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CAN INTERACTIVE MEDIA ATTENUATE PSYCHOLOGICAL REACTANCE? A STUDY OF THE ROLE PLAYED BY USER COMMENTING AND AUDIENCE METRICS IN PROMOTING PERSUASION

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ABSTRACT

Health communication messages usually consist of warnings about possible risks to one's well-being. On the one hand, such messages could raise awareness of potential risks and cause viewers to follow the recommendation. On the other hand, these messages have the potential to threaten viewers' freedom of action by telling them what to do and what not to do. This can generate psychological reactance, leading to boomerang effects, as numerous studies have shown. Scholars have identified several ways to reduce psychological reactance, including raising audience's liking for the message content and increasing their credibility judgment of the message. However, almost all the existing literature has been focusing on identifying and utilizing message features to reduce reactance.

As campaigns go online, many technological affordances of digital media, such as audience metrics that reflect audience evaluations, could provide important cues that influence user's perceptions, evaluations, and credibility judgments of the message and the message source, which can in turn influence message acceptance. In addition, these affordances facilitate a variety of user actions, which could potentially empower users and afford them choices and control. Can such technological affordances attenuate psychological reactance individuals experience in response to health messages? The present dissertation aims at answering this question by examining the role played by the presence of audience size metrics (known as 'bandwagon cues') and the affordance of commenting action in reducing reactance and enhancing persuasive outcomes of health messages that pose a threat to freedom of action.

To test the effect of technological affordances in influencing persuasion in health communication, a 2 (message threat: high vs. low) X 2 (bandwagon cue: high vs. low) X 2 (comment function: presence vs. absence) between-subjects experiment was conducted. Findings

suggest that high bandwagon cues do indeed reduce reactance and improve message acceptance by eliciting bandwagon perceptions and feelings of isolation. Comment action is associated with a strong sense of agency, which in turn predicts individuals' strong intention to follow the message recommendation. A series of moderated mediation tests reveal that effects of bandwagon cues override effects of message features, such that in low bandwagon conditions, message threat affects message acceptance through perceived threat to freedom, whereas in high bandwagon conditions, viewers' perceived threat to freedom does not mediate the effect of message threat on persuasion. In addition, the action effect overrides effects of bandwagon cues—only when users do not leave a comment will high bandwagon cue improve persuasion by enhancing their evaluation of message persuasiveness; for users who post a comment, this effect is not found.

This dissertation contributes to psychological reactance theory, and the theory of interactive media (TIME) by exploring new ways of reducing audience reactance to persuasive messages conveyed via online media, and provides practical implications for communicators and designers interested in improving the effectiveness of advocacy in the domain of persuasion, particularly health communication.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGMENTS

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INTRODUCTION

Media campaigns are widely used in a variety of communication fields, including health communication, advertising, political communication, and public relations. To many media scholars and campaign practitioners, whether or not planned campaigns achieve expected outcomes is a critical question, and evaluating the effectiveness of a campaign is an important step in their plan. Numerous media scholars and campaign practitioners have been making efforts to explore ways of improving the effectiveness of media campaigns. Unfortunately, not all well-planned campaigns are able to achieve desirable outcomes. Occasionally, campaigns lead to undesirable outcomes; and some of them even produce totally opposite outcomes than what was intended by campaign designers. For example, a few public health campaigns aimed at educating smokers to quit smoking have actually increased the amount of smoking among target audience members. Why does this happen?

Scholars have found that this intriguing phenomenon can be explained by the theory of psychological reactance (Brehm, 1966), which suggests that whenever a person's freedom of action is threatened, they are likely to experience a motivational state called psychological reactance, which will motivate them to prevent further loss of freedom and to regain their lost freedom. In the above example, once smokers feel like public anti-smoking campaigns threaten their freedom of action and hence experience psychological reactance, they will try to regain their threatened freedom by smoking even more.

Recently, scholars have realized that persuasive health messages, especially those target young adults, are at risk of threatening individuals' freedom of action by explicitly or implicitly telling them what to do and what not to. As a result, these messages could potentially generate

reactance among intended audience members and lead to undesirable boomerang effects (e.g., Burgoon, Alvaro, Grandpre, & Voulodakis, 2002; Dillard & Shen, 2005).

Having identified psychological reactance as a key to boomerang effects, scholars have started to explore ways to reduce it in order to improve message effectiveness. For example, they have discovered that increasing audiences' liking for the message content or connections between audiences and message sources can enhance the legitimacy of the message as well as the interference posed in the message, which could help mitigate psychological reactance (Silvia, 2005; Shen, 2010). Another strategy is to offer more options and choices to audiences in order to increase their sense of control and agency and compensate for the feelings of losing control, which can help reduce reactance experienced by audiences as well (Brehm, 1966; Brehm & Brehm, 1981; Miller, Lane, Deatrick, Young, & Potts, 2007).

So far, research attention in this area has primarily been focused on message features and the relationship between audiences and the message source; the communication technology that conveys the message has been largely ignored. As campaigns go online, affordances of digital media, such as metrics that display audience engagement and audience evaluation, can potentially influence user's perceptions and credibility judgment of the message and the message source (Sundar, 2008), which can in turn influence audiences' perceived persuasiveness of the message and their message acceptance. In addition, some digital media interfaces allow users to take various actions on the interface, the process of which could potentially empower users and afford them the choices and control (Sundar, 2008; Sundar, Jia, Waddle, & Huang, 2015) that may help counteract reactance to persuasive messages.

Given the potential of communication technologies in attenuating psychological reactance triggered by persuasive messages, the current study strives to answer three questions:

In this day and age of crowdsourcing, can indicators of other audience members' reactions play a role in the persuasion process? And, considering the interactive nature of most modern media, will users' own actions on the interface influence their acceptance of the message? What's more, when different types of technological affordances coexist on an interface, as they usually do on modern media interfaces, how do they interact with each other in influencing users? To answer these questions and explore the role played by communication technologies in persuasion, the current dissertation reviews literature on psychological reactance, audience metrics, and user interactivity, proposes hypotheses, describes the experiment designed to test those hypotheses, reports findings of data analyses, and then discusses theoretical and practical implications of the findings.

Chapter 1

LITERATURE REVIEW

Since reactance to advocacy messages is a starting point for this research, the researcher will first review the literature on this concept, explicate its meaning, cover the antecedents and consequences of reactance, and then discuss reactance reduction and explain how it applies to the research at hand.

Psychological Reactance Theory

People have freedom of action. Frequently, people have the freedom to choose what to do, as well as when and how to do it. From various behavioral possibilities, people usually choose the action that can fulfill their needs to the greatest extent. If, however, the freedom of action is eliminated or threatened with elimination, people may generate a motivational state called psychological reactance. Presumably, this motivational state will be directed against further loss of freedom and also be directed towards restoration of the lost or threatened freedom (Brehm, 1966; Brehm & Brehm, 1981).

There are several forms of freedom restoration. People can choose to directly re-establish the freedom eliminated. For example, if drinkers are told by their parents not to drink anymore, they may generate reactance to the attempted influence and continue to drink, sometimes even drink more than they used to. If direct re-establishment is not possible, people may also restore their lost freedom indirectly. For instance, they may express an increased liking or a stronger desire of the forbidden behavior (Brehm, 1966; Dillard & Shen, 2005; Jung, Shim, & Mantaro, 2010; Ringold, 2002), perform a similar behavior to regain freedom (Dillard & Shen, 2005; Quick & Stephenson, 2007), or restore freedom vicariously by observing others conducting the forbidden act (Brehm, 1966; Quick & Stephenson, 2007).

Psychological reactance theory is built upon several cognitive assumptions:

To start with, people need to believe that they have the freedom to (or not to) conduct an action, and also, the action should be realistic. It is not always clear whether a person has certain freedom of action and whether they believe so for various reasons. Sometimes, people lack information as to whether they have the freedom to conduct certain behavior; in some other circumstances, the existence of conflicting information may also confuse people (Brehm, 1966). Only if people believe they have certain freedom of action will they generate reactance once the freedom is eliminated or threatened with elimination.

In addition, the extent to which a person believes holding certain freedom is legitimate could also influence the level of reactance. If people believe it's absolutely legitimate to perform certain behavior, they are more likely to generate reactance in response to threatened freedom of action than when they think it's not legitimate to conduct such behavior anyway (Brehm, 1966). For instance, people who hold the belief that binge drinking is an inappropriate and undesirable behavior are less likely to react to anti-binge drinking messages than those who believe it's legitimate to binge drink.

Brehm (1966) pointed out that the magnitude of reactance is determined by several factors, including the importance of the threatened or eliminated behavior; the proportion of free behaviors that are threatened or eliminated; and the magnitude of the threat.

The importance of the threatened or eliminated behavior is a function of two components. People take actions to fulfill their needs. If the action eliminated or threatened is unique for people to fulfill certain needs, or if the need is important, the threatened or eliminated behavior would be of great importance. Generally, the more important the threatened or eliminated behavior is, the stronger the reactance will be. Relatively speaking, if a behavior is more

important than other behavioral options for a person to fulfill certain needs, then this person is likely to generate stronger reactance when this specific behavior is eliminated or threatened with elimination than is any other behavior.

Besides, the proportion of a behavior in a person's behavior repertoire may also play an important role in determining the magnitude of reactance. As the number of freedom threats increase, the reactance will increase. Similarly, compared to the situation where a person has many behavioral options, one freedom threat may cause stronger reactance when a person only has a few options to choose from, because proportionally speaking, the person loses more in the latter situation. In a word, the greater is the proportion of free behaviors get eliminated or threatened with elimination, the greater the magnitude of reactance will be.

In terms of the magnitude of threat, generally speaking, when a person's freedom of action is threatened, the greater is the threat, the stronger will be the reactance. From a communication perspective, strong persuasion intention and intense language (i.e., controlling, forceful, or dogmatic language) are generally seen as a high threat to freedom and hence lead to strong reactance (Bensley & Wu, 1991; Dillard & Shen, 2005; Worchel & Brehm, 1970).

In addition, the extent to which the interference is legitimate or justified could affect the magnitude of reactance and how this person responds to the reactance. Generally speaking, compared to illegitimate inference, legitimate interference may help reduce psychological reactance. This does not imply that reactance will appear given legitimate excuses, rather, psychological reactance is expected to occur when individuals' freedom of action is eliminated or threatened with elimination, regardless of the legitimacy of interference (Brehm, 1966; Brehm & Brehm, 1981). Nevertheless, legitimate interference may serve as a stronger justification to help attenuate possible reactance that individuals may show.

According to the psychological reactance theory, recipients may perceive a persuasive message as a threat to their freedom of independent decision-making and action; therefore they may resist the message, even though the message is designed for their own benefits. As a result, message recipients may engage in discouraged behaviors as a response to the message, and that's why sometimes persuasive messages even elicit the opposite undesirable effects (Brehm, 1966; Dillard & Shen, 2005).

The nature of psychological reactance

Brehm (1966) defined psychological reactance by its antecedents and effects, rather than what it is in nature. Aside from the fact that he mentioned individuals "may be aware of hostile and aggressive feelings" (Brehm, 1966, p. 9), he treated reactance as a "black box" (Quick, Shen, & Dillard, 2013, p. 169) and claimed that psychological reactance could not be directly measured.

For decades, scholars who studied reactance manipulated messages to induce threat and then measured persuasion outcomes. If counter-persuasion arises, they claimed that reactance must have played a role in the middle. If, on the other hand, the persuasive messages work as predicted, scholars argued that it must be because the message did not elicit reactance. The unfalsifiable black-box approach lasted for decades until scholars started to find possible associations between reactance and other concepts – anger and counter argument (Dillard & Meijnders, 2002; Dillard & Shen, 2005).

Anger usually occurs when an individual perceives that his goal-oriented behaviors are interfered or when one perceives demeaning offense against himself or inappropriate acts towards his family or friends (Lazarus, 1991; Nabi, 1999). As suggested in the above section, individuals want the freedom of action to fulfill their needs and achieve their goals (Brehm,

1996). If their freedom of action is eliminated or threatened with elimination, they may see the threat as an obstacle that interfere with their goal-oriented behavior and prevent them from achieving their goals and fulfilling their needs, then anger is likely to accrue to them. Anger has been found to be able to mobilize and sustain high level of energy for defending oneself and correcting misappraisals (Izard, 1993; Nabi, 1999). With the action tendency of attacking, anger could make individuals focus their attention to attacking or getting back at the source of the anger to get rid of the barrier (Dillard & Seo, 2013; Lazarus, 1991; Nabi, 1999).

Besides the association between anger and reactance, scholars have long observed that individuals may counter argue to protect themselves from threatening messages (Hovland, Lumsdaine, & Sheffield, 1949). Researchers who employed the thought-listing technique in studying reactance also found that messages that induce strong reactance led to significantly more unfavorable cognitions than non-reactance-inducing messages (Dillard & Shen, 2005).

Based on these findings, scholars have revealed the nature of reactance and found direct measurements for it (Dillard & Shen, 2005). They found that a stronger threat (more explicit persuasion intention and intense language) led to a higher number of counter-arguments and a higher level of anger, which in turn led to less positive attitude towards the advocated behavior and a weaker intention to conduct the advocated behavior. Data also showed that both anger and counter-argument mediated the effect of threat and psychological reactance proneness on persuasion outcomes, including attitude and behavioral intention, showing that the black box of psychological reactance actually contained both a cognitive component and an affective component, the two of which were intertwined in the model. Dillard and Shen (2005) then concluded that psychological reactance in nature is a combination of anger and negative

cognition, the two of which are "intertwined to such a degree that their effects on persuasion cannot be disentangled" (p. 147).

More evidence has accumulated to support Dillard and Shen (2005)'s finding (e.g., Quick & Stephenson, 2007b; Rains & Turner, 2007). Quick and Stephenson (2007b) tested the conceptual coherence of psychological reactance by examining its relationship with participants' threat-to-choice perceptions and persuasiveness of seven condom ads. They found that for all the seven ads examined, threat-to-choice perceptions were positively related to psychological reactance, which was treated as a latent construct comprised of state anger and negative cognitions. Also, reactance was found to be negatively correlated with ad persuasiveness for all seven ads.

Rains and Turner (2007) also tested the dual-process model and the intertwined model proposed by Dillard and Shen (2005), along with a third possibility that modeled a linear affective-cognitive reactance process in which emotion preceded cognition. Consistent with previous findings, the intertwined model fit the data better than the dual-process model or the affective-cognitive model does, which further supports Dillard and Shen's conclusion that psychological reactance by nature is a combination of anger and negative cognitions, which are intertwined and can not be disentangled.

In addition, a meta-analytic review (Rains, 2013) showed that among different ways of modeling psychological reactance, the intertwined model originally identified by Dillard and Shen (2015) fit the sample data the best.

Antecedents and Effects of Reactance

Researchers have been making efforts to explore the antecedents and effects of reactance. Generally, reactance is a result of threat to freedom (Brehm, 1966; Dillard & Shen, 2005; Jung et

al., 2010; Quick & Stephenson, 2008). Specifically, strong persuasion intention and intense language (i.e., controlling, forceful, or dogmatic language) are generally seen as a high threat to freedom and hence lead to strong reactance (Bensley & Wu, 1991; Dillard & Shen, 2005; Worchel & Brehm, 1970).

For example, Bensly and Wu (1991) found that compared to neutral messages, the dogmatic alcohol prevention message led to higher beer consumption among participants.

When participants focused their attention on the restrictive nature of policies, they tended to experience reactance and therefore responded negatively to the restrictive policies; however, when they failed to notice the restrictive nature of policies, no reactance was generated, and they tended to react favorably to and endorse restrictive policies (Laurin, Kay, Proudfoot, & Fitzsimons, 2013).

When testing the psychological reactance theory in classroom context, researchers found that instructors' use of either unclear or forceful language was positively associated with individuals' perceived level of threat, which predicted psychological reactance among students. As a result, students with a higher level of reactance reported higher intention to engage in different types of instructional dissent and challenge behavior (Ball & Goodboy, 2014).

Besides, personal traits, such as sensation seeking and trait proneness to reactance, will also influence the extent to which individuals resist to the persuasive messages they encounter (Dillard & Shen, 2005; Jung et al., 2010; Quick & Stephenson, 2008). For example, several researchers have consistently established that individuals with high reactance proneness tended to generate a higher level of psychological reactance in response to persuasive messages compared to those who have relatively low level of reactance proneness (Dillard & Shen, 2005; Jung et al., 2010). Similarly, Quick and Stephenson (2008) also found that once individuals

perceive certain messages to be threatening, those with high reactance proneness are more likely to generate strong state reactance compared to those with low reactance proneness.

As a summary, researchers have consistently identified threat to freedom and reactance proneness as the antecedents of psychological reactance. Specifically, messages containing high threat to freedom will lead to greater reactance than low threat messages. Besides, individuals with high psychological reactance proneness tend to generate a greater level of reactance than those with low psychological reactance proneness.

Numerous studies have shown that reactance could intervene in or even ruin messages' persuasive effects (Dillard & Shen, 2005; Jung et al., 2010; Quick & Stephenson, 2008; Shen, 2010), especially when the target audiences are young (Burgoon et al., 2002; Miller et al., 2007). Adolescents (12 – 19-years-old) and emerging adults (17 – 25-years-old) are in a state when they are not yet adults but wanting the freedoms of adults. When exposed to persuasive messages, especially health related messages that are explicitly directive in nature, young audiences are very likely to generate reactance, since they generally perceive themselves to be capable of determining their own health outcomes (Miller et al., 2007).

