



# Reactance to anti-binge drinking messages: testing cognitive and affective mechanisms among noncollege emerging adults

Bethany R. Shorey-Fennell<sup>1</sup> · Renee E. Magnan<sup>1,2</sup>

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**Abstract** Strong health messages may result in reactance, increasing unhealthy behaviors. Reactance is purported to be derived of both cognitive and affective factors. The current study investigated the extent to which these cognitive and affective reactance components accounted for the link between message exposure on intentions and behavior. Emerging adults who never attended college ( $N = 244$ ) completed an online study assessing anger and negative cognitions towards high or low threat anti-binge drinking messages. Intentions to drink and binge drink in the next week and drinking behaviors 1 week later were assessed. High threat messages elicited more anger and negative cognitions than low threat messages. High threat messages had a significant total indirect effect on intentions but had no effect on drinking behaviors. These outcomes suggest that while immediate cognitive and affect reactance has an effect on intentions, it may not influence longer-term decision making and may not outweigh benefits of strong messages.

**Keywords** Psychological reactance · Health messages · Anger · Negative cognitions · Emerging adults

## Introduction

Binge drinking is linked to multiple negative health outcomes (CDC, 2018). Health messaging campaigns are a common binge drinking prevention approach (for review, Kuntsche et al., 2017); however, some campaigns lead to more alcohol consumption (e.g. Ringold, 2002). Psychological reactance theory (Brehm, 1966) may explain why in some cases an increase in targeted unhealthy behaviors occurs in response to such campaigns. This theory posits that people are motivated to retain personal autonomy out of a belief that they typically make appropriate decisions. When a perceived threat to autonomy occurs, individuals react to restore autonomy which may include acting counter to persuasion attempts (i.e. the boomerang effect) such as when people drink more after viewing an anti-drinking message (Ringold, 2002). Any persuasive attempt may result in a threat to one's sense of autonomy regardless of source (e.g. an authority figure, a stranger) or format (e.g. public health messages, spoken command).

Health message development is challenging. Messages should command attention, be clear and concise, and contain accurate and relevant information (Miller et al., 2007). However, the elements common to strong and effective health messages may also be perceived as threatening. For example, messages with controlling language (e.g. "Choose not to binge drink") are perceived as more threatening than less controlling language (e.g. "Alcohol causes cancer in more places than you think"; Miller et al., 2007). In turn, these are rated as less trustworthy, and elicit more anger and negative cognitions (Quick & Stephenson, 2007). Paradoxically, messages utilizing controlling language are also more likely to capture attention, garner more intentions to follow message advice, and are perceived as easier to understand than messages with less

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✉ Bethany R. Shorey-Fennell  
b.shoreyfennell@wsu.edu

<sup>1</sup> Department of Psychology, Washington State University  
Vancouver, 14204 NE Salmon Creek Ave, Vancouver,  
WA 98686, USA

<sup>2</sup> Translational Addictions Research Center, Washington State  
University, Pullman, WA, USA

controlling language (Miller et al., 2007). Other factors may also contribute to perceived threat. A greater number of freedoms threatened should increase reactance (Brehm & Brehm, 1981). For example, an anti-binge drinking message may not only threaten one's freedom to drink alcohol, but also one's social life. Additionally, people who engage in high levels of the targeted behavior (e.g. heavy drinking) are more likely to feel threatened (Brehm & Brehm, 1981) and react defensively to a message advocating change (Harris & Napper, 2005), and less likely to implement change (Noguchi et al., 2007). Thus, it is difficult to reach those whom health campaigns are designed to target.

Negative cognitions and anger are the two components of state psychological reactance (Dillard & Shen, 2005; Rains & Turner, 2007). Negative cognitive responses to messages include skepticism and counter-arguments against the message (Miller et al., 2013) and are associated with more perceived threat and less persuasion (Quick & Stephenson, 2007). Anger includes hostility toward the source of the threat (i.e. source derogation) which may have long-lasting implications, such as paying less attention to future messages from the same source (Miller et al., 2007). Anger experienced in response to messages is also associated with less attention, underestimation of one's personal risk of behavioral consequences, and less likelihood of enacting positive behavior change (Lench & Darbor, 2014). Additionally, both negative cognitions and anger can have detrimental effects on attitudes toward message advocacy, leading to disagreement with the positions advocated in the message (Dillard & Shen, 2005).

