25	13.3% <i>n</i> = 3 of 23	15.8% <i>n</i> = 3 of 19	15.8% <i>n</i> = 3 of 19
High Threat	Low Argument Quality	18.5% <i>n</i> = 5 of 27	8.3% <i>n</i> = 2 of 24	7.1% <i>n</i> = 1 of 14	5.6% <i>n</i> = 1 of 18
	High Argument Quality	19.2% <i>n</i> = 5 of 26	16.7% <i>n</i> = 3 of 18	29.4% <i>n</i> = 5 of 17	3.7% <i>n</i> = 1 of 26

Table H3

Number of Subjects who had a Belief Position Boomerang per Message Condition for Each Issue

DV3: Boomerang on Belief Position		Prior Belief: Oppose the policy		Prior Belief: Support the policy	
		1. Message valence: Anti-policy	2. Message valence: Pro-policy	3. Message valence: Anti-policy	4. Message valence: Pro-policy
Low Threat	Low Argument Quality	7.4% <i>n</i> = 2 of 27	11.1% <i>n</i> = 2 of 18	13.5% <i>n</i> = 2 of 15	30.8% <i>n</i> = 8 of 26
	High Argument Quality	8% <i>n</i> = 2 of 25	17.4% <i>n</i> = 4 of 23	42.1% <i>n</i> = 8 of 19	42.1% <i>n</i> = 8 of 19
High Threat	Low Argument Quality	7.4% <i>n</i> = 2 of 27	20.8% <i>n</i> = 5 of 24	28.6% <i>n</i> = 4 of 14	38.9% <i>n</i> = 7 of 18
	High Argument Quality	15.4% <i>n</i> = 4 of 26	38.9% <i>n</i> = 7 of 18	23.5% <i>n</i> = 4 of 17	30.8% <i>n</i> = 8 of 26

Appendix I: Results from Auxiliary Interaction Tests

Table I1

Main and Interactional Effects of Subgroup, Perceived Threat, and Argument Quality

Topic: Drinking	DV1: Belief toward lowering the drinking age	DV2: Attitude regarding the extent to which the drinking age was liked	DV3: Belief position on the drinking age
Subgroup (proattitudinal vs. counterattitudinal)	111.25***	114.00***	103.53***
Perceived threat	.42	.13	.72
Argument quality	.00	.34	.01
Subgroup * Perceived threat	.00	.16	.00
Subgroup * Argument quality	7.60**	1.21	6.17**
R^2 Adjusted R^2	.41 .40	.41 .39	.40 .38
Topic: Marriage	DV1: Belief toward raising the marriage age	DV2: Attitude regarding the extent to which the marriage age was liked	DV3: Belief position on the marriage age
Subgroup (proattitudinal vs. counterattitudinal)	14.58***	58.75***	11.28***
Perceived threat	4.23*	.43	.18
Argument quality	.80	1.28	.07
Subgroup * Perceived threat	6.03*	.05	.11
Subgroup * Argument quality	.07	2.16	.29
R^2 (Adjusted R^2)	.14 .11	.28 .25	.07 .04

Note. $N = 174$ for drinking age and $N = 171$ for marriage age. F values (sig.) for the main effects and interaction effects were reported in the table. See Table 2 for how these dependent variables were transformed.

[†] $p < .10$. * $p < .05$. ** $p < .01$.

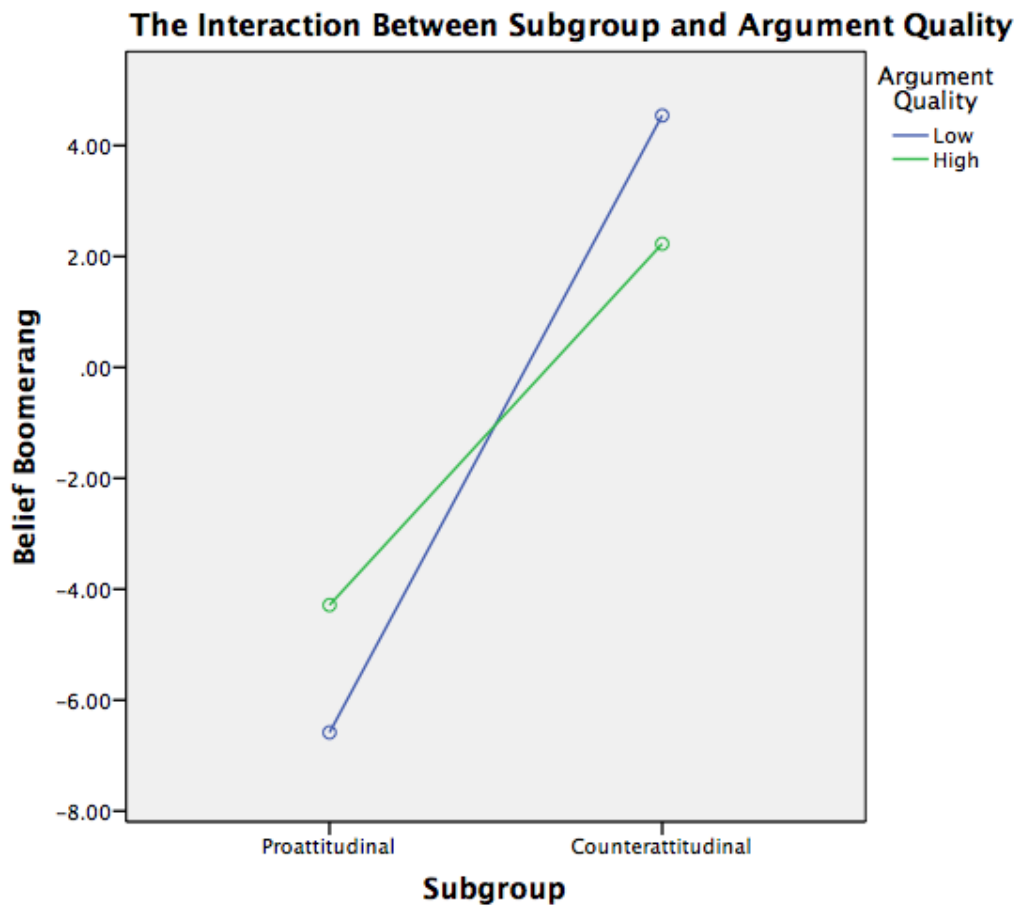


Figure 11. The interaction between subgroup and argument quality on the belief boomerang for the drinking age ($N = 174$).

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