Recently, a large number of reactance studies have found health related messages targeting young audiences could easily produce boomerang effects (Burgoon et al., 2002; Miller et al., 2007). For example, Grandpre and his colleagues (Grandpre, Alvaro, Burgoon, Miller, & Hall, 2003) found that implicit anti-smoking messages produced less reactance among adolescents and were evaluated more positively than explicit persuasive messages. Besides, 10^{th}-graders who viewed explicit anti-smoking messages reported a higher intention to try a cigarette soon than those exposed to implicit messages. In addition, alcoholic beverage controls, alcohol

related education programs, and warnings about risks associated with drinking are also found to cause boomerang effects among young adults (Ringold, 2002).

Based on an in-school survey, researchers identified age, prior experimentation, and having friends who smoke as the principal predictors of smoking risk. Besides, psychological reactance also served as an important predictor of adolescent smoking initiation (Miller, Burgoon, Grandpre, & Alvaro, 2006).

Silvia (2006) identified two paths from threatened freedom to resistance to persuasion: when a communicator threatened individuals' freedom at the beginning of the message, individuals' unfavorable cognitive responses (e.g., counter-arguing) mediated the effect of threat on disagreement; however, when the threat was at the end of a persuasive message, the threat would have a direct effect on disagreement without cognitive responses serving as mediators. Besides, the disagreement mediated by cognitive responses was more persistent than that directly caused by threat.

Dillard and Shen (2005) examined the effect of reactance for two health behaviors: flossing and college drinking. They showed persuasive messages with either high threat or low threat to participants respectively and found that the high-threat messages generated more reactance among participants compared to the low-threat ones. They also found that for the issue of flossing, participants' reactance caused their negative attitudes towards flossing, which in turn led to negative behavioral intention of flossing. However, for the issue of limited drinking, participants' reactance led to negative attitudes towards limited drinking and negative intention of limited drinking respectively.

Another study (Jung et al., 2010) has shown that social norms marketing messages have small effects on changing binge drinking college student's drinking behavior due to the

mediating variable of psychological reactance. When college binge drinkers perceive a restraint to their freedom of drinking, they are likely to deny the legitimacy of social norms messages. The results of the study showed a similar pattern to Dillard and Shen (2005)'s study: reactance is directly related to attitude and intentions respectively, but again, no direct link was found between attitude and intention (Jung, Shim, & Mantaro, 2010).

In summary, psychological reactance has been shown to be able to ruin a message's persuasive effects. Specifically, when audiences experience psychological reactance in response to a persuasive message, it is very likely such motivational state will cause them to generate negative attitude towards the message's advocacy and also lower their intention to follow the message's suggestion.

Reducing Psychological Reactance

Given that psychological reactance may cause persuasive messages to be ineffective or even lead to boomerang effects in the context of communication and persuasion, researchers and campaign practitioners have been exploring ways to reduce psychological reactance in order to achieve expected persuasive outcomes.

Some scholars found that different message styles could generate different levels of psychological reactance, which in turn could lead to various message acceptance (Erceg- Hurn & Steed, 2011; Reinhart et al., 2007). For example, compared to graphic warning, textual cigarette health warnings were less likely to lead to elevated and extreme levels of reactance (Erceg−Hurn & Steed, 2011).

Reinhart and colleagues have found that compared to loss-framed messages, gain-framed messages could lead to more favorable reactions among audiences by eliciting less psychological reactance (Reinhart et al., 2007). Similarly, Cho and Sands (2011) also found that compared to

loss-framing messages, which were often times perceived as a command that must be obeyed, gain-framing messages were more like an offer or an option that could be accepted or rejected. Therefore, gain-framing messages were less likely to be perceived as threating to freedom by participants than loss-framing messages.

Miller and her colleagues (2007) tested the effect of including a postscript restoration message to the end of the persuasive message to emphasize that message receivers ultimately have the final choice in how to behave. They found that the persuasive message containing such postscript message was perceived to be less a threat to freedom compared to the persuasive message that did not end with the postscript reminder.

Some other scholars found that in addition to message styles, bonding and connections between audience and communicators or characters could also help mitigate reactance among audience, and hence increase their message acceptance (Silvia, 2005; Shen, 2010)

Silvia (2005) proposed that a persuasive message that contains threats to freedom might exert a positive force for individuals to comply and also a negative force for them to react. When the positive force outweighs the negative force, individuals are very likely to comply as opposed to react. Therefore, either increasing the positive force or decreasing the negative force could help deflect reactance. Specifically, he found out that similarity between audience and communicator increased liking for communicator, which served as a positive force for individuals to comply and could also decrease the perceived threat posed by the message, and ultimately mitigated reactance. Individuals who perceived themselves to be similar to the communicator agreed more with the communicator.

Shen (2010) also found that state empathy that audience experience could mitigate psychological reactance. Specifically, state empathy has three components: affective empathy,

which refers to understanding others' feelings; cognitive empathy, which pertains to taking the perspective of another person and understanding others' point of view; and an associative component that is similar to identification conceptually. Once audience experience associative empathy, they tend to identify with a character, meaning that the audience vicariously experience what the character experiences, which facilitates their bonding and building relationship with the character (Cohen, 2006). Taken together, state empathy could both enhance persuasive outcomes of messages directly and indirectly through mitigated psychological reactance (Shen, 2010). Similarly, other scholars also found that participants who were instructed to take the perspective of the threatener reported lower level of psychological reactance compared to those who did not do so (Steindl & Jonas, 2012).

In the context of entertainment education media, Moyer-Gusé and Nabi (2010) found that when audience parasocially interact with a character, they are likely to see the character as a peer and as somebody who is a part of their social network. As a result, audiences are less likely to react to these characters depicted in an entertainment education program.

In addition, Brehm (1966) also proposed that the legitimacy of the interference might influence the magnitude of reactance. Specifically, a legitimate and credible source might serve as a justification of an interference, which could lead to lower level of psychological reactance compared to an illegitimate source. Scholars have consistently found negative association between individuals' magnitude of reactance and their credibility judgments of the message source (Quick & Bates; Li & Shen, unpublished). When individuals perceived the message source to be more credible and trustworthy, they tended to have more positive attitude towards the topic and report higher intention to follow the suggestion (Miller et al., 2007). Therefore, it's

reasonable to speculate that a positive source credibility judgment could help mitigate psychological reactance, and hence lead to stronger persuasive outcomes.

In summary, theories and empirical findings have shown that psychological reactance could be reduced through different mechanisms. Increasing connections with the message source or character or liking for the message content could increase the legitimacy of the interference and reduce audience's perceived threat to freedom. In addition, providing audience with choices could mitigate their feelings of losing control and increase their sense of autonomy. Either way, individuals may react less intensively to persuasive messages and are more likely to accept the message.

Thus far, research on psychological reactance has primarily focused on communication source or message attributes, while the role played by communication technologies has been largely overlooked. Nowadays, with public service announcements and other types of communication messages being commonly delivered by digital media, technological features that come along with messages may also play an important role in influencing individuals' perceptions, evaluations, and even acceptance of messages. Therefore, communication scholars and practitioners should be mindful of such technological features and take them into consideration for message design and evaluation. The following section reviews effects of technological affordances and features as well as their potential impact on attenuating psychological reactance.

Technological Affordances, Credibility Judgment & Agency

In the modern era, media are no longer mere channels that convey information, rather the advancement of technology makes it possible for us to interact with media or with others through media to a greater extent. Various forms of media, based on their unique interface affordances

and features, could lead to different forms of communication as well as consequent media effects (Sundar, Jia, Waddell, & Huang, 2015).

Sundar and colleagues proposed that technological affordances generally influence user psychology in two different ways—"by triggering action on the part of the user and/or by serving as symbolic representational cues on the interface" (Sundar et al., 2015, p. 51).

The Cue Route, Bandwagon Cues & Effects

One way that interactive media influence user psychology is through cue route. If designed well, the sheer presence of certain technological affordances can serve as salient psychological cues for users and hence have important consequences without requiring users to take any action. For example, the presence of customization tools, such as features that allow users to adjust font size or color of the website, may serve as cues that make users feel autonomous; the presence of auto-generated metrics, such as the number of views or likes associated with an article or a star rating of a product on Amazon.com could indicate collective opinion or popularity of certain media content, which in turn might influence users' perceptions and evaluations.

People nowadays encounter and process a great amount of information every day. Given limited time and capacity, we learn to pick up cues from these media and rely on some mental shortcuts to rapidly assess the credibility of the information they encounter or even the media source that provides the information.

As social psychologists have long argued, cues in persuasion contexts could lead message receivers to make a loose association between the cue and the message (Sundar, 2008). According to the MAIN Model (Sundar, 2008), communication technologies nowadays offer "affordances" (defined as action possibilities), and the presence of affordances on the media

interface are able to cue cognitive heuristics, which can influence users' judgments of quality and credibility of mediated content. In this process, an affordance refers to capability offered by the medium of communication that can facilitate certain actions. A heuristic generally means a simple rule of thumb that individuals use to make judgments. The MAIN Model identified four classes of affordances that can influence online users' credibility judgment of media content - modality, agency, interactivity, and navigability.

Among the four types of affordances, agency affordances are of particular interest to the current research. The agency affordance concerns the assignment of sourcing to particular entities in the communication process. An agency affordance is generally an interface feature that not only allows users to serve as source of information but also identifies who or what is the source of a particular piece of media content. Salient agency affordances can serve as cues that trigger certain rules of thumb (heuristics), which help users evaluate the message sources. For instance, if a message is coupled with an interface feature that shows that the message source is an expert, individuals are more likely to perceive it as credible, sometimes before they even read the message. Similarly, when people shop online, one criterion that they tend to rely on heavily is the star rating of a product, based on the assumption that if many others like it, it must be good. In both examples, the "expertise = credibility" and "many people like it = it must be good" equations serve as mental shortcuts or heuristics that individuals have learned based on past experience. Sometimes, individuals purely rely on these peripheral cues (ELM, Petty, Cacioppo, & Schumann, 1983) to make judgments, and this is called heuristic processing (HSM, Chaiken, 1980). In some other situations, these cues can serve as important tools to facilitate individuals to systematically process information as well.

Compared to traditional media, one advantage of digital media lies in the fact that they have different technological affordances to convey various cues, which can trigger audience's cognitive heuristics and facilitate their information processing (Sundar, 2008).

Interface cues that can cue the collective opinion of other users are called bandwagon cues (Sundar, 2008). Bandwagon cues can indicate the popularity of content. For example, metrics such as number of views, number of subscriptions, number of followers, number of comments, star rating, or ranking can all help users evaluate the popularity or acceptance of the media content they encounter.

In line with social proof and social norms proposed by social psychologists (Cialdini, 2007; Cialdini, Reno, & Kallgren, 1990), individuals sometimes hold the perception that "if others think something is good, it must be", which is called bandwagon heuristic (Sundar, 2008). Bandwagon heuristic could serve as a powerful tool in influencing individuals' perceptions and judgments since it usually implies collective endorsement and popularity of the associated content through collaborative filtering systems. For example, if an article advocating limited drinking is associated with a large number of "likes" and have many supporting comments, it may create an impression that the message, and the advocated limited drinking behavior, is accepted and supported by many others, which may influence audience's perceptions and evaluations with regard to the message as well as their normative perceptions on limited drinking and their acceptance of the behavior.

Scholars have found that bandwagon heuristic could influence individuals' perceptions and credibility judgments related to media content, media source, and the interface (Sundar, 2008; Sundar et al., 2015).

In examining the effects of different interface cues pertaining to source on credibility of

health messages, Lee and Sundar (2013) found that when a professional source with a great number of followers tweeted, individuals tended to perceive the tweet to be more credible than when the professional source with only a few followers tweets, and the opposite pattern was found when a layperson tweeted: if a layperson with a lot of followers retweeted, participants perceived the content being more credible than when a layperson with a few followers retweeted.

These findings were replicated in the context of online health boards. Kim and Sundar (2011) found that a high bandwagon cue led to more positive attitudes toward the content and the webpage compared to a low bandwagon cue when the replier had relatively higher level of source expertise; as contrast, when the replier was just a regular member who did not seem to have much expertise, the low bandwagon cue resulted in more positive attitudes toward both the content and the webpage than the high bandwagon cue.

In exploring audience's psychological reactions to different sources of online media, Sundar and Nass (2001) assigned participants to four conditions in which they were exposed to the same media content but with different sources (news editor as source, computer as source, other users as source, or the user himself as source). They found that when participants were told the news stories were selected by other users, they tended to like the content more, perceived the news stories to be of higher quality than when the source was attributed to news editors or users themselves, and believed the news stories to be more representative of news than when they were told that they themselves selected the news stories.

Knobloch-Westerwick and colleagues (2005) also found that online portals featuring explicit news recommendations (based on star rating) led users to pick more articles than online portals featuring implicit news recommendations (times viewed). Besides, participants perceived the star-rating feature to be a better representation of other individuals' recommendation than the

times viewed feature. In addition, higher averaged rating resulted in longer reading time among audience (Knobloch-Westerwick, Sharma, Hansen, & Alter, 2005). Similarly, audiences paid more attention to a news feed with many diggs, perceived it to be more credible, and reported a higher likelihood to click at the news feed and share it with others than a news feed with only a few digs (Xu, 2013).

The bandwagon effects were found in other contexts as well. Online videos with popular bandwagon cues (high view count) attracted more viewing over time than videos that were not as popular in the first place (Fu, 2012). When it comes to online shopping, the star rating and sales rank feature influenced participants' evaluations of the product credibility and quality, as well as their purchase intention through eliciting bandwagon perceptions (Sundar, Oeldorf-Hirsch, & Xu, 2008; Sundar, Xu, & Oeldorf-Hirsch, 2009). In the context of advocacy groups and social networking sites, the bandwagon effect was found to interact with race of participants, such that White participants reported a more positive group evaluation when they saw many White affiliates than when they saw only a few White affiliates, while the pattern was the opposite when Black affiliates were shown: the greater number of Black affiliates caused White participants to lower their group evaluation (Xu, Schmierbach, Bellur, Ash, Oeldorf-Hirsch, & Kegerise, 2012).

In addition, the number or the valence of other users' comments associated with certain messages, which can also serve as bandwagon cues, was found to be able to influence individuals' perceptions of the messages and the issue discussed in the message. Scholars found that when an antimarijuana video was associated with many supportive or derisive comments as opposed to negative comments, participants who viewed the video tended to have more positive evaluations on the video (Walther, DeAndrea, Kim, & Anthony, 2010). Lee, Jang, and Kim

(2009) also found that the comments associated with online news stories influenced readers' attitude towards the issue discussed in the news story.

In summary, high positive bandwagon cues, such as high star ratings, a large number of views or likes, or a preponderance of positive comments, can lead to stronger bandwagon perceptions and higher credibility judgment of the source among audience members. Given that enhanced bandwagon perceptions and high credibility judgment of message source could potentially make a persuasive message a more legitimate interference, as discussed in the previous section, it is reasonable to believe that messages that are coupled with high bandwagon cues could attenuate psychological reactance.

Formally stated, the hypotheses are as follow:

Hypothesis 1: High bandwagon cues will lead to (a) stronger bandwagon perceptions and (b) higher credibility judgment of the source, and these two mechanisms will be associated with (c) a lower level of psychological reactance, (d) more positive evaluation of message persuasiveness, (e) more positive attitudes toward limited drinking, and (f) stronger intention to limit drinking, compared to those with low bandwagon cues.

Message Threat & Bandwagon Cues

Thus far, the effects of message threat and bandwagon cues on psychological reactance have been reviewed separately. When message features and technological affordances are taken into consideration simultaneously, their effects on psychological reactance become more complicated.

Silvia (2005) found that when the similarity between participants and the communicator was low, the message that contained strong threat led to more reactance compared to the message that contained low threat; while when the similarity was high, participants liked the

communicator better and perceived the communicator to be less coercive, then message threat had no significant effect on individuals' reactance or agreement.

Similarly, high bandwagon cues could also improve individuals' evaluation on the message and source, so that even if the message contains a strong threat to individuals' freedom of action, the perceived threat of the message could be mitigated by high bandwagon cues through elevated credibility judgment of the message source, as well as enhanced evaluations of the message. As a result, users may not perceive the message with strong threat to be as threatening when it is coupled with high bandwagon cues.

When message threat and bandwagon cues are taken into consideration simultaneously, for a message that only contains a low level of threat, audiences who encounter such a message may only generate a very low level of psychological reactance, if at all. Under such conditions, bandwagon cues may not play a significant role in influencing individuals' reactance level given that they may not experience much reactance in the first place. On the other hand, messages that are highly threatening may cause a much higher level of psychological reactance among audiences. However, when such messages are coupled with high bandwagon cues, especially when viewers have connections with other viewers who liked such messages, these cues could increase audiences' bandwagon perceptions and improve their credibility judgment of the message source (Sundar et al., 2015). As a result, they may perceive the messages to be less coercive or threatening and more legitimate, which could mitigate audiences' psychological reactance and improve their message acceptance. However, low bandwagon cues may not generate strong enough bandwagon effects; therefore, when highly threatening messages are coupled with low bandwagon cues, audiences may still experience an intense psychological reactance.

Based on the above rationale, we propose

Hypothesis 2a: Bandwagon cues will moderate the effect of message threat on perceived threat and reactance, such that messages that contain a low level of threat will lead to a low level of perceived threat and reactance, regardless of bandwagon cues; while for messages that contain a high level of threat, the presence of high bandwagon cues will lead to significantly lower level of perceived threat and reactance than the low bandwagon cues (see Figure 1).