Psychological reactance is more likely at certain times in life, including emerging adulthood (ages 17–25) during which people tend to highly value autonomy (Arnett, 2007). This is also an age targeted by many health campaigns as emerging adults experiment with riskier behaviors (Bhochhibhoya et al., 2015). In a systematic review, McCambridge et al. (2011) found that late adolescent drinking was the strongest predictor of adult drinking patterns and that heavy drinking in adolescence was related to greater risk of alcohol dependence later in life. Thus, intervening during this at-risk period is key for preventing negative health outcomes. In the context of alcohol health messaging campaigns, "emerging adults" usually means college students (e.g. Kingsbury et al., 2015), with little attention given to noncollege emerging adults despite evidence that college attendance influences both drinking patterns (Johnston et al., 2013) and long-term alcohol use trajectories (Simons-Morton et al., 2016). Given that public health messages are designed to reach a large population, and that tendencies toward reactance are high during emerging adulthood, it is also important to understand how

noncollege emerging adults experience reactance to anti-binge drinking messages.

Given that reactance components of anger and negative cognitions may influence not only how viewers perceive a message, but also how they subsequently think about the behavior, the source of the message, and their own personal risk, understanding the interplay of reactance and responses to messages is important for development of optimal health communications. This is particularly true for individuals who are most at risk (Harris & Napper, 2005) and least likely to change their behavior as these are the very people many health messages tend to target (Noguchi et al., 2007). Although some work investigates proximal outcomes (e.g. Dillard & Shen, 2005), empirical work addressing the extent to which cognitive and affective responses account for subsequent intentions and behaviors is limited (see Quick & Stephenson, 2007, for an exception). Further, it is unclear if one of these components (anger or negative cognitions) is relatively more important for explaining the relationship between reactance and behavioral intentions and outcomes.

The primary aim of the present study was to investigate cognitive and affective reactance to high and low threat anti-binge drinking messages and to test whether these responses explain the link between message threat and intentions and behavior. We hypothesized that high threat messages would elicit more negative cognitions and anger than low threat messages. Further, we hypothesized that message threat would indirectly predict more intentions to drink and binge drink and more drinking and binge drinking behavior one week later through the combined effect of negative cognitions and anger elicited from the messages. We also explored if one of these reactance components is relatively more important for explaining the relationship between reactance and behavioral intentions and outcomes.

## Method

### Message development

An independent sample ( $N = 185$ ) rated eighteen publicly available anti-binge drinking graphic messages on perceived threat level and cognitive evaluations. Presentation of messages was randomized such that each individual evaluated only nine messages. Messages were selected for evaluation based on varying levels of threatening language (e.g. "...you are a fully qualified binge drinker", "Excessive drinking is dangerous"). *Perceived Threat* was assessed with three questions (The message... tried to manipulate me, tried to pressure me, threatened my freedom to choose,  $1 = \text{Strongly Disagree}/7 = \text{Strongly Agree}$ ;

average  $\alpha = .87$ ; Shen & Dillard, 2005). In order to reduce response burden, we adapted Dillard et al.'s (1996), *negative cognitions* measure from 9 to 5 items. These were assessed with 7-point semantic differential scales (The message was... *Fair/Unfair*, *Believable/Unbelievable*, *Accurate/Exaggerated*, *Mattered to me/Did not matter to me*, *Effective/Not effective*; average  $\alpha = .89$ ). These measures have been used as indicators of perceived message threat and effectiveness (Miller et al., 2007). We created a multiplicative score from these components to create an overall “threat score” (ranging from 1 to 49) for each message and selected the two highest (avg  $M = 13.29$ ) and two lowest threat messages (avg  $M = 7.02$ ,) for use in the current study ( $d = .77$ ). High threat messages were evaluated as eliciting more perceived threat (avg  $M_{high} = 3.55$ ,  $M_{low} = 2.84$ ,  $d = .46$ ), and negative cognitions (avg  $M_{high} = 3.40$ ,  $M_{low} = 2.31$ ,  $d = .79$ ). We also ensured message understandability (“The message was easy to understand; 1 = *Strongly Disagree*/7 = *Strongly Agree*) to reduce the possibility of reactance due to misunderstanding. All selected messages were evaluated as understandable ( $M = 5.63$ – $5.90$ ).