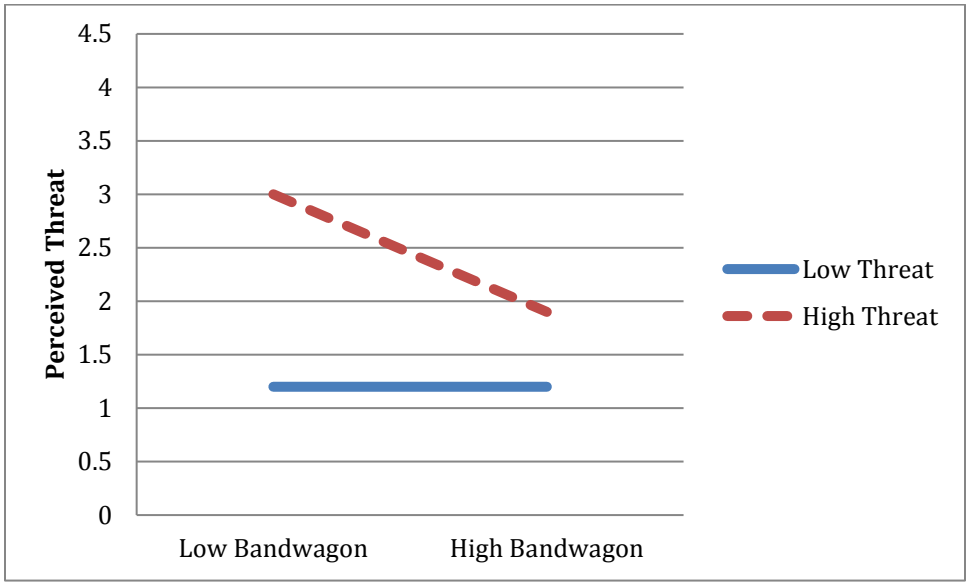

Figure 1. The First Pattern of Interaction Between Message Threat and Bandwagon Cues

On the other hand, the presence of high bandwagon cues could also strengthen the magnitude of the threat felt by the receiver, creating the impression that many other online presences, along with the message source, are "ganging up" on the message viewer, which may make the viewer feel isolated. As a result, participants who see the message along with high bandwagon cues may feel isolated and perceive the message to be even more threatening, therefore, they may generate stronger reactance compared to their counterparts who are in other conditions.

Therefore, we hypothesize an alternative possibility to hypothesis 2a:

Hypothesis 2b: Bandwagon cues will moderate the effect of message threat on perceived threat and reactance, such that messages that contain a low level of threat will lead to a low level of perceived threat and reactance, regardless of bandwagon cues; while for messages that contain a high level of threat, the presence of high bandwagon cues will lead to significantly higher level of perceived threat and reactance than the low bandwagon cues (see Figure 2).

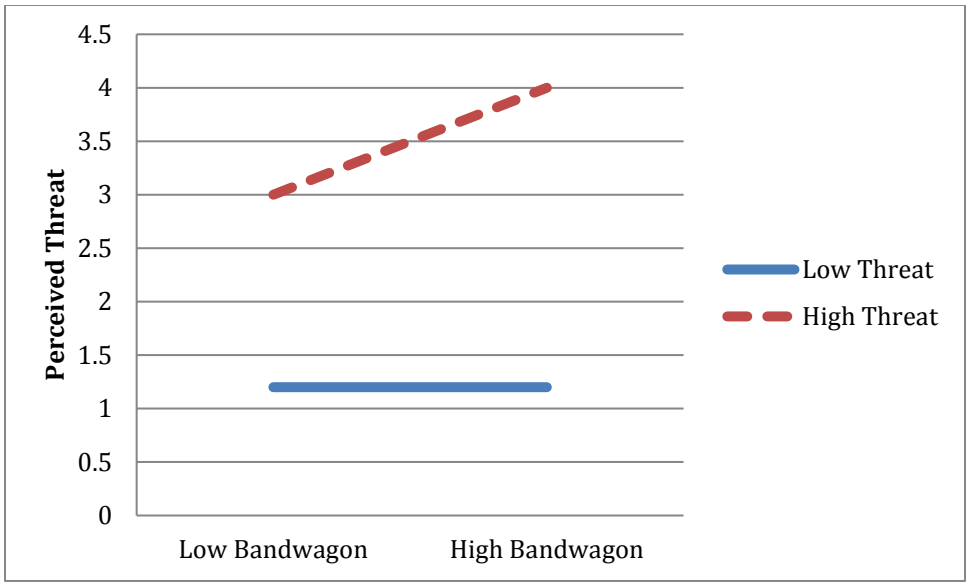

Figure 2. The Second Pattern of Interaction Between Message Threat and Bandwagon Cues

In line with the above rationale, when high bandwagon cues are coupled with persuasive messages that contain persuasion intention and advocacy, viewers may view the high bandwagon cues as strong peer pressure. Under such conditions, they may feel isolated by the threatening nature of the message and other viewers' massive support of the threat, hence provoking more psychological reactance. Therefore, it is also reasonable to expect that

Hypothesis 3: High bandwagon cues will lead to (a) stronger feelings of isolation, which in turn will lead to (b) a higher level of psychological reactance.

The Action Route, Comment Action & Effects

As Brehm (1966) originally proposed, individuals experience psychological reactance primarily due to perceived loss of control over their own behavior. Therefore, one important way to reduce psychological reactance is to regain an individual's control. In other words, if we empower users and give them sense of agency, they may experience less psychological reactance.

Media scholars have found that some technological affordances could allow users to perform communication tasks on interfaces, the process of which could empower users and give them autonomy and sense of agency. According to TIME model (Sundar et al., 2015), the actions afforded by interfaces (e.g., provision of choice to users, features allowing users to comment, like, or share to serve as the message source themselves) could lead to users' psychological correlates, such as "choice = perceived control, self as source = sense of agency" (Sundar et al., 2015, p. 51). These psychological correlates could mediate the effects of afforded actions on user engagement with the content or the interface, which in turn could moderate how content influences user's knowledge, attitudes, and behaviors. This process describes the second way through which interactive media influence individuals – the action route.

Different actions influence users through various mechanisms. Nowadays, interactive media are able to turn message receivers to message sources by allowing them to act as gatekeepers, recommenders, or even message creators both for themselves and for other users, and this type of technological affordance is called source interactivity. Many news channels allow users to customize the topics of news they receive based on their own preferences; social media tools are even able to let users share information with others and post their own messages. By turning users into sources of information, source interactivity affords greater self-expression,

which can better engage users and influence their cognition, attitudes, and behaviors (Sundar, 2007; Sundar et al., 2015).

For example, Sundar and colleagues found that individuals who got the freedom to write about any topic of their choice (active blogging) had a higher level of sense of community, found this function to be more useful, tended to like the portal better, reported that they felt more competent to use the portal website, and were more intrinsically motivated to use the portal website compared to those who were only allowed to choose a message source and a message to re-disseminate (filter blogging, Sundar et al., 2012). In another study, they also found that different types of blogging could empower women by affording them a strong sense of community or sense of agency, or both. As a result, participants felt more agentic and powerful (Stavrositu & Sundar, 2008).

Given that some technological affordances could empower users and rebuild their sense of agency through affording them freedom to act on the interface, it is reasonable to speculate that such actions could compensate for individuals' feelings of losing control, which means that these actions could potentially reduce individuals' psychological reactance by empowering them.

Therefore, we propose that

Hypothesis 4: Participants who publish their own comment will experience stronger sense of agency, which in turn could predict lower level of psychological reactance and higher level of persuasion.

Other than the potential main effect, the comment action could interact with bandwagon cues in creating psychological outcomes. Kim and Sundar (2014) found that in online health communities, high bandwagon cues could lead to users' stronger intentions to post among participants than low bandwagon cues. In addition, participants who had online buddies also

reported a higher level of perceived helpfulness and social presence in response to high bandwagon cues than to low bandwagon cues. The findings showed that bandwagon cues could serve as psychological compensation for online health community users by boosting their recognition of acknowledgement by other community members and making them feel more present in the community. The findings also demonstrated the power of positive feedbacks from other users in motivating and encouraging users to contribute.

Similarly, in another study, Kim and Sundar (2011) found that high bandwagon cues caused stronger intention to post and higher sense of community among users than low bandwagon cues. Mediation test revealed that sense of community mediated the effect of bandwagon on individuals' intention to post, and perceived empowerment further mediated the relationship between sense of community and individuals' attitudes toward posting. Based on these findings, bandwagon cues could serve as great tools in online communities to stimulate individuals' contribution. When individuals pick up bandwagon cues from the online community, they tend to build a sense of community and empowerment, which could cause them to hold a more positive attitude towards the postings and motivate them to contribute more to the online community.

Based on the above empirical findings, we predict that

Hypothesis 5: Participants in the high bandwagon conditions are more likely to publish a public comment compared to their counterparts who are in the low bandwagon conditions.

Besides, the valence of the new comment will presumably vary based on the interaction pattern between message threat and bandwagon cue. Specifically, in the situation where high bandwagon cues help reduce individuals' reactance by eliciting bandwagon heuristic and improving their evaluations on the message and the source, individuals are more likely to leave a

comment that is consistent with the primary valence of other users' comments. And the commenting action could increase their sense of agency, which could further reduce psychological reactance among these users.

Formally stated, the hypothesis is as follow:

Hypothesis 6a: Participants in the high bandwagon conditions are more likely to leave a supportive comment when given the chance, and audiences' perceived threat to freedom and psychological reactance will be further reduced by the comment function through enhanced sense of agency such that the combination of high bandwagon cues and the comment action will lead to the lowest level of reactance among all the conditions (see Figure 3).

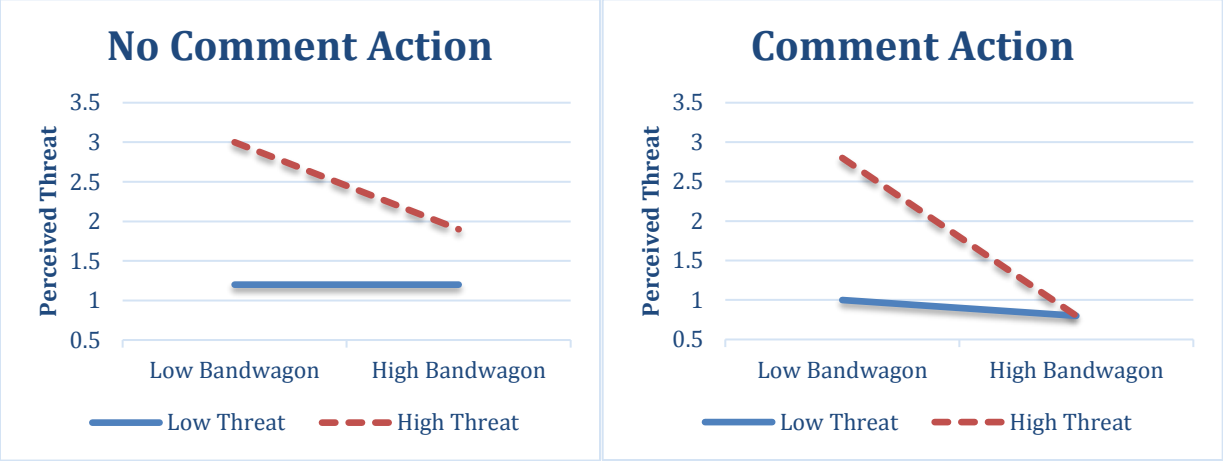

Figure 3. The First Pattern of Three-way Interaction Among Message Threat, Bandwagon Cues, and the Comment Action

Even for the situation in which high bandwagon cues increase individuals' reactance given that individuals perceive the combination of high threat and high bandwagon to be extremely threatening, they are still very likely to leave a comment to relieve their anger and anxiety or to express a unique opinion. However, in this case, the valence of their own comments is more likely to be inconsistent with the primary valence of other users' comments. After they've taken the action, the commenting action could presumably purge the users, so that after

they've done that, some of their uncomfortable feelings or the urge to counter argue vanish, and then their reactance will also be lower.

Based on this rationale, we hypothesize

Hypothesis 6b: Participants in the high bandwagon conditions are more likely to leave a counter arguing comment when given the chance, and audiences' perceived threat to freedom and psychological reactance will be reduced by the comment function through enhanced sense of agency (see Figure 4).

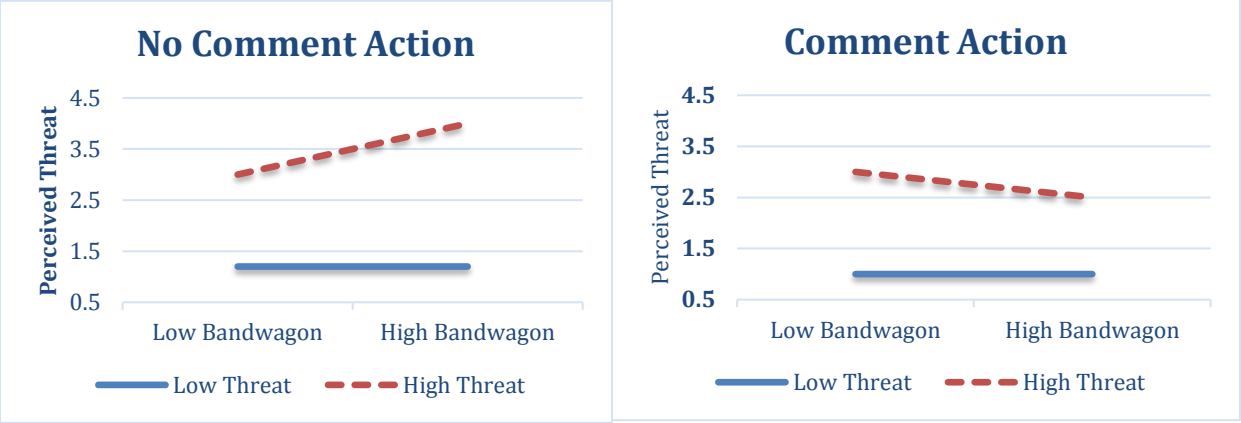

Figure 4. The Second Pattern of Three-way Interaction Among Message Threat, Bandwagon Cues, and the Comment Action

Chapter 2

METHOD

Design & Procedure

To test these hypotheses, a 2 (message threat: high vs. low) X 2 (bandwagon cue: high vs. low) X 2 (comment function: presence vs. absence) between subjects experiment was conducted. Participants were recruited from undergraduate level courses at Penn State. The questionnaire was administered on Qualtrics. The study was approved by the institutional review board at the Pennsylvania State University as an exempt study.

To recruit participants, an email was sent to several course instructors who agreed for their students to participate. The email contained a brief description of the study as well as a Google Sheet link for students to sign up for a one-hour experiment session to participate. Participation was voluntary, and students who participated in the study were offered one extra credit. The researcher described the study purpose, study procedure and method of signing-up for participation in the recruitment email sent to potential participants, and also offered the researcher's contact information and an alternative assignment for receiving the same amount of extra credit. Students were instructed to sign up in the Google sheet if they agreed to participate in the study. Once students signed up in the Google sheet, they would receive an email containing detailed study descriptions, a link to one of the eight experimental webpages, and a link to the questionnaire held on Qualtrics one hour prior to their sign-up time.

Each participant was randomly assigned to one of the eight experimental conditions after they signed up, and they received the corresponding webpage link prior to their experimental session. Each of the eight webpages contained a public service announcement video that advocates limited drinking. Below the video was a metric indicating the number of viewers who

liked the video and other viewers' comments to the video. For participants who were assigned to the no comment conditions, they were instructed to view the website and then complete the questionnaire during the hour of their choice on their own devices. For participants in the comment conditions, the study instructions encouraged them to post their own public comment on the website.

After participants finished viewing the webpage and publishing their own comment, they were asked to complete a questionnaire where their thoughts and evaluations on the PSA, the message source, and the interface, personality traits, as well as their attitudes and behavioral intentions with regard to limited drinking were measured. At the end of the questionnaire, participants were redirected to another independent questionnaire where their name and PSU ID were collected. After the data collection was completed, students' name list was organized and sent to their respective instructor for them to receive extra credits.

Participants

Two hundred and sixty one undergraduate students participated in the study. They were between ages 18 and 31 (M = 20.67, SD = 1.42). The sample comprised of 72.8% of females and 27.2% of males. The majority of participants (67.4%) self identified as White, followed by 21.1% Asian/Pacific Islander, 10% Black/African American, 6.5% Hispanic/Latino, and 1.5% others.

Stimuli

The researcher created eight webpages as experimental stimuli. All webpages shared the same design that mimicked Penn State's official website design. Each webpage contains a public service announcement (PSA) video as the main content.

The first part of the video describes negative consequences of binge drinking on drinkers (e.g., "Each year, 1,825 college students die from alcohol related injuries"). The second part of the video contains an advocacy of limited drinking. The manipulation of message threat also lies in this part. The strong threat condition contains intense language and strong persuasion intention (Dillard & Shen, 2015), such as "Three drinks is a safe limit that you must stick to. Do it"; while the weak threat condition employs neutral language with weak persuasion intention, such as "Perhaps three drinks is a safe limit you can live with. Why not give responsible drinking a try?"

Both videos were one minute and twenty-two seconds long. They both contained textual information, pictures, as well as a short video clip depicting a mock-up car accident. The high-threat video was coupled with intense music, while the low-threat video had no sound.

On the website, each version of the two PSA videos was coupled with bandwagon cues. For high bandwagon cue conditions, the video was ostensibly liked by 1,322 viewers, and the like symbol was followed by a sentence "93% viewers liked this video". Besides, the video received 140+ comments, and 9 comments were displayed; while for the low bandwagon cue conditions, the video only received 20 likes (3% of all the viewers) and 1 comment.

All the comments shown on the website were created by the researcher using different names and profile pictures. All comments were in favor of the advocated message, in order to rule out the potential confounding effects of comment valence. For the low bandwagon conditions, only one comment was displayed: "Drinking is stupid"; while for the high bandwagon conditions, eight more comments were displayed on top of the comment used in the low bandwagon conditions. The eight comments were "People can have fun without alcohol!", "You know drunk people are really annoying.", "I think it's really important for students who don't drink to be very confident about their decision to not drink", "Binge drinking should be

avoided", "When people get drunk, they are stupid", "I personally feel that I tend to just have fun hanging out with my friends and not drinking, but if they want to drink, I am not going to stop them or say they're terrible people. I will just say I will take a soda", and "If you go to a party just to drink, that is not the right mindset".

In terms of the manipulation of the comment function, half of the participants were assigned to conditions in which they were offered a textbox where they could publish a public comment, and they had the freedom to choose whether or not to leave a comment; while the other half were not offered this textbox. After a participant left a comment, they could see their newly published comment reflected on the webpage right away. However, the newly published comment posted by a participant was recorded and removed by the researcher before the next participant started his or her experimental session in order to rule out the possible confounds caused by other participants' comments.

Manipulation Checks

A pre-test was conducted to ensure that manipulations were successful. Sixty undergraduate students in the College of Communications at Penn State University were recruited to participate in the pre-test. All of them successfully identified that the topic of the study was college drinking, and that the source of the website was Penn State.

One-tailed independent sample t-test results showed that when asked to rate the level of threat they perceived the video posed to them, participants exposed to the high threat video perceived the video to be more threatening ($M = 3.99$, $SD = 1.57$) than their counterparts in the low threat video condition ($M = 3.21$, $SD = 1.55$), $t\ (56) = -1.91$, $p < 0.05$.

In terms of bandwagon cues, participants were first asked to identify whether they had seen a great percentage of viewers who liked the video or a small percentage. Chi-square test of

independence results showed that participants who were assigned to the high bandwagon condition were much more likely (89.7%) to report that they saw a great percentage of viewers who liked the video, and that the vast majority of those assigned to the low bandwagon condition (96.6%) reported that they saw a small percentage of viewers who liked the video (see Table 1), χ^2 (1) = 43.31, $p < .001$. Participants were then asked whether they had saw a bunch of comments on the website or only one comment. Similarly, 96.6% of participants in the high bandwagon condition claimed that they saw a bunch of comments published by other viewers on the website; and 96.6% of participants assigned to the low bandwagon conditions reported that they only saw one comment on the website (see Table 2), χ^2 (1) = 50.28, $p < .001$.

Table 1: *Contingency Table of Bandwagon Manipulation Check on Number of Likes in Pre-test*

	A Great Percentage of Viewers	A Small Percentage of Viewers	Total
High Bandwagon	26	3	29
Low Bandwagon	1	28	29
Total	27	31	58

Note: Participants were asked to identify whether there was a great percentage of viewers who liked the video or a small percentage, based on their memory.

Table 2: *Contingency Table of Bandwagon Manipulation Check on Number of Comments in Pre-test*

	A Bunch of Comments	Only One Comment	Total
High Bandwagon	28	1	29
Low Bandwagon	1	28	29
Total	29	29	58

Note: Participants were asked to identify whether they saw a bunch of comments or only one comment on the website, based on their memory.

Coding

All comments published by participants were recorded by the researcher, coded, and then analyzed as a series of dependent variables. Specifically, for each participant who was assigned to the conditions where they could leave a comment, whether or not the participant chose to leave a comment was recorded into a variable. What's more, each comment left by a participant was then further coded into three categories: supportive comments, neutral comments, and counter arguments by two independent coders (Krippendorf's $\alpha = 0.83$). Disagreements were resolved in discussion.

Comment Action

One of the major independent variables in this study is whether or not participants take the action to leave a comment. For participants who were not provided the comment box on the website, they could not leave a comment. Among those who were provided the comment box, some participants chose to take the action and publish their comment, while some other chose not to. Therefore, only those who actually published a comment were coded into the "comment action" group, and those who were not provided a comment box or those who were but chose not to leave a comment were combined into the "no action" group.

Comment Cue

Given that participants who were not provided a comment box and those who were but chose not to leave a comment are fundamentally different in nature in terms of the agency they were afforded, another variable, comment cue, was created. Participants who were not provided the comment box were assigned into the "no cue" condition, while those who were provided the comment box, no matter whether they took the action to leave a comment or not, were assigned into the "comment cue" condition. Comment cue was used as a covariate in all the analyses

involving comment action to rule out the potential difference between the two groups of participants who were assigned into the "no action" group.

Supportive Comment

As mentioned above, the valence of comment was coded into three categories: supportive comments, neutral comments, or counter-arguments. In order to test whether participants in certain conditions are more likely to leave a supportive comment over other comments, each supportive comment was assigned the value "1", and each neutral or counter-arguing comment was assigned "0" for the variable of supportive comment.

Counter-arguing Comment

Similarly, in order to test whether participants in certain conditions are more likely to publish a counter-arguing comment, another variable, counter-arguing comment, was created by assigning 1 to each counter-arguing comment and assigning 0 to supportive and neutral comments.

Measurements

All variables were measured using 7-point Likert-scale ranging from 1, "strongly disagree" to 7, "strongly agree" unless stated otherwise.

According to Dillard and Shen (2005), psychological reactance is comprised of an affective component (anger) and a cognitive component (counterargument), the two of which are intertwined. The detailed measurement of each component is described in the following section.

Right after participants viewed the website and were offered a chance to leave a comment (only for the comment conditions), they were given 3 minutes to write down their thoughts about the message or the source they just viewed. Two independent coders were trained to code

participants' thoughts in three steps: first, each participant's thoughts were sorted into separate psychological thought units. Agreement among the two coders was 97%.

Second, coders relied on a list of feeling terms that describe anger (Shaver, Schartz, Kirson, & O'Connor, 1987) to identify thought units that convey participants' feelings of anger. The list of terms included aggravation, irritation, agitation, annoyance, grouchiness, grumpiness, exasperation, frustration, anger, rage, outrage, fury, wrath, hostility, ferocity, bitterness, hate, loathing, scorn, spite, vengefulness, dislike, resentment, disgust, revulsion, contempt, envy, jealousy, and torment. After coders identified all the thought units that contained these terms, they evaluated whether the thought unit was expressing anger. For instance, "Also, the text in the video irritated me because it said things like 'you have to'" qualified as an angry thought, while "The people's comments on the video also made me laugh, especially the person who said drunk people are annoying" did not qualify even though it contained the term "annoying". Coders achieved perfect reliability in this step. Each participant's number of thought units that expressed anger was used as the operationalization of anger.

Finally, coders were instructed to code each thought unit to unqualified thought, supportive thought, neutral thought, or negative thought. Generally, unqualified thoughts include thoughts about affect other than anger or those that are irrelevant to the message. These thoughts were identified to reduce noise and to ensure that all the thoughts were only used to capture the cognitive part of participants' responses. Supportive thoughts include those that express agreement with the message, positive evaluations on the message or source, or intention to comply to the message; while negative thoughts refer to those contain disagreement with the message, negative evaluations on the message or source, or intention to not to comply with the message. Neutral thoughts refer to those non-evaluative responses. The two coders reached a

good inter-coder reliability (Krippendorf's $\alpha = 0.81$). The number of negative thoughts was used in the main analyses as the operationalization of counterargument, which is the cognitive component of psychological reactance (Chaiken, 1980; Dillard & Shen, 2005).

Perceived threat to freedom, which is often seen as antecedent of psychological reactance, was measured with four items including "The message threatened my freedom to choose," "The message tried to manipulate me", "The message tried to pressure me", and "The message tried to make a decision for me" on a 5-point Likert scale ranging from 1, "strongly disagree" to 5, "strongly agree" (Dillard & Shen, 2005; Cronbach's α = .86; *M* = 2.59, *SD* =1.02).

Participants' bandwagon perceptions were measured with three items (Sundar, Xu, & Oeldorf-Hirsch, 2013) to capture their beliefs of how other Penn Staters think of the video. They are asked to rate the following items "how likely are other people at Penn State to trust this video"; "how likely are other people at Penn State to recommend this video"; and "how likely is it that other people at Penn State would think this video is believable" on a scale ranging from 1, "not at all likely" to 7, "highly likely" (Cronbach's α = .85; *M* = 3.79, *SD* =1.49).

Evaluations of message persuasiveness were measured with five 7-point semantic differential scale items. Participants were asked to rate the question "I feel the message was___" on five word pairs, including "Not at all persuasive – very persuasive"; "Very bad – very good"; "Not at all convincing – very convincing"; "distorted – balanced"; and "biased – fair" (Cronbach's α = .91; *M* = 4.27, *SD* =1.54).

Similarly, participants' credibility judgment on the message source were measured with fourteen semantic differential scale items adapted from two scales (McCroskey, 1966; Miller et al., 2007). Participants rated on the continuum of fourteen word pairs in response to the question

"The source of the message is ___". Word pairs include "knowledgeable –not knowledgeable"; "Intelligent – unintelligent"; "Qualified – unqualified"; "Broad – narrow"; "Friendly – unfriendly"; "Nice – awful"; "Good-natured – irritable"; "Cheerful – gloomy"; "Pleasant – unpleasant"; "Sympathetic – unsympathetic"; "Honest – dishonest"; "Virtuous – sinful"; "Unselfish – selfish"; "Good – bad" (Cronbach's α = .92; *M* = 3.44, *SD* =1.05).

Three items were used to measure participants' feelings of isolation. Specifically, participants were expected to rate their agreement on three items: "The video, coupled with other Penn Staters' likes and comments, make me feel alone"; "The video, coupled with other Penn Staters' likes and comments, make me feel isolated"; and "The video, coupled with other Penn Staters' likes and comments, make me feel cornered" (Cronbach's α = .88; *M* = 2.02, *SD* =1.24).

Sense of agency was measured with three items adapted from Stavrositu and Sundar (2008)'s sense of agency scale. Participants were asked to rate their agreement on the following items: "Leaving a comment makes me feel I have control over my own voice", "Leaving a comment enables me to assert myself", and "Leaving a comment makes me feel I have a distinct voice" (Cronbach's α = .92; *M* = 4.26, *SD* =1.54).

Attitude towards limited drinking was measured by asking participants to rate to what extent they think limiting their alcohol consumption to three drinks or less is positive, good, desirable, wise, necessary, and beneficial (Ajzen, 2002a) on 7-point semantic differential scale (Cronbach's α = .90; *M* = 4.70, *SD* =1.40).

Intention to limit alcohol consumption was measured by asking participants to estimate the likelihood that they would limit their alcohol consumption to three or less the next time they drink and in the future respectively on a eleven point scale ranging from 0 to 100%, with 10% being a unit (Dillard & Shen, 2005; Cronbach's α = .94; *M* = 5.74, *SD* =3.20).

Quick and Bates (2010) also identified alcohol consumption to be an individual difference that might influence individuals' acceptance of health messages advocating limited drinking, therefore, participants' alcohol consumption history and current status were also measured with four questions. Participants were first asked to mark a response on two 7-point scale items ranging from "I have never had a drink of alcohol" to "I drink alcohol almost daily" and "I do not drink alcohol at all" to "I usually drink a lot of alcohol (more than 9 beers or drinks) on any given occasion" respectively. Then they were asked to choose from 0 to 7 as a response to the question "On a typical week, how many days do you drink", which is followed by a textbox in which they were asked to put the average number of drinks they have each time they drink.

Besides, participants' demographic information, such as age, gender, and ethnicity were also measured.

Data Analysis Plan

Cleaning & Preparation

After the data collection was completed, the whole dataset was downloaded from Qualtrics. Missing values were checked first. Seven participants had numerous missing values or had missing values on important outcome variable, and they were removed from the sample. For participants who missed one scale item, the same participant's average value of other related items for the same variable was imputed as his response to the missing item.

Next, the researcher removed five participants who constantly marked the same number for all the questions and then conducted exploratory data analyses. Specifically, for nominal variables, like gender and ethnicity, frequency was examined to make sure that there were no illogical values. For continuous variables, mean, standard deviation, range, skewness, and

kurtosis were examined. Three items were positively skewed, and they were transformed by taking the square root of each item.

A series box-plots were then conducted to probe for outliers. Five participants were removed from the dataset because their responses were identified as outliers for multiple items of major dependent variables.

Also, scale reliability for each measured variable was examined. Correlations between major dependent variables were assessed to make sure that the correlation matrix was positive definite (Kline, 2011).

Analytic Approach

One-tailed independent sample t-test was used to test whether the high threat message was perceived to be more threatening than the low threat one. Multivariate general linear model was conducted to test whether bandwagon cues had effects (H1a, H1b, H3a), as well as whether the presence or absence of the comment action led to different outcomes (H4). Chi-square was used to test whether participants could correctly identify the bandwagon cues they viewed. General Linear Model was used to examine the interaction effects of independent variables (H2 and H6). Logistic regression was used to test the relationship between bandwagon cues and the comment action or valence of comment (H5 and H6). The PROCESS Macro was used to test mediating relationships (H4, Hayes, 2013).

Given that reactance needs to be modeled as an intertwined compound of anger and counterargument (Dillard & Shen, 2005), all analyses that involve reactance were tested with structural equation modeling. The clean dataset was used for structural equation modeling (H1c, H1d, H1e, H1f, H2, H3b, H4, and H6). Maximum likelihood estimation was employed.

Interaction terms of two or three variables were created by multiplying these variables together in SPSS.

For structural equation modeling, a measurement model was specified first. All the variables, either manipulated or measured, were treated as latent constructs in the measurement model. Anger and counterargument were treated as second-order subsets of psychological reactance (Dillard & Shen, 2005).

The measurement model was specified based on modification indices (based on chi-square, chi-square/df, CFI, RMSEA, PCLOSE, TLI). Chi-square is a classic absolute fit index that assesses model fit, and it measures the extent to which the reproduced model deviates from the observed one. It is extremely sensitive to sample size, and it is not a robust indicator of model fit given a large sample size. Therefore, chi-square/df was also evaluated. Carmines and McIver (1981) have suggested that chi-square/df lower than 2 indicates an acceptable model fit.

Both CFI and TLI are comparative fit indices, which compares the fit of a user-specified model to the null independence model. A CFI value greater than .93 (Hu & Bentler, 1999) and a TLI value greater than .95 indicate a good model fit.

RMSEA, short for root mean square error of approximation, is a model fit index that incorporate a penalty function for poor model parsimony (Brown, 2006). It measures to what extent the model fits reasonably well, as opposed to perfectly well, in the population. A RMSEA value closer to 0 shows a good model fit. The "close" fit is operationalized as RMSEA less than or equal to 0.05.

The model was iteratively modified based on MIs until it achieved a decent model fit based on criteria described above. See Figure 5 for the hypothesized structural equation model.

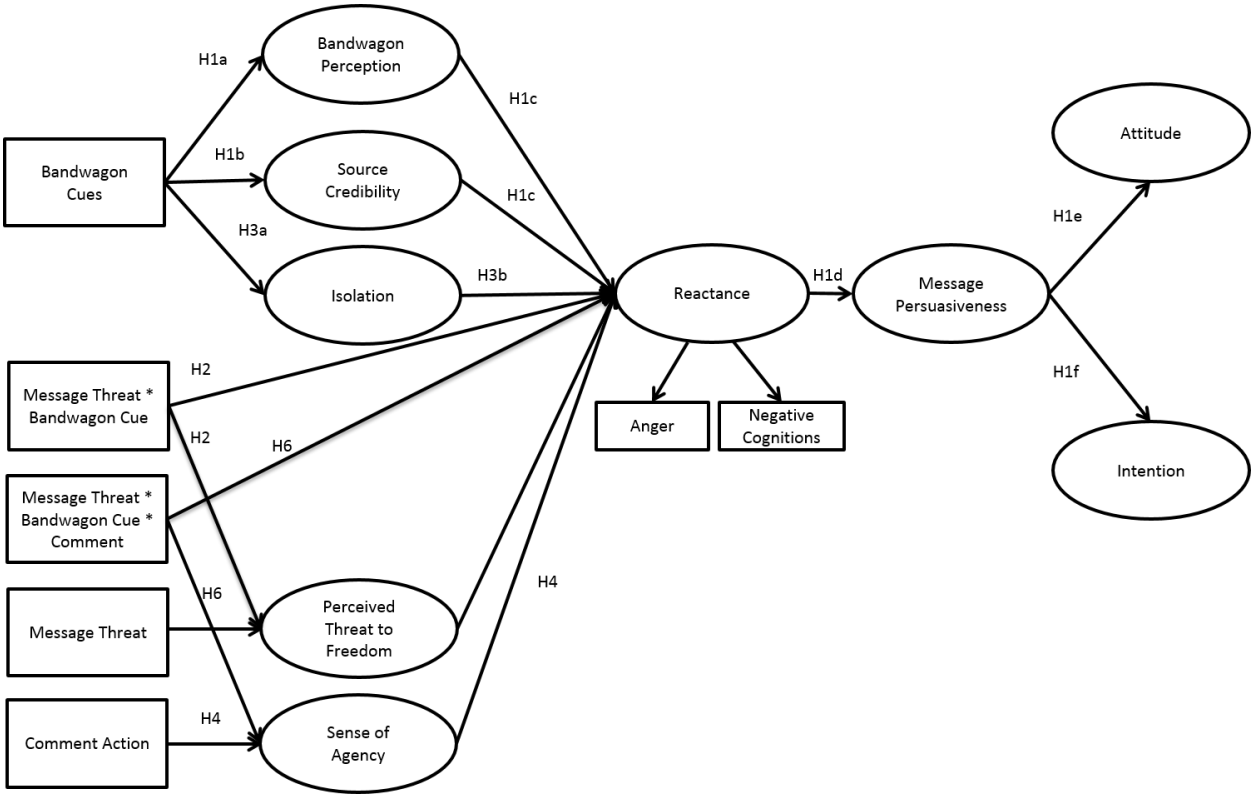

Figure 5. The Hypothesized Model

A covariance matrix was constructed and inputted into AMOS as data to estimate the parameters in the hypothesized model using maximum likelihood procedure.