### Participants and procedure

Participants ( $N = 244$ ) were emerging adults (ages 18–25) from an online study testing the effects of message threat on reactance outcomes and binge drinking intentions and behavior. Participants who reported never attending even one semester of community college, were recruited through Amazon Mechanical Turk Prime (MTurk) from July 2017 to August 2017 and received \$3.50 for participation. In order to capture variability in alcohol use, we did not exclude based on drinking frequency.

After providing informed consent, participants were randomly assigned to a brief reactance reduction intervention: self-affirmation condition, restoring autonomy postscript condition, or a control postscript condition. The interventions produced no significant effects on the variables of interest and are not discussed further. Participants were randomly assigned to view either two high threat or two low threat anti-binge graphic drinking messages. Presentation of messages was counterbalanced to control for order effects. Participants completed a brief reactance assessment after viewing each message, and then indicated their intentions to drink and binge drink over the next week. Seven to ten days later, participants completed a follow-up online survey about their past week drinking. All procedures were approved by the Washington State University IRB.

## Measures

### Trait reactance

Trait reactance was assessed using the 11-item Trait Reactance Scale (Hong & Faedda, 1996). Responses were made using a 5-point scale (1 = *Strongly Disagree*, 5 = *Strongly Agree*) and averaged, with higher scores representing greater trait reactance ( $\alpha = .80$ ). Trait reactance was, on average, moderate in this sample ( $M = 3.18$ ,  $SD = .56$ ).

### Alcohol use

Participants who indicated they had consumed alcohol in the last year then reported how many days they drank and binge drank (five or more drinks for men, four or more for women) in the past 30 days (modified from Miller & Quick, 2010). The majority had tried alcohol in the past year (79.0%). On average, they reported drinking 4.64 days ( $SD = 6.25$ ) and bingeing 1.64 days ( $SD = 3.03$ ) in the past month. At follow-up, they indicated how many days in the past week they drank ( $M = 1.07$ ,  $SD = 1.52$ ) and binge drank ( $M = .45$ ,  $SD = 1.08$ ).

### Message evaluation

Responses for each assessment were averaged with higher scores representing more of that construct. *Anger* was assessed with four items (Dillard & Shen, 2005; “To what extent did you feel [*angered, annoyed, aggravated, irritated*] after reading this message?”, 1 = *Not at all*, 7 = *Extremely*), average  $\alpha = .94$ . *Negative cognitions* (Dillard et al., 1996) were assessed with nine 7-point semantic differential scales (e.g. “The message was...”, *Fair/Unfair*; *Accurate/Exaggerated*), average  $\alpha = .91$ . *Negative source evaluation* (Miller et al., 2007) was assessed with seven 7-point semantic differential scales (e.g. “The source of the message was...”, *Expert/Inexpert*; *Reasonable/Unreasonable*), average  $\alpha = .90$ . *Attitudes toward message advocacy* (Dillard & Shen, 2005) were assessed with three items (I am favorable to the main point of the message; I agree with the position advocated in the message; I support what the message was trying to accomplish, 1 = *Strongly Disagree*, 7 = *Strongly Agree*), average  $\alpha = .94$ .

### Behavioral intentions

Participants indicated how many days in the next week they intended to have at least one drink ( $M = .90$ ,  $SD = 1.41$ ) and five or more (four or more for women) drinks

within a couple of hours ( $M = .41$ ,  $SD = .92$ ; modified from Miller & Quick, 2010).