Chapter 3

RESULTS

Manipulation Checks

Participants were first asked to answer a few questions related to factual information contained in the video. One participant identified the topic of the video to be STD rather than college drinking; six participants reported that the source of the video was CDC or WHO rather than Penn State; and thirty-six participants could not correctly identify that the safe number of drinks discussed in the video was three. All these forty-three participants were hence removed from the sample.

Message Threat

One-tailed independent sample t-test results showed that when asked to rate the level of threat they perceived the video posed to them, participants exposed to the high threat video (M = 2.77, SD = 1.06) perceived the video to be more threatening than their counterparts in the low threat video condition (M = 2.41, SD = .94), t (177) = -2.43, $p < 0.01$. Therefore, the manipulation of message threat was successful.

Bandwagon Cue

Bandwagon cues were manipulated via both the number of likes and the number of comments. Participants were asked to identify whether they had seen a great percentage of viewers who liked the video or a small percentage. Among the 111 participants who were assigned to the low bandwagon condition, eight of them incorrectly reported that they saw a great percentage of viewers who liked the video; and among the 108 participants who were assigned to the high bandwagon conditions, eight of them reported that they saw a small percentage of viewers who liked the video. Since the sixteen participants incorrectly identified

the bandwagon cues they viewed, they were removed from the sample. Similarly, four participants in the low bandwagon condition claimed that they saw a bunch of comments published by other viewers on the website; and three participants assigned in the high bandwagon conditions reported that they only saw one comment on the website. These seven participants were removed as well.

Comment Action

Among the 179 participants who passed all the manipulation check questions, 87 of them were assigned to the condition where they did not receive a comment box, and 92 were assigned to the conditions where the comment box was provided. Among the latter group of participants, 37 of them did not post a comment, while 55 of them did.

Bandwagon Effects

In terms of the effects of bandwagon cues, H1 predicted that high bandwagon cues would lead to stronger bandwagon perceptions and higher credibility judgment of the source, which in turn will predict a lower level of psychological reactance and better persuasive outcomes compared to those with low bandwagon cues; while on the other hand, H3 predicted that high bandwagon cues would lead to stronger feelings of isolation, which in turn would predict a higher level of psychological reactance. Multivariate general linear model with bandwagon cue as independent variable, bandwagon perception, credibility judgment, as well as isolation as dependent variable, and participants' gender and drinking history as covariates was conducted.

Results showed a significant main effect of bandwagon cues on bandwagon perceptions and isolation. Specifically, participants who viewed the webpage with a high bandwagon cue held stronger bandwagon perceptions (M = 4.00, SD = 1.48) compared to their counterparts in the low bandwagon conditions (M = 3.58, SD = 1.49), $F(1, 175) = 3.99$, $p < .05$, $\eta_p^2 = .02$.

Similarly, participants who were assigned to high bandwagon conditions (M = 2.23, SD = 1.43) also reported a higher level of isolation than those in the low bandwagon conditions (M = 1.80, SD = .97), $F(1, 175) = 6.35$, $p < .05$, $\eta_p^2 = .04$. However, the difference between high bandwagon conditions and the low bandwagon conditions was non-significant for source credibility judgment (p = .42). Participants in the high bandwagon conditions (M = 3.49, SD = 1.10) perceived a similar level of source credibility as their counterparts in the low bandwagon conditions (M = 3.39, SD = 1.00). Therefore, H1a and H3a were supported, while H1b was not supported.

Message Threat & Bandwagon Cues

H2 predicted two competing interactions between message threat and bandwagon cues on participants' perceived threat to freedom. Univariate general linear model was conducted with message threat and bandwagon cue as independent variable, perceived threat to freedom as dependent variable, and participants' gender and drinking history as covariates. The results showed a significant interaction between message threat and bandwagon cues on perceived threat to freedom, $F(1, 173) = 3.94$, $p < .05$, $\eta_p^2 = .02$. Specifically, as shown in figure 6, when participants were exposed to the message containing low level of threat, the high bandwagon cue (M = 2.51, SE = .16) and low bandwagon cue (M = 2.32, SE = .15) led to similar levels of perceived threat to freedom; however, when participants viewed the message with high level of threat, the high bandwagon cue (M = 2.58, SE = .14) led to a lower level of perceived threat to freedom compared to the low bandwagon cue (M = 2.99, SE = .16). The interaction pattern was more consistent with H2a rather than H2b, therefore, H2a was supported, and H2b was not supported.

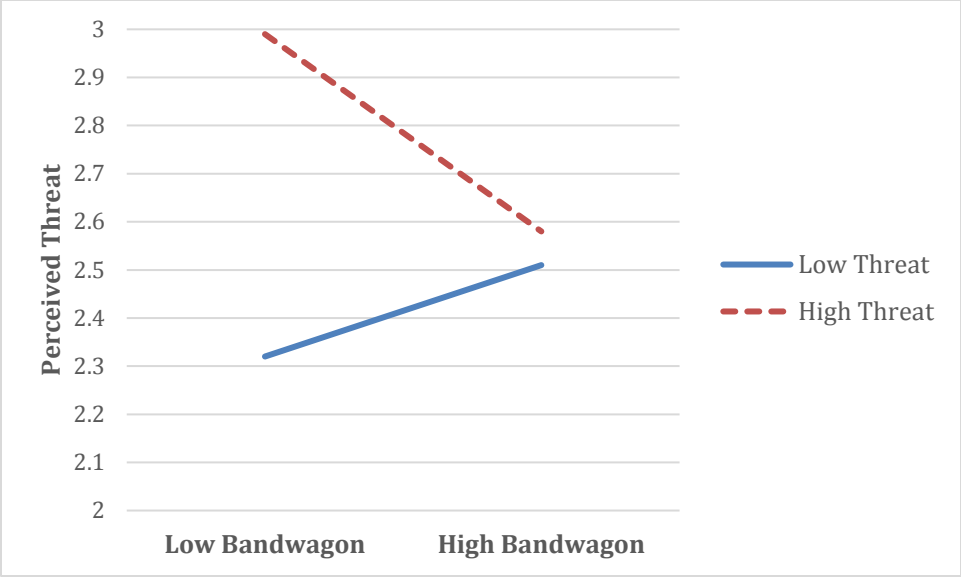

Figure 6. The Interaction Between Message Threat and Bandwagon Cue on Perceived Threat.

In addition, a similar interaction (see Figure 7) was found between message threat and bandwagon cues on participants' attitudes toward limited drinking, $F(1, 173) = 5.54$, $p < .05$, $\eta_p^2 = .03$. For the message containing high level of threat, the high bandwagon cue ($M = 4.89$, $SE = .20$) led to more positive attitudes toward limited drinking among participants than the low bandwagon cue ($M = 4.55$, $SE = .22$); on the contrary, for the message that contained a low level of threat, the high bandwagon cue ($M = 4.33$, $SE = .22$) led to less positive attitudes toward limited drinking compared to the low bandwagon cue ($M = 4.97$, $SE = .20$).

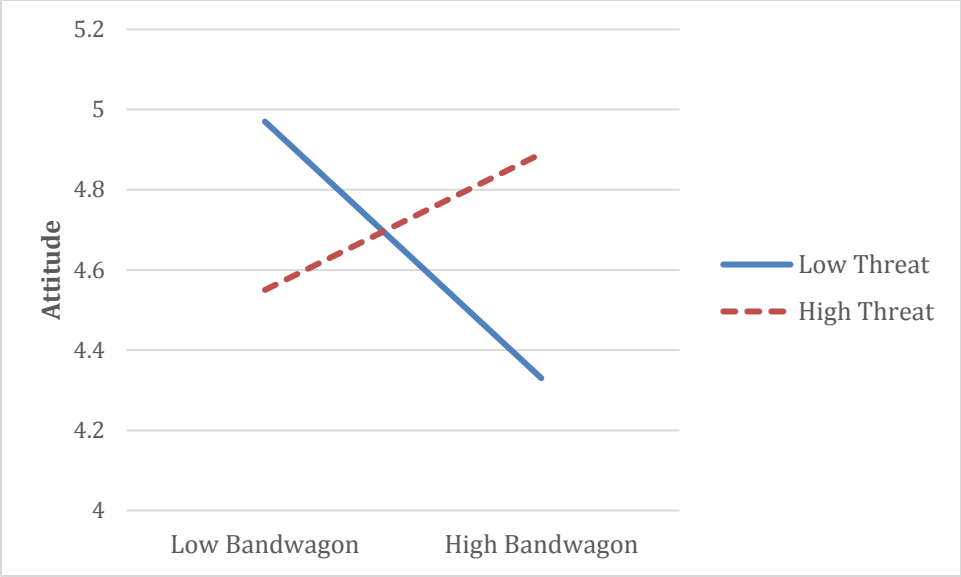

Figure 7. The Interaction Between Message Threat and Bandwagon Cue on Attitude Towards Limited Drinking

A moderated mediation analysis was conducted to uncover the underlying mechanism of the above interaction on attitudes with threat being the independent variable, bandwagon cue being the moderator, perceived threat being the mediator, and attitude being the dependent variable. Model 7 of PROCESS (Hayes, 2013) Macro was employed with 5,000 bootstrap samples. Results revealed a significant moderated mediation pattern: bandwagon cue moderated the effect of message threat on participants' attitudes toward drinking through their perceived threat to freedom, index of moderated mediation = .34, *SE* = .20, 95% CI = [.02, .80]. Specifically, when the health message is coupled with a low bandwagon cue, participants' perceived threat to freedom significantly mediated the effect of message threat on their attitudes toward limited drinking, *b* = -.38, *SE* = .15, 95% CI = [-.72, -.13], such that the message containing high threat caused individuals to perceive the message to be highly threatening, which in turn led to poor attitudes toward limited drinking. However, in high bandwagon conditions,

perceived threat did not mediate the effect of message threat on attitudes, b = -.04, SE = .12, 95% CI = [-.26, .23].

Comment Effects

H4 proposed that participants who publish their own comment would experience stronger sense of agency, which in turn could predict lower level of psychological reactance and higher level of persuasion. Multivariate general linear model with comment action as independent variable, sense of agency, attitude, and behavioral intention as dependent variable, and participants' gender, drinking history, and comment cue as covariates was conducted.

Results showed a significant main effect of comment action on sense of agency, $F(1, 174) = 9.85$, $p < .01$, $\eta_p^2 = .05$. Specifically, participants who chose to leave a comment on the website (M = 4.62, SD = 1.32) reported a stronger sense of agency compared to their counterparts who did not get a comment box or who did not choose to leave a comment (M = 4.10, SD = 1.61). However, the comment action did not have a significant main effect on participants' attitudes toward drinking (p = .99) or their intention to limit drinking (p = .79).

A serial mediation test was conducted with comment action being the independent variable, sense of agency and attitudes being mediators, comment cue as covariate, and behavioral intention serving as the dependent variable. Model 6 of PROCESS (Hayes, 2013) Macro was employed with 5,000 bootstrap samples. Results showed that sense of agency significantly mediated the effect of comment action on behavioral intention, b =.28, SE = .19, 95% CI = [.01, .80] (see Figure 8), even though it did not affect attitude, b =.01, SE = .10, 95% CI = [-.19, .21]. Therefore, H4 was supported.

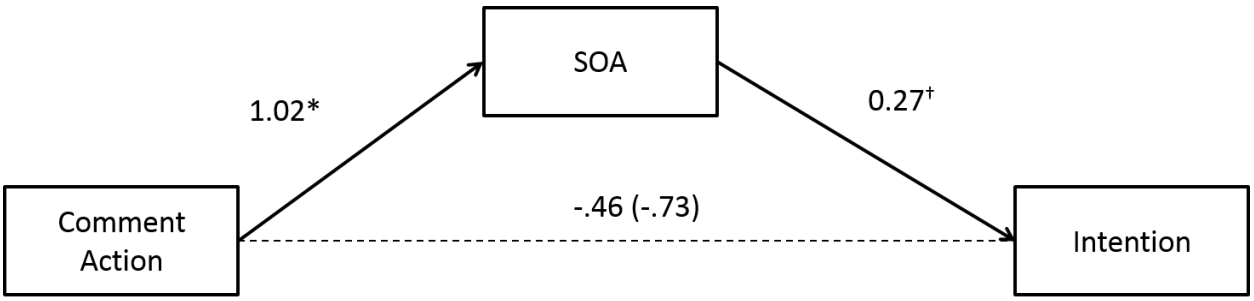

Figure 8. Mediation Effect of Comment Action on Behavioral Intention Through Sense of Agency

Note: The effect size of the direct effect of comment action on intention is in parentheses.

$< 0.1^{\dagger}$; $< 0.05^{*}$

H5 predicted that participants in the high bandwagon conditions were more likely to publish a public comment on the website compared to those in the low bandwagon conditions. Binary logistic regression was conducted to test this hypothesis with bandwagon cues as independent variable and comment action as dependent variable. Given that participants who were not given a comment box had no chance leaving a comment at all, they were excluded from this analysis. Results showed that bandwagon cue was not a significant predictor of whether participants chose to leave a public comment or not, b = -.60, SE = .43, p = .16. Therefore, H5 was not supported.

Message Threat, Bandwagon Cue, & Comment Action

H6 proposed two competing patterns as to the valence of comment published by participants in the high bandwagon condition as well as a three-way interaction between message threat, bandwagon cues, and comment action. Binary logistic regression was employed to test the relationship between bandwagon cues and the valence of comments among those participants who left a comment. Results showed that participants in the high bandwagon conditions were not more likely to leave a supportive comment, b = -.12, SE = .57, p = .84, nor were they more likely

to leave a counter-arguing comment compared to those in the low bandwagon conditions, b = -.41, SE = .91, p = .66. Therefore, the data showed no significant relationship between the bandwagon condition and the valence of comments posted by participants.

As for the test of the three-way interaction between message threat, bandwagon cue, and comment action, multivariate general linear model was employed with message threat, bandwagon cue, and comment action as independent variable, participants' gender, drinking history, and comment cue as covariates, sense of agency and perceived threat to freedom as dependent variable. Results showed no significant three-way interaction on either sense of agency (p = .11) or perceived threat to freedom (p = .48). Therefore, H6a and H6b were not supported.

Bandwagon Cue & Comment Action

Exploratory analyses revealed a significant interaction effect between bandwagon cue and the comment action on message persuasiveness evaluation, $F(1, 172) = 7.86$, $p < .01$, $\eta_p^2 = .04$. As shown in figure 9, for participants who did not leave a comment or given no chance to leave a comment, the high bandwagon cue (M = 4.66, SD = 1.35) made individuals perceive the message to be more persuasive than the low bandwagon cue (M = 4.00, SD = 1.71); however, when participants took the action to leave a comment, the high bandwagon cue (M = 3.89, SD = 1.37) tended to undermine the persuasiveness of the message compared to the low bandwagon cue (M = 4.56, SD = 1.55).

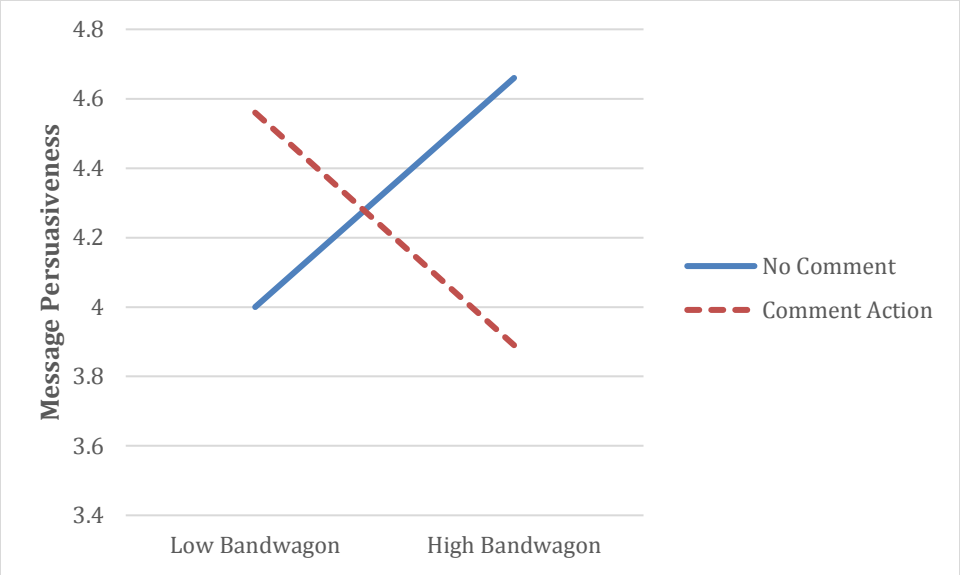

Figure 9. The Interaction Between Bandwagon Cue and Comment Action on Message Persuasiveness Evaluation

In addition, a moderated mediation test using model 7 of PROCESS Macro (Hayes, 2013) showed that the comment action significantly moderated the mediation effect of bandwagon cue on behavioral intention through message persuasiveness, index of moderated mediation = -1.21, *SE* = .46, 95% CI = [-2.18, -.37]. Specifically, for participants who did not take the comment action, their evaluations on the message persuasiveness significantly mediated the effect of bandwagon cue on their intention to limit drinking, *b* = .61, *SE* = .26, 95% CI = [.15, 1.16]. However, when participants chose to publish their own comment, their perception of message persuasiveness did not mediate the effect of bandwagon cue on their intention to limit drinking, *b* = -.60, *SE* = .38, 95% CI = [-1.37, .11].