## Analysis

Continuous variables were first evaluated for assumptions of normality. Days drank and binge drank were natural logged transformed prior to analysis. Independent samples  $t$ -tests compared the mean differences between high and low threat messages on anger and negative cognitions. The direct and indirect effects (through the combined effects of anger and negative cognitions) of message threat on drinking and binge intentions and drinking and binge behavior were evaluated using the parallel multiple mediation procedure outlined by Hayes (2013) which uses a bootstrapping resampling procedure to create bias-corrected 95% confidence intervals (CI) for the direct and indirect effects. If the CI does not include zero, it is a significant effect. All mediation analyses controlled for intervention condition, trait reactance, and past 30-day drinking. Continuous variables were standardized before being entered into the models.

## Results

Participants were on average 21.49 ( $SD = 1.74$ ) years of age, the majority White/Caucasian (67.1%), and approximately half were female (50.2%). Retention at follow-up was 82.5%. Those who responded to the follow-up survey were more likely to be White/Caucasian (86.9%) than those who did not (73.3%;  $\chi^2(1) = 6.43$ ,  $p = .01$ ), but otherwise did not differ.

### Message evaluations

Anger, negative cognitions, and negative evaluations of message source, were significantly higher among those who viewed high threat messages than low threat messages (Cohen's  $d$ s .37–.73, all  $p$ s < .004). Additionally, agreement with message advocacy was lower among those who viewed high threat messages than low threat messages ( $d = .47$ ,  $p < .001$ ). Thus, message evaluations confirmed that “high threat” messages were perceived as more threatening than “low threat” messages. Supplementary Table 1 includes means of message evaluations across high and low threat messages.

### Mediation models

Table 1 provides the unstandardized coefficients and confidence intervals (CI) around the total, direct, and indirect effects for the intention and behavior models. *Drinking*

*intentions*. There was not a significant total (CI – .29, .10) or direct effect (CI – .38, .03) of message threat on drinking intentions. However, there was a significant total indirect effect through the combination of anger and negative cognitions ( $est = .08$ ,  $SE = .04$ , CI .01, .18; see Fig. 1a), although neither specific indirect effect was significant. Those exposed to high threat messages experienced more anger and negative cognitions, and the combination of these two in turn, predicted higher intentions to drink. *Binge drinking intentions*. Patterns were similar for binge drinking intentions such that there was not a significant total (CI – .35, .17) or direct effect (CI – .50, .04) of message threat on binge drinking intentions, but there was a significant total indirect effect through the combination of anger and negative cognitions ( $est = .14$ ,  $SE = .06$ , CI .04, .29; see Fig. 1b) although neither specific indirect effect was significant. Those exposed to high threat messages experienced more anger and negative cognitions, and the combination of these two in turn, predicted higher intentions to binge drink. *Follow-up Drinking*. There was not a significant total (CI – .11, .31) or direct (CI – .10, .35) effect of message threat on drinking (Fig. 1c). Nor was there a significant total indirect effect of message threat through the combination of anger and negative cognitions (CI – .11, .05). Thus, neither the specific nor combined effects of anger and negative cognitions explained the relationship between message threat and drinking. *Follow-up Binge Drinking*. There was not a significant total (CI – .34, .19) or direct effect (CI – .39, .17; see Fig. 1d) of message threat on binge drinking. Nor was there a significant total indirect effect of the combination of binge drinking anger and negative cognitions, although the specific indirect anger effect was significant ( $est = .12$ ,  $SE = .06$ , CI .03, .29). Those exposed to high threat messages experience more anger and negative cognitions, but only anger predicted more binge drinking.

## Discussion

The purpose of the current study was to examine whether cognitive and affective reactance components explained in part the effect of message threat on drinking intentions and behavior. As expected, participants reported more immediate anger and negative cognitions (the two components of psychological reactance) in response to high threat than low threat messages. High threat messages also elicited more negative evaluations of the message source and less agreement with message advocacy suggesting that messages a priori identified as “high threat” and “low threat” were perceived as such by participants.