Reactance Reduction & Persuasion

Structural equation modeling was used to test the extent to which psychological reactance was influenced by participants' perceptions, evaluations, and feelings, and the extent to which it

influenced persuasive outcomes. Given that source credibility was not affected by any independent variable, it was not included in the structural equation model.

A measurement model was first tested to ensure the validity of measurements. The initial measurement model fit the data poorly: χ^2 (518) = 966.22, $p < .001$; χ^2/df = 1.87; CFI = .91; TLI = .88; RMSEA = .07 (90% CI LO = .06, 90% CI HI= .08, PCLOSE < .001). Based on modification indices, one item measuring message persuasiveness evaluation ("I feel the message was___: Not at all convincing – very convincing"), one item measuring feelings of isolation ("The video, coupled with other Penn Staters' likes and comments, make me feel cornered"), and two items measuring attitude towards limited drinking ("To limit one's alcohol consumption to three drinks or less is ___: unfavorable – favorable"; and ("To limit one's alcohol consumption to three drinks or less is ___: unnecessary – necessary") were removed iteratively because they had low loadings on their respective latent variable or they heavily cross-loaded on other latent variables. After elimination of these items, the measurement model yielded a good fit, χ^2 (384) = 533.70, $p < .001$; χ^2/df = 1.39; CFI = .96; TLI = .95; RMSEA = .05 (90% CI LO = .04, 90% CI HI= .06, PCLOSE = .71).

Table 3 presents the partial correlation matrix, means, and standard deviations of each independent and dependent variable with gender, drinking history, and comment cue statistically controlled. The partial correlation matrix was used as input to AMOS. Maximum likelihood estimation was employed in the model testing, and the iteration limit was set to 500. Each measured variable was corrected for measurement error by setting the variance of error term to be 1-α times the variance of the corresponding manifest.

Figure 10 shows the final model resulting from model specification and the standardized regression weight of each path in the model. The model achieved a good fit, χ^2 (61) = 89.63, p =

.01; χ^2/df = 1.47; CFI = .98; TLI = .97; RMSEA = .05 (90% CI LO = .03, 90% CI HI= .07, PCLOSE = .44).

Table 3. *Partial Correlation Matrix, Means, and Standard Deviations*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Bandwagon (BW)	1														
2. Threat	.08	1													
3. Comment Action (CA)	.11	.12	1												
4. Threat*BW	.72***	.72***	.16*	1											
5. Threat*BW*CA	.61***	.62***	.56***	.86***	1										
6. Perceived Threat	-.04	.18*	.04	.06	.06	1									
7. Anger	.09	.20**	.07	.18*	.22**	.22**	1								
8. Counterargument	-.05	.20**	.07	.09	.12	.40***	.31***	1							
9. Bandwagon Perception	.15*	-.06	-.03	.07	.03	-.22**	-.06	-.41***	1						
10. Message Persuasiveness	.06	-.17*	-.10	-.06	-.11	-.54***	-.26***	-.61***	.66***	1					
11. Intention	.03	-.10	-.02	-.05	-.08	-.21**	-.19**	-.33***	.27***	.46***	1				
12. Sense of Agency	.15*	.11	.23**	.18*	.22**	.04	.05	-.09	.12	.05	.13	1			
13. Isolation	.20**	.02	.04	.13	.09	.35***	.03	-.01	-.02	-.09	.13	.08	1		
14. Attitude	-.03	.05	.02	.05	.07	-.37***	-.09	-.28***	.34***	.46***	.42***	.01	-.20**	1	
15. Source Credibility	.05	.16*	.10	.14	.16*	.51***	.24	.37***	-.41***	-.60***	-.25**	.05	.26***	-.32***	1
Mean	1.51	1.51	1.31	2.30	3.08	2.59	.08	.37	3.79	4.28	5.74	4.26	1.89	4.88	3.55
SD	.50	.50	.46	1.14	2.07	1.02	.27	.61	1.49	1.56	3.20	1.54	1.22	1.41	1.08

Note: Participants' gender, drinking history, and comment cue were controlled.

<.05* <.01** <.001***

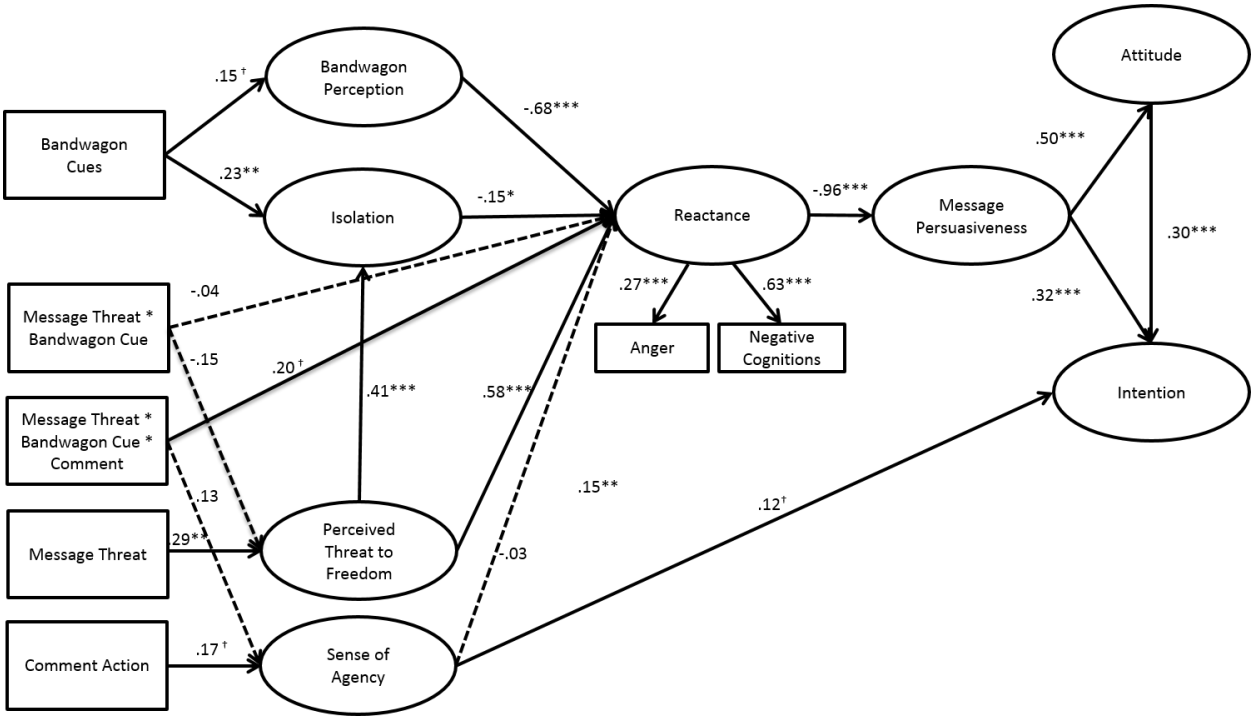

Figure 10. Structural Equation Model with Standardized Regression Weights

Note: Solid lines indicate significant paths, and dashed lines indicate non-significant paths. Error covariances are not shown in the figure in order to reduce visual clutter.

$< 0.1^{\dagger}$; < 0.05*; < 0.01**; < 0.001***.

H1 proposed that a higher level of bandwagon perceptions would predict lower psychological reactance, which in turn would be associated with better evaluation of message persuasiveness, more positive attitudes toward drinking and stronger intention to limit drinking. Results showed that bandwagon perceptions significantly predicted reactance (β = -.68, p < .001), which in turn predicted evaluation of message persuasiveness (β = -.96, p < .001), and that was significantly associated with both participants' attitudes toward limited drinking (β = .50, p < .001) and their intention to limit drinking (β = .32, p < .001). Therefore, H1c, H1d, H1e and H1f were supported.

H2 also predicted an interaction between message threat and bandwagon cue on psychological reactance in addition to on perceived threat. Path estimate results showed that the association between the interaction term of threat and bandwagon and reactance was non-significant (β = -.04, p = .71), showing no support for this part of the hypothesis.

H3 proposed that high bandwagon cues would lead to stronger feelings of isolation, which in turn would be associated with higher levels of reactance. Results showed that bandwagon cue contributed to feelings of isolation (β = .23, p < .01), which in turn predicted reactance, but in the opposite direction, i.e., isolation was negatively related to reactance (β = -.15, p < .05). Therefore, H3b was not supported.

H4 predicted a negative association between sense of agency and psychological reactance. Results showed that the association was non-significant (β = -.03, p = .55), which shows no support for the hypothesis.

Last but not the least, H6 predicted a three-way interaction between message threat, bandwagon cue, and comment action on reactance. However, the results showed no such significant association (β = .20, p = .07), showing no support for the hypothesis.

During the procedure of model specification, several interesting paths manifested themselves based on modification indices. Perceived threat to freedom positively predicted feelings of isolation (β = .41, p < .001). Also, a significant association was found between attitudes and behavioral intention, β = .30, p <.001.

In order to better present significant main effects of independent variables, the SEM analysis was run without interaction terms. The model (Figure 11) achieved a decent fit, χ^2 (51) = 84.80, p < .01; χ^2/df = 1.66; CFI = .92; TLI = .90; RMSEA = .06 (90% CI LO = .04, 90% CI HI= .08, PCLOSE = .21).

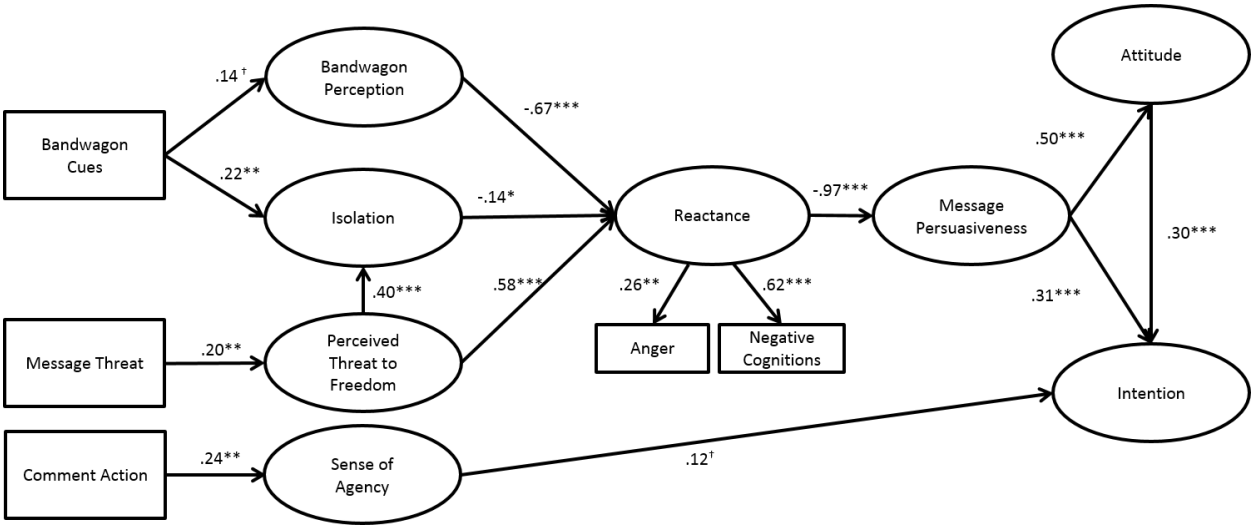

Figure 11. Structural Equation Model without Interaction Terms

Note: Numbers on paths are standardized regression weights.

$< 0.1^{\dagger}$; < 0.05*; < 0.01**; < 0.001***

Summary

This chapter has reported several ways in which online media technological affordances influence users' reactions to and acceptance of online messages. The major findings are summarized in the following section.

Message Threat

Consistent with previous literature, findings show that individuals perceive a message containing dogmatic language and a strong intent to persuade to be threatening. Furthermore, perceived threat to freedom predicted negative evaluations on the message's persuasiveness, which led to strong reactance, which is negatively associated with attitudes toward the advocacy of the message and intention to not follow the advocacy.

Bandwagon Effects

Results showed that strong bandwagon cues led to strong bandwagon perceptions and feelings of isolation. Bandwagon perceptions helped reduce reactance. Surprisingly, participants'

feelings of isolation also helped mitigate reactance. Participants in the high bandwagon conditions reported a stronger feeling of isolation, and that was associated with less reactance and better message persuasion.

Message Threat & Bandwagon Cue

In addition to main effects, bandwagon cues also interact with message threat in influencing individuals' message acceptance. When participants were exposed to messages containing a high level of threat, high bandwagon cues reduced participants' perceptions of the threat level of the message and enhanced their attitudes toward limited drinking. In addition, when participants viewed the message coupled with low bandwagon cues, their perceived threat of the message mediated their attitudes toward limited drinking, while the mediation was not significant in high bandwagon conditions.

Comment Effects

The act of posting a comment significantly predicted sense of agency among users, which in turn was associated with increased intention to follow the message advocacy. Note that comment action was not directly associated with psychological reactance or user intention to limit drinking, however, sense of agency significantly mediated the relationship between comment action and intention. The mediation results showed that both total effect (b = -.46) and direct effect (b = -.73) of comment action on intention were negative, while the indirect effect of comment action on intention through sense of agency was positive. The negative relationship between comment action and intention was strengthened once sense of agency was statistically removed, which indicates suppression effect (MacKinnon, Krull, & Lockwood, 2000).

Bandwagon Cue & Comment Action

Results showed no relationship between bandwagon cues and the likelihood that participants chose to leave a comment when given the chance. No association was found between bandwagon cues and the valence of the comment published by participants either.

A two-way interaction was found between bandwagon cues and comment action on participants' evaluation of message persuasiveness. For those who did not leave a comment, high bandwagon cues boosted participants' evaluation on the persuasiveness of the message, while for those who took the action to post a comment, the opposite pattern was found: those exposed to low bandwagon cues rated the persuasiveness of the message to be higher than their counterparts assigned to high bandwagon conditions.

In addition to the interaction effect, a moderated mediation test revealed that the comment action significantly moderated the effect of bandwagon cues on participants' intention to limit drinking through their evaluation of message persuasiveness. Specifically, for those who did not post any comment on the website, their evaluation of message persuasiveness mediated the effect of bandwagon cues on their intention to limit drinking. However, this mediation effect was not found for participants who took the action to post a comment.

Reactance Reduction & Persuasion

Structural equation modeling results revealed two ways in which psychological reactance could be mitigated. First, bandwagon perceptions largely reduced reactance. High bandwagon cues raised bandwagon perceptions among participants, and such perceptions were associated with a lower level of psychological reactance. Another way through which reactance could be reduced is to increase viewers' feelings of isolation. High bandwagon cues led to stronger

feelings of isolation among participants, and such feelings negatively predicted their reactance level.

In summary, high bandwagon cues caused stronger feelings of isolation as well as bandwagon perceptions among participants. Such perceptions, along with feelings of isolation, mitigated the level of reactance. Once participants' reactance level was reduced, they tended to perceive the message to be more persuasive, hold more positive attitudes toward the message advocacy and reported stronger intention to follow the message's advocacy.

Chapter 4

DISCUSSION

As more and more health campaigns go online, viewers evaluate health messages not only based on the quality of the content and the credibility of the source, but they form their evaluation and judgment depending on technological affordances conveyed by the medium as well. The current dissertation finds that technological affordances related to agency can influence users' message evaluation and acceptance. Furthermore, different types of technological affordances seem to interact with each other in exerting influence on users. Such findings have theoretical implications for the field of media effects and persuasion, and also provide practical implications for health communication and persuasion practitioners as well as interface designers, both of which are discussed in the following section.

Bandwagon Effects

In line with previous research on bandwagon effects, study findings show that bandwagon cues are able to influence individuals' perceptions of online content, which in turn influence individuals' reactions to and acceptance of online messages. Consistent with what Kim and Sundar (2011) found, when participants believed that the health message they viewed was published by Penn State, which was a relatively credible source, seeing a high bandwagon cue associated with the message elicited strong perceptions that "if others like the message, then the message must be good". Such bandwagon perceptions directly decreased their reactance and enhanced their acceptance of the message. This finding supports the MAIN model (Sundar, 2008), which proposes that affordances on the media interface are able to cue cognitive heuristics, which can influence users' judgments of quality and credibility of mediated content and ultimately influence users' attitude and behaviors.

In addition to this, bandwagon cues also exert influence on reactance and message acceptance through another mechanism. The high bandwagon cue elicited a strong feeling of isolation among participants. When they noticed that many other viewers liked the online message and left comments supporting the message, they felt isolated and cornered. But, contrary to expectations, such peer pressure also contributed to the reduction of reactance, rather than enhancing it.

In sum, it appears that high bandwagon cues can enhance persuasion not only by conveying popular opinion about an issue, but also by triggering the fear of being isolated from the majority, thus making individuals more likely to jump on the bandwagon and accept the message, even though the message itself may threaten one's freedom of action.

Message Threat & Bandwagon Cue

Findings on the interaction between message threat and bandwagon cues showed that bandwagon cues could not only directly enhance persuasion, but high bandwagon cues were capable of mitigating individuals' psychological reactance to persuasive messages that contain a strong intent to persuade.