The extent to which anger and negative cognitions elicited by warnings subsequently account for intentions and

**Table 1** 95% bias-corrected confidence intervals around the direct and indirect effects

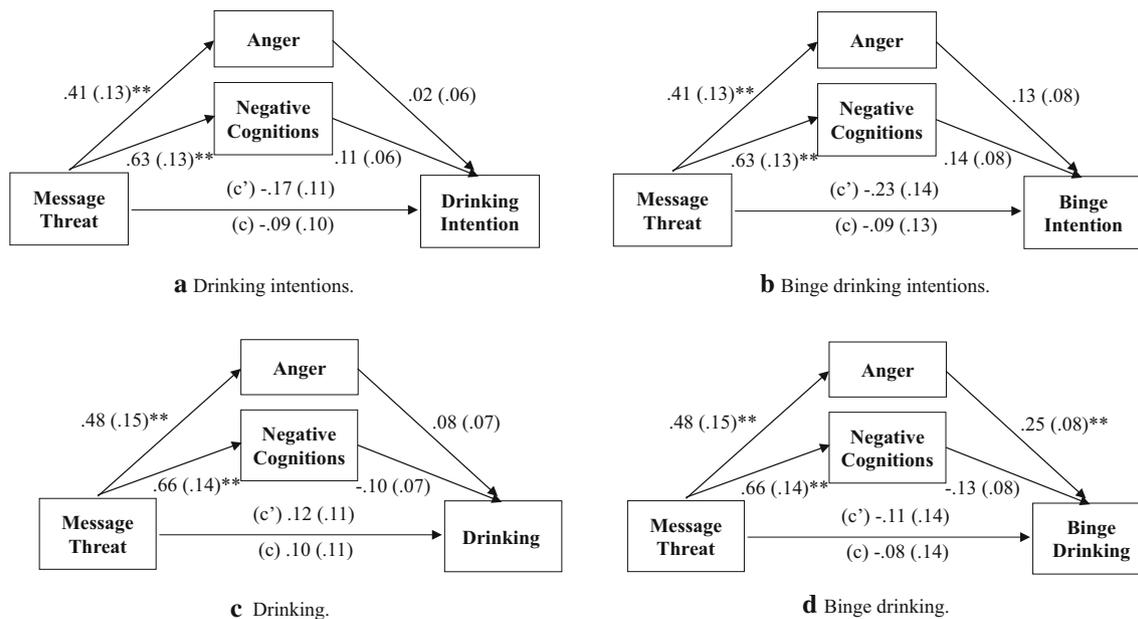
Effect	B	LLCI	ULCI
Drinking intentions			
Total	– .09	– .29	.10
Direct	– .17	– .38	.03
Total indirect	<b>.08</b>	<b>.01</b>	<b>.18</b>
Indirect anger	.01	– .05	.07
Indirect negative cognitions	.07	– .01	.17
Binge drinking intentions			
Total	– .09	– .35	.17
Direct	– .23	– .50	.04
Total indirect	<b>.14</b>	<b>.04</b>	<b>.29</b>
Indirect anger	.05	– .02	.16
Indirect negative cognitions	.09	– .004	.21
Drinking			
Total	.10	– .11	.31
Direct	.12	– .10	.35
Total indirect	– .03	– .11	.05
Indirect anger	.04	– .02	.12
Indirect negative cognitions	– .07	– .16	.001
Binge drinking			
Total	– .07	– .34	.19
Direct	– .11	– .39	.17
Total indirect	.04	– .09	.17
Indirect anger	<b>.12</b>	<b>.03</b>	<b>.29</b>
Indirect negative cognitions	– .09	– .24	.03

All models control for trait reactance, intervention condition, and past 30-day drinking. Bold indicates a significant coefficient  
B, unstandardized coefficient; LLCI, lower limit confidence interval; *ULCI*, upper limit confidence interval

behavior is less clear. For drinking and binge drinking intentions, high threat messages enhanced anger and negative cognitions which together (but not separately) were associated with higher intentions to drink. This pattern indicates that the specific indirect effects were too small to be detected alone but strong enough to be detected combined (Hayes, 2013). Thus, while the total indirect effect was statistically significant it may not be clinically meaningful. It is important to note, however, that these results are consistent with prior theoretical work indicating reactance is an amalgam of cognition and affect rather than separate dual processes that work independently on intentions (e.g. Dillard & Shen, 2005). Additionally, because the specific indirect paths were not significant, we are not able to determine if the cognitive or affective pathway is more important than the another in the current context.

Regarding behavior, the only significant effect was a specific indirect effect of message threat on binge drinking through anger. There were no additional significant indirect effects through anger and negative cognitions on drinking or binge drinking behavior 1 week later. The lack of a total indirect effect in the binge drinking model is likely due to

the competing directions of the specific anger and negative cognitions indirect effects (Hayes, 2013). One interpretation is that anger elicited from messages may be particularly important for binge drinking, but not drinking in general. As the messages targeted binge drinking specifically, this pattern is not entirely unexpected. If anger is more detrimental than negative cognitions on subsequent behavior, researchers may consider ways to create informative messages while simultaneously eliciting less anger (Noguchi et al., 2007). This should be possible as others have designed messages to target specific affective and cognitive responses: for example, affective attitudes versus cognitive attitudes (Conner et al., 2011) and worry versus perceived risk (McCaul & Mullens, 2003). Importantly, however, the lack of consistent indirect effects for drinking and binge drinking behavior may also indicate that immediate reactance to health messages may not necessarily translate to a boomerang effect on drinking behaviors. There were also no direct message effects on any drinking intentions or behaviors, indicating that high threat messages did not directly influence drinking behavior in this sample.



**Fig. 1** Multi-mediator model through anger and negative cognitions. *Note* Coefficients are unstandardized and standard errors are in parentheses. The lower coefficient on the c path (c) represents the total effect and the upper coefficient (c') represents the direct effect

controlling for anger and negative cognitions. All models include trait reactance, intervention condition, and past 30-day drinking as covariates. \*  $p < .05$ , \*\* $p < .01$

Although high threat messages may result in stronger immediate cognitive and affective reactance than lower threat messages, this reactance may not necessarily translate to higher intentions or engagement in unhealthy behaviors. Given that messages with high threat qualities (e.g. directive, clear) are often simultaneously more persuasive (Miller et al., 2007) it is possible that the persuasiveness of the message may override the momentary reactance experienced. Indeed, reactance does not necessarily translate to less attention towards the message (Cho et al., 2016). More work is needed to determine if reactance is associated with negative outcomes that outweigh the benefits of strong health messages across multiple health behavior outcomes.

Strengths of the current study include a prospective design, an experimental manipulation of message threat, and external validity due to the use of existing anti-binge drinking messages. However, there are also limitations. First, the measures of intentions and behavior only identified the number of days drinking rather than the number of drinks per episode or frequency of use per day. Use of such measures in future research may capture more variability in behavior and be more sensitive to reactance and message strength effects. Second, although experimentally manipulated, it is possible that the messages did not elicit enough anger and negative cognitions to strongly influence intentions and behavior. Although there was variability in responses, those who viewed high threat messages on

average reported weak to moderate anger and negative cognitions towards the messages. Third, participants were MTurk users who self-selected to participate. Using MTurk generally provides data that is comparably reliable to more traditionally sourced data (Buhrmester et al., 2011). Still, these results may not generalize to less computer literate emerging adult populations or to those who have attended college. Yet, it does target an underrepresented population (noncollege emerging adults).

Public health messages reach a large number of people who may or may not engage in the target behaviors; therefore, it is important that health messages be developed for optimal effectiveness. Given the scale of public health messages, even small improvements in effectiveness may serve to prevent problematic drinking in this population. The current investigation answers the call to address the mediating role of negative cognitions and anger (Quick & Stephenson, 2007) and extends empirical work regarding the role of reactance in proximal and distal health decision-making contexts. Although preliminary, this work suggests that anger may be a stronger influence on longer-term behavioral decisions targeted in health messages. However, given the weak effects of reactance on intentions and behavior and the potential for strong health messages to enhance knowledge and intentions to change (e.g. Cho et al., 2016), the effects of reactance may not outweigh the benefits of strong health messages.

## Compliance with ethical standards

**Conflict of interest** Bethany R. Shorey-Fennell and Renee E. Magnan declare they have no conflict of interest.

**Human and animal rights and Informed consent** Ethical oversight was provided by the Washington State University IRB, all ethical standards were adhered to, and all participants provided informed consent.

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