Specifically, when messages are coupled with low bandwagon cues, participants' perceived threat to freedom mediate the effect of message threat on their attitudes toward limited drinking, meaning that when bandwagon cues are low, message threat, rather than bandwagon cues, dominates individuals' perceptions of the message, which in turn determines the persuasive outcome of the message. Messages containing a high level of threat were perceived to be highly threatening, with individuals showing negative attitudes toward the message's advocacy.

However, when the same persuasive message was coupled with high bandwagon cues, such bandwagon cues override the threatening nature of the high threat message, such that

participants perceived the high threat message and the low threat message to be about equal on threat. As a result, the extent to which individuals perceive a message to be threatening was no longer determined by the degree of threat in the message, and therefore unable to influence message acceptance.

This finding provides evidence that technological cues can interact with certain message features in influencing users' reactions and acceptance of the message. Specifically, high bandwagon cues can mitigate users' reactance to threatening persuasive messages and improve the persuasive outcomes of such messages.

Comment Effects

Findings showed that participants who took the comment action experienced a stronger sense of agency than those who did not take such action. The finding is consistent with previous studies that found that blogging enhanced sense of agency among users (Stavrositu & Sundar, 2008; Sundar et al., 2012). However, no association was found between sense of agency and the extent to which participants experienced psychological reactance.

These findings show that online technological tools that allow users to take actions can indeed empower users by affording them sense of agency and control, as proposed by the action route of TIME (Sundar et al., 2015). However, such elicited sense of agency does not help mitigate users' reactance to persuasive messages. One possible explanation is that, unlike bandwagon cues, sense of agency does not influence users' perceptions or evaluation of the persuasive message. Even though participants who left a comment felt agentic, they still perceived the persuasive message to be threatening, unfriendly, and unpersuasive. As a result, they still felt angry at the threatening message and experienced the urge to counterargue with the

message. In other words, users still experienced reactance to the persuasive message, despite the extent to which they felt agentic.

Although participants who posted a comment did not report significantly higher intention to limit drinking than those who did not take the action, mediation test revealed a suppression effect. Specifically, sense of agency mediated the effect of comment action on behavioral intention to limit drinking, making it an important underlying mechanism through which taking comment action enhances persuasion. Put another way, without successfully eliciting sense of agency among users, the act of posting a comment reduced, rather than increasing, persuasion. This finding supports the action route of TIME (Sundar et al., 2015), which suggests that, by allowing users to take actions, technological affordances can enhance their sense of agency, leading to greater engagement with content and ultimately persuasion.

Bandwagon Cue & Comment Action

Study results showed that the bandwagon cue did not determine whether they chose to post a comment or not, nor could it predict the valence of the comment. This stands in contrast to previous studies which have shown that high bandwagon cues lead to stronger user intentions to post in online health communities (Kim & Sundar, 2011; 2014).

One possible explanation for the inconsistency lies in that the current study measured users' behavior as the outcome variable, while previous studies (Kim & Sundar, 2011; 2014) focused on users' behavioral intention. Even though behavioral intention has long been seen as the antecedent of human behavior, there might be disconnect between these two from time to time. In the current study, participants took part in the study in exchange for extra credits, and leaving a comment was not a mandatory action for them to receive extra credits. Therefore, some of them might ignore this step for the sake of saving time, despite their intention to leave the

comment. Besides, they were instructed that once they left the comment, other viewers could see it. This may have made some of them reluctant to reveal what they had in mind.

In addition, unlike previous studies that took place in online health communities, the current one employed a webpage as the main experimental stimulus. For each participant, they only accessed the webpage to participate in the study, and they did not get a chance to communicate or bond with one another, nor could they receive feedbacks from other users. Therefore, participants in the current study might not experience sense of community or sense of presence. As a result, high bandwagon cues in this context might not be able to boost their willingness to take actions to contribute to the community.

Another explanation could be that in the Kim and Sundar (2011, 2014) studies, the bandwagon cues were attached to the user's previous posts, so that their future posting intentions could be predicted based on the bandwagon support they received for their past comments. However, in the current dissertation, bandwagon cues are attached to an advocacy message, rather than users' own posts. Therefore, the context is quite different in the two studies, which may explain why in the current study bandwagon cues do not predict users' comment action.

Although no significant three-way interaction was found between message threat, bandwagon cues, and comment action, findings revealed an interesting two-way interaction between bandwagon cues and comment action on participants' evaluation of message persuasiveness. When participants did not post a comment, they perceived the message coupled with high bandwagon cues to be more persuasive than the same message coupled with low bandwagon cues; however, for those who took the action, high bandwagon cues did not strengthen the persuasiveness of the message.

A further moderated mediation analysis showed that for participants who did not leave a comment, their evaluation of message persuasiveness mediated the effect of bandwagon cues on their intention to limit drinking, meaning that when users took no action, high bandwagon cues associated with online messages improved persuasion by influencing users' perceptions and evaluation on the message. Put another way, when communication messages and technological cues coexisted in an online environment, technological cues could influence users' perceptions and evaluation of the message feature, and ultimately influence users' acceptance of the message, regardless of certain message features, in this case, the threat level contained in the message.

For participants who posted a comment on the website, message persuasiveness did not mediate the effect of bandwagon cues on intention to limit drinking. This part of the finding is not surprising given that participants' sense of agency mediated the effect of comment action on user intention to limit drinking, as discussed above. Taken together, when users take actions on an interface, message features become less important in terms of influencing persuasion, and their perceptions and evaluation of the message cannot be trusted as core predictors of persuasion. Rather, as the action route of TIME (Sundar et al., 2015) predicts, psychological correlates, such as sense of agency, play an important role as mediators between actions and user engagement, which in turn influence persuasion.

Reactance Reduction & Persuasion

Consistent with previous studies (Dillard & Shen, 2005), results showed that perceived threat to freedom positively predicted psychological reactance. Individuals who perceived the message to be a strong threat to freedom tended to experience a higher level of psychological reactance. Findings also show that both feelings of isolation and bandwagon perceptions

negatively predict reactance, meaning that reactance to a persuasive message can be reduced by increasing feelings of isolation and bandwagon perceptions.

As discussed before, bandwagon cues play an important role in generating feelings of isolation. To participants, high bandwagon cues served as indicators of the opinion climate and made viewers felt isolated and cornered, or in other words, pressured. As a result, such negative feelings pushed viewers to cave in to the message. Therefore, they ended up experiencing less reactance and reported higher level of message acceptance.

Interestingly, feelings of isolation were also influenced by another factor – perceived threat to freedom. Results showed that participants exposed to the high threat message perceived the message to be a higher threat to their freedom, which positively predicted their feelings of isolation. As a result, they experienced lower reactance. At a glance, this finding seems to be contradictory to previous studies which have shown that high threat leads to high reactance (e.g., Dillard & Shen, 2005); however, considering that feelings of isolation were measured as an outcome of not only the message, but other viewers' reactions to the message as well (e.g., "The video, coupled with other Penn Staters' likes and comments, make me feel isolated"), it is not surprising that such feeling negatively predicts reactance. This finding shows that when bandwagon cues are present and viewers are aware that the message they view are supported by some other viewers, the threatening nature of persuasive messages may not necessarily lead to reactance or counter-persuasion. Rather, such technological and message features could work together to create peer pressure and force viewers to accept the message.

In terms of bandwagon perceptions, high bandwagon cues elicited viewers' perceptions that if so many others like the message, then it must be good, and such perceptions help justify the interference contained in the persuasive message, hence reducing viewers' feelings of anger

and their urge to counterargue. Therefore, increasing bandwagon cues helps to mitigate viewers' reactance to a message by enhancing their bandwagon perceptions.

Summary of Theoretical Contributions

This study is the very first attempt to study message features and technological affordances simultaneously to reduce user reactance to persuasive messages and enhance persuasion. It contributes to theories in the domain of psychological reactance, persuasion, and technology.

To start with, the current study reveals that other than message features or connections between viewers and communicators, communication technology can also mitigate users' psychological reactance to persuasive messages and improve persuasion. Since Brehm (1966) came up with psychological reactance theory, researchers have gradually realized the importance of this state in the process of persuasion and hence have been taking efforts to explore ways to reduce reactance. However, previous research attention has been limited to message features, communicator characteristics, or the connections between message receivers and communicators. The current study extends such exploration to a different domain by coming up with a new solution – in the world of digital media, communication technology can be used to reduce viewers' reactance to persuasive messages.

Foremost, the current study identifies technological affordances as effective tools that can override message features and influence viewers' evaluation of persuasive messages, and ultimately influence the message's persuasive outcome through mitigating reactance. This dissertation contributes to research on psychological reactance and persuasion by introducing novel mechanisms through which reactance can be mitigated and persuasion can be

strengthened. It complements traditional research on psychological reactance that focuses on messages or communicators themselves by incorporating effects of technological affordances.

Specifically, the current dissertation contributes to the MAIN model and the TIME theory by illustrating how technological affordances influence user psychology through both the cue route and the action route in the domain of health communication and persuasion. Findings show that one type of agency affordances, audience metrics (e.g., number of likes and number of comments associated with a message), are able to convey "other agency" (i.e., enabling other users to serve as communication sources), and hence can serve as bandwagon cues that elicit bandwagon heuristics, such as "if many others like and support the message, then I should too" (Sundar, 2008). Viewers will then take advantage of such rule of thumb to form their perceptions of the message, which ultimately attenuate their psychological reactance to such message and improve their acceptance of the message.

The agency affordances that convey other user's agency and opinions on an interface can also afford self-agency, i.e., allow users themselves to express themselves via actions on the interface, such as posting a comment. This dissertation shows that letting users post a comment can enhance their sense of agency and control, which in turn improves their intention to follow the suggestion contained in the persuasive message. Quite contrary from traditional persuasion theories, such as Theory of Planned Behavior (Ajzen, 2002b), findings of the current study show that individuals' attitude towards certain behavior does not necessarily determine their corresponding behavioral intention, rather, as TIME theory suggests, in the context of digital media, technological affordances that allow users to take actions can influence user intention via psychological correlates related to the self. Once users feel empowered by taking actions, such

agentic feelings directly influence their intention to follow the message suggestion without eliciting positive attitudes toward the behavior first.

Although study findings largely support TIME, they also extend the theory by uncovering a hierarchy of effects due to cues and actions. To elaborate, TIME identified cue route and action route as two separate ways through which technological affordances influenced user psychology, and it treated the two routes as parallel routes. In other words, the TIME model did not specify how cue effect and action effect interact with each other when they coexist. While the current study uncovered that when technological cues and action take place simultaneously, the action effect overrides cue effect in influencing user psychology, such that when users take the comment action on the website, their sense of agency determines their message acceptance, regardless of the bandwagon cues they viewed; while only when they took no action did the bandwagon cue exerted influence on persuasion. In other words, findings show that a user's own action-taking behavior is more influential than their noticing the sheer presence of an interface cue. When technological affordances enable users to take certain action on an interface and users make use of the opportunity to act, other cues become less meaningful in terms of generating psychological outcomes. Rather, users' own action is found to be associated with a strong sense of agency, which significantly predicts their message acceptance. On the other hand, when users choose not to or they don't have the chance to take any action on an interface, the extent to which they accept online messages is largely influenced by the cues they pick up on the interface, especially cues resulting from other users' actions. When they see high bandwagon cues as opposed to low ones, they are more likely to evaluate the message in a more positive way and ultimately accept the message.

Practical Implications

Given that this dissertation takes a problem-solving approach to explore ways to reduce individuals' reactance to persuasive messages, the practical implications are self-explanatory.

First, the current dissertation reveals that different types of technological affordances on digital media are able to influence the persuasive outcome of online messages, therefore, for media campaign practitioners, they can not only reach mass audience in a short period of time using online media platforms to display their persuasive messages, but they can take advantage of useful technological affordances on online media platforms as well to reduce viewers' psychological reactance to persuasive messages and to improve campaign outcomes.

Given that the study shows that high bandwagon cues, such as a large number of likes and supportive comments, can reduce viewers' psychological reactance to persuasive messages, when campaign messages contain a strong intent to persuade, like public health messages and advertisements, collecting and displaying audience matrices may help prevent boomerang effects, especially when audience matrices indicate that the message is well-accepted by a large number of other viewers. Once viewers notice that many others like the message or support the message, they may make a quick mental judgment based on such audience metrics and form a positive evaluation of the message, despite the quality or content of the message. Meanwhile, selectively showing a few supportive comments on the message can also create the impression that the message is highly acceptable to others, which can help attenuate viewers' potential reactance to the message and enhance their message acceptance as well.

Findings also show that participants who take the comment action have a strong sense of agency, which predicts their intention to follow the message advocacy. Therefore, aside from displaying relevant audience metrics, campaign practitioners can also take advantage of

technological affordances that allow users to take actions on the interface in order to achieve better persuasive outcomes. Once users take the chance to act on the interface, they are no longer just message receivers, but they become sources themselves. The switch in roles empowers users and make them feel agentic, and such feelings of having control can improve their message acceptance as well.

Note that during this process, letting users experience sense of agency is the key to persuasion, not the action itself. Therefore, campaign or interface designers should provide users with actions that are meaningful enough to let them feel agentic in order to achieve optimal persuasion effects. In other words, interface designers should not only realize the importance of letting users take actions on an interface, but they should test and identify those actions that can generate sense of agency among users and incorporate affordances that allow such actions. In addition, realizing that sense of agency is the key to persuasion improvement, campaign and interface designers can use sense of agency as a key indicator to segment audience: those with strong sense of agency are more likely to form strong intention to accept the message and follow the message advocacy compared to those without.

Last but not the least, since different types of technological affordances interact with each other in influencing user psychology, interface designers should be cautious with setting up multiple affordances simultaneously. For example, given that the effect of action overrides the effect of cues, it may not be wise to encourage user actions when interface designers are attempting to take advantage of salient user metrics.

Limitations and Future Research

Like all the other studies, this dissertation is not without limitations. To begin with, all the participants are undergraduate students at Penn State University, who tend to be young, well-

educated, and most them are females. They believed that the video was published by the university, and all other viewers were also Penn Staters like themselves. This unique experimental setting requires that the results should be interpreted and applied with caution. It is unclear whether the general population will respond to persuasive messages published by more distant authorities (e.g., CDC or WHO) the same way as the participants did to their own university, and it is also reasonable to speculate that participants value other viewers' opinions more in the current study because they believed all other viewers were their peers at Penn State. Future studies can test the research question among general population using a common health message source, which can boost the external validity of the current study.

A similar limitation lies in that the study only employed a single persuasive message on the topic of college drinking, and it is unclear whether the study results can be replicated on other health topics or in other domains of persuasion, like advertising. Therefore, future research should employ more diverse messages on other topics or in other domains of strategic communication.

An additional limitation is that participants viewed the experimental stimulus and finished the questionnaire unsupervised. Although manipulation check questions were used to filter out participants who clearly paid little attention to the stimulus, the researcher still had no control over when and how participants viewed the stimulus and answer questions. They might multitask, get interrupted, or only pay minimal attention while participating, but the researcher could not monitor their environment. Although the study setting largely mimics the real-world environment in which they might encounter and consume media messages, the unsupervised study environment may still harm the internal validity of the study and create noise in data. Future research can replicate the study in a lab setting to better ensure internal validity.

Another limitation is that all the comments listed on the website are entirely positive in nature, meaning that they all support the message advocacy. Given that the topic of the study is college drinking, such pattern of comments is quite unusual in the real-world setting, which indicates poor ecological validity. Future research can further test bandwagon effects using unanimous negative comments or mixed comments.

Last but not the least, one of the major independent variables, the comment action, was not entirely manipulated by the researcher. Given that the major outcome variable of interest was psychological reactance, the researcher did not choose to force participants assigned in the action group to post a comment. Rather, they were instructed to post a comment if they wanted to. This procedure restricted the researcher's ability to uncover causal relationships that involves the comment action, and hence undermines the internal validity of the experiment. Future research can fully manipulate the comment action variable by requiring all participants in the action condition to take actions in order to better examine the effect of such action.

Conclusion

The current dissertation shows that communication technology can effectively influence the persuasiveness of health messages. Findings clearly demonstrate how technological affordances on digital media affect users' reaction to and acceptance of persuasive health messages through both cue route and action route. The study also reveals that technological affordances can interact with message features and with each other in influencing user psychology. As more and more media campaigns go online, viewers' evaluation and acceptance of persuasive messages not only depend on the content of messages, but also on interface cues that convey audience agency and affordances that allow users to take actions on the interface.

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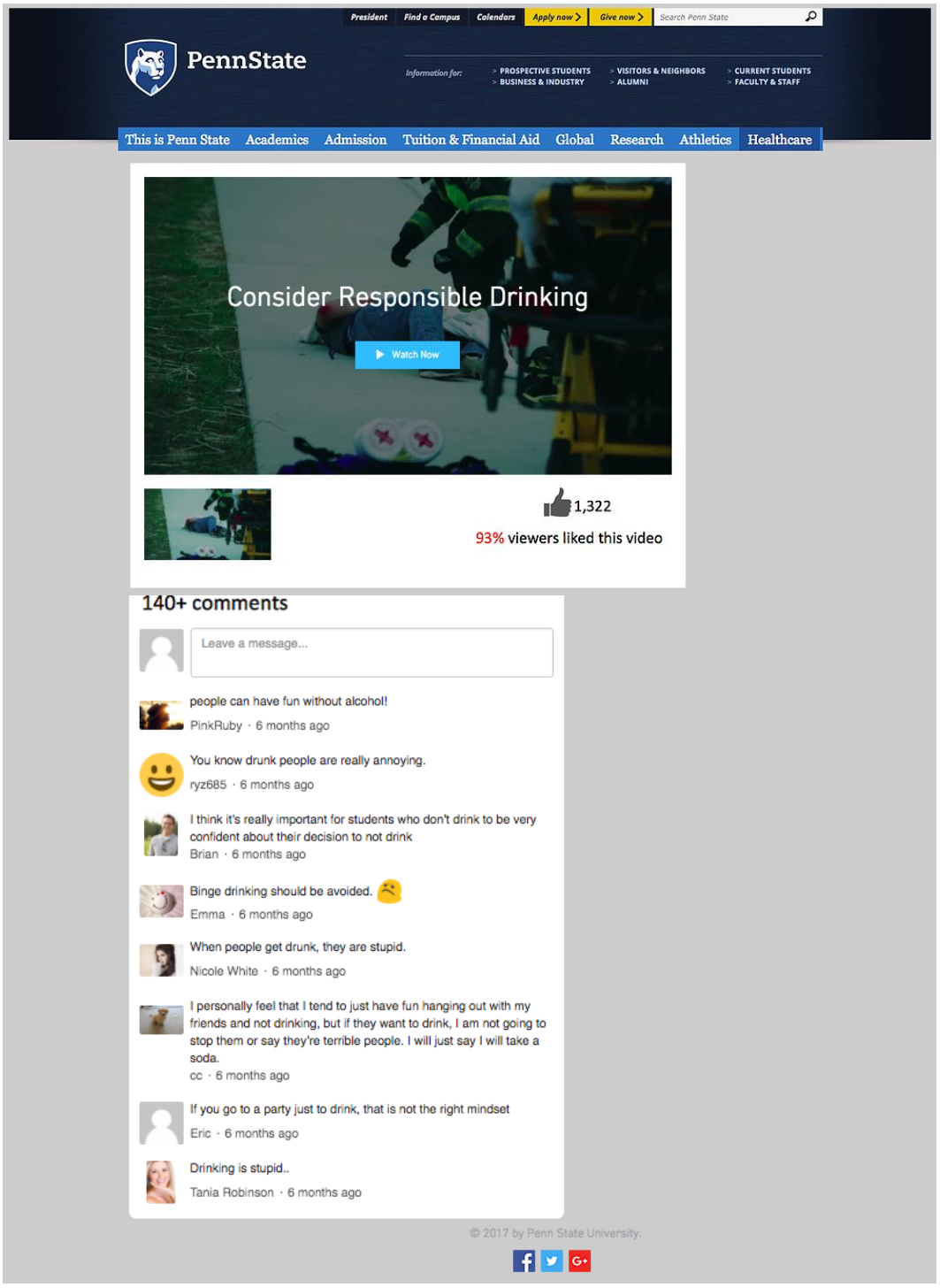
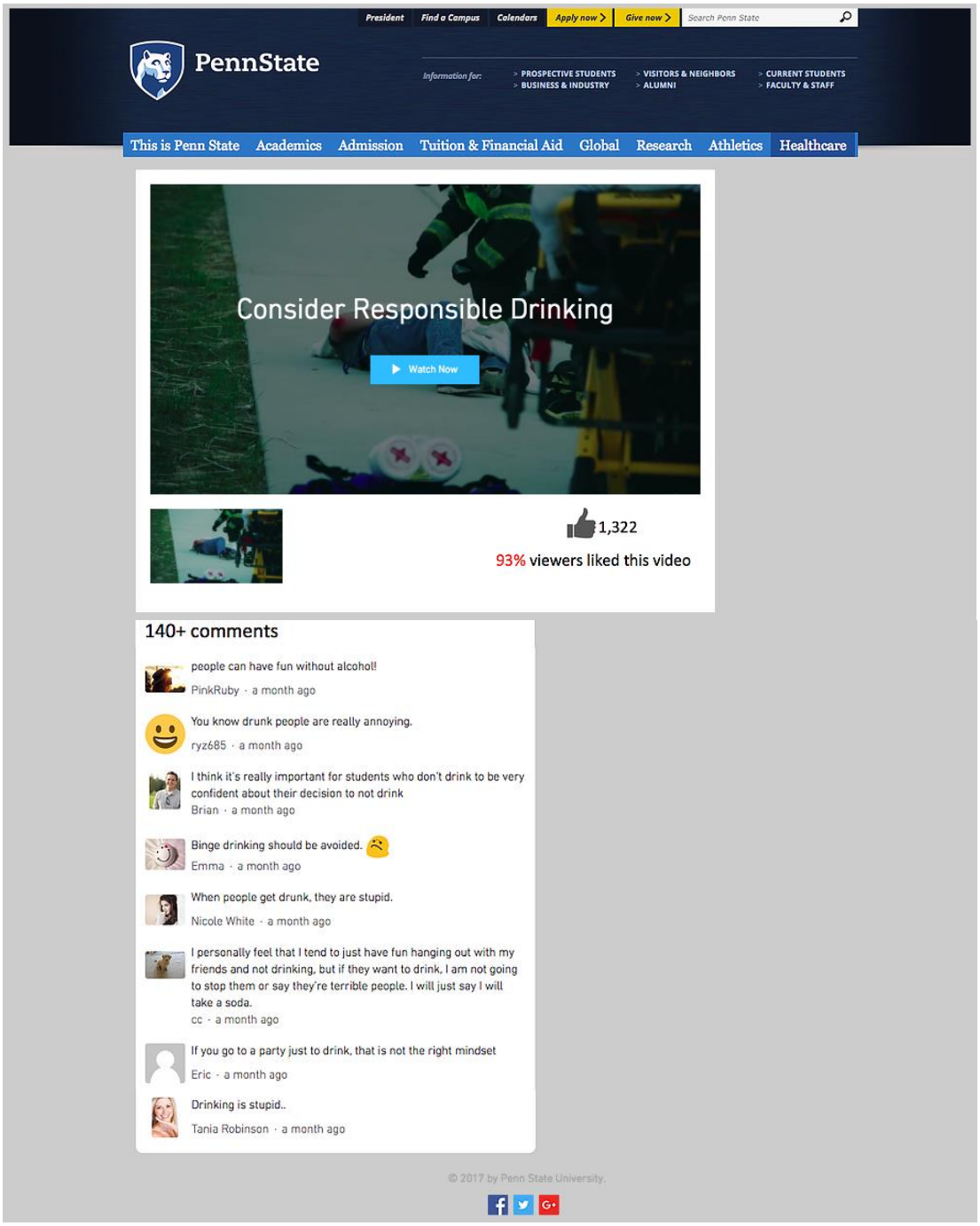
APPENDIX

EXPERIMENT STIMULUS

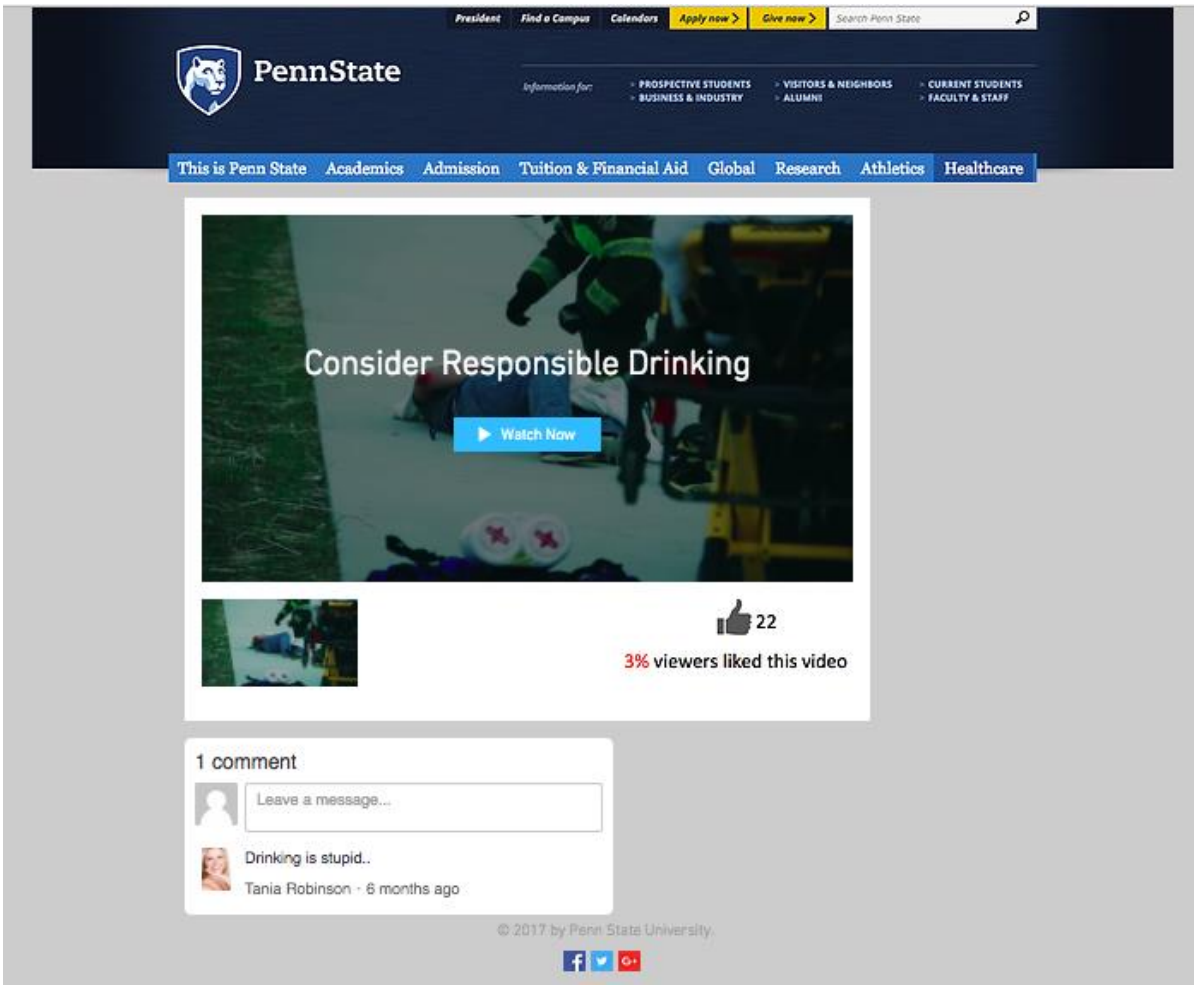
1. Screenshot of the low threat, high bandwagon, comment action website:



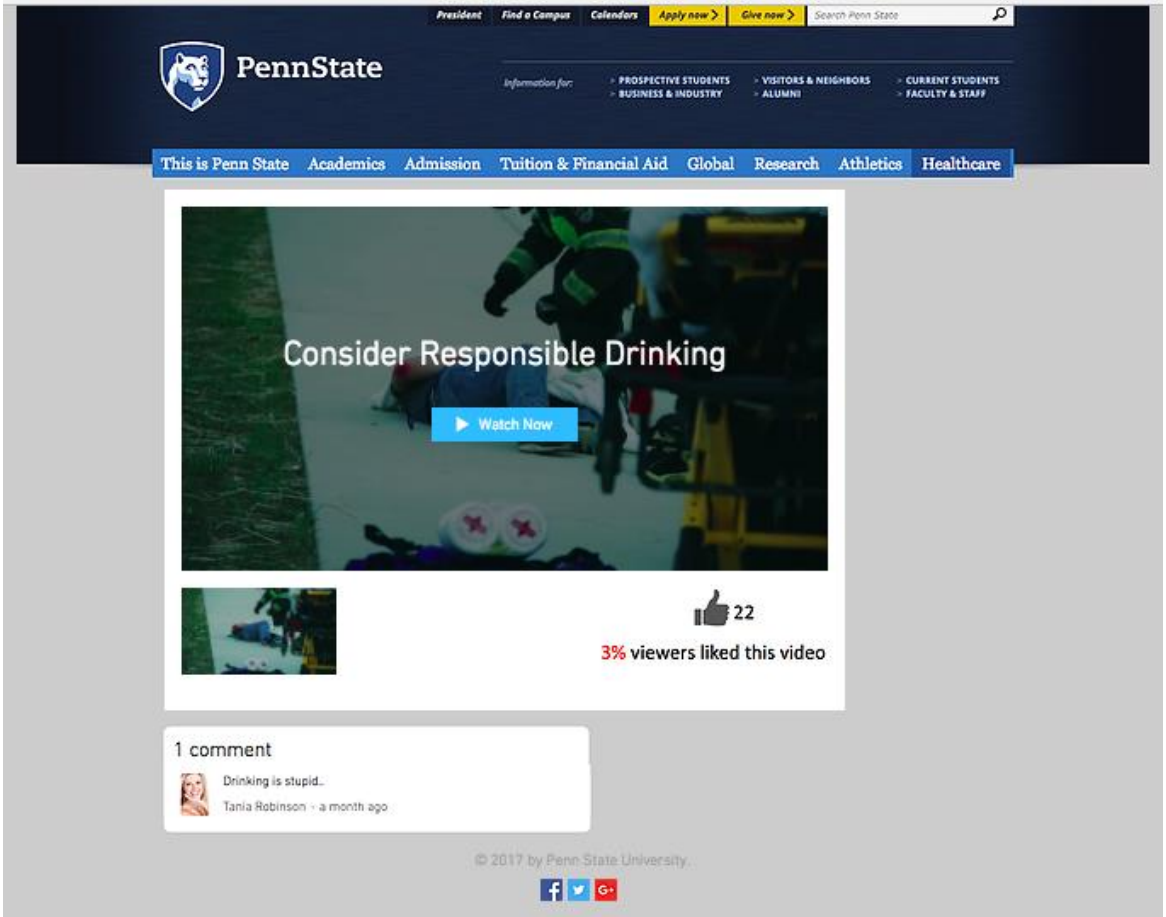
2. Screenshot of the low threat, high bandwagon, no comment action website:



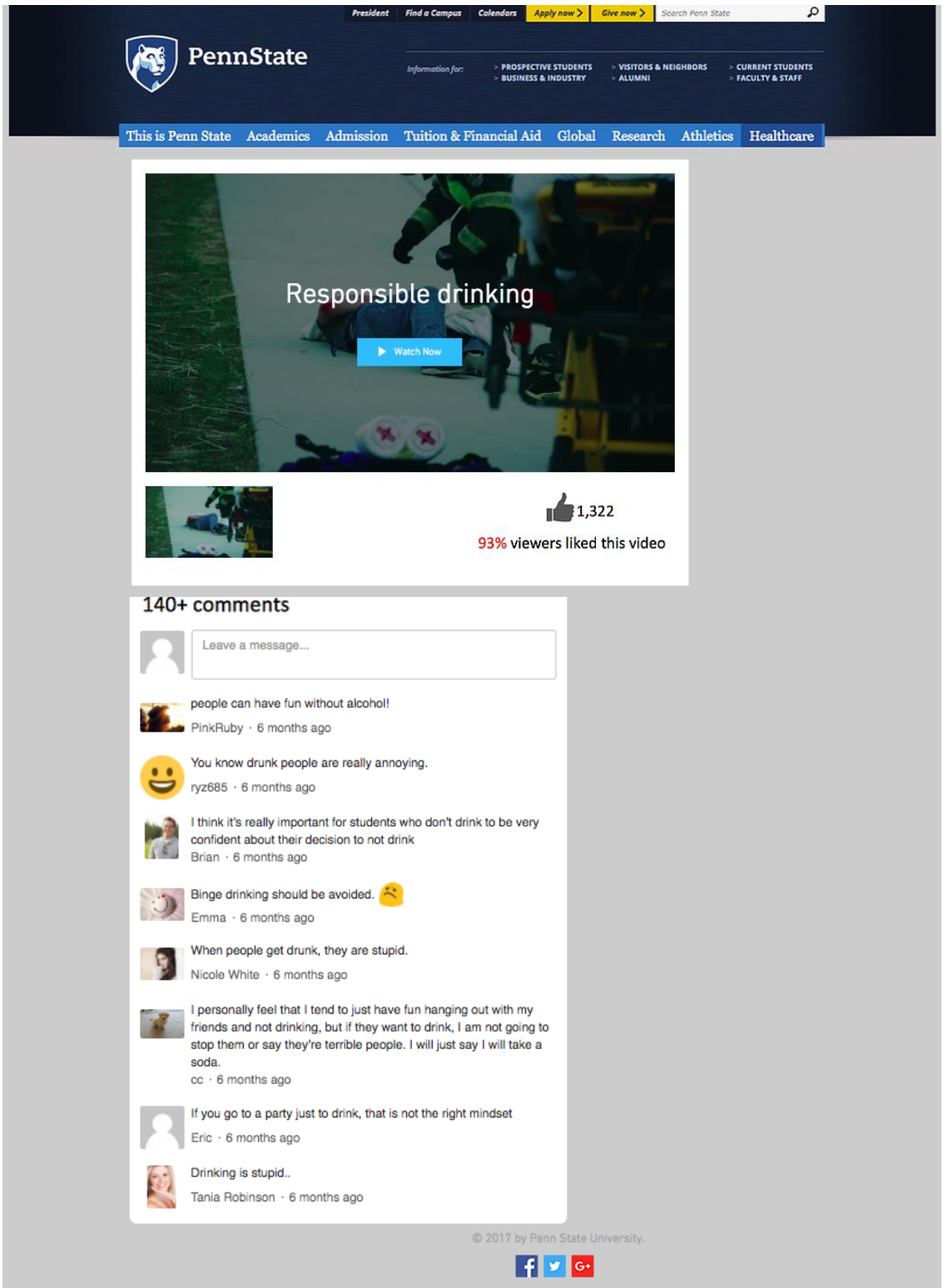
3. Screenshot of the low threat, low bandwagon, comment action website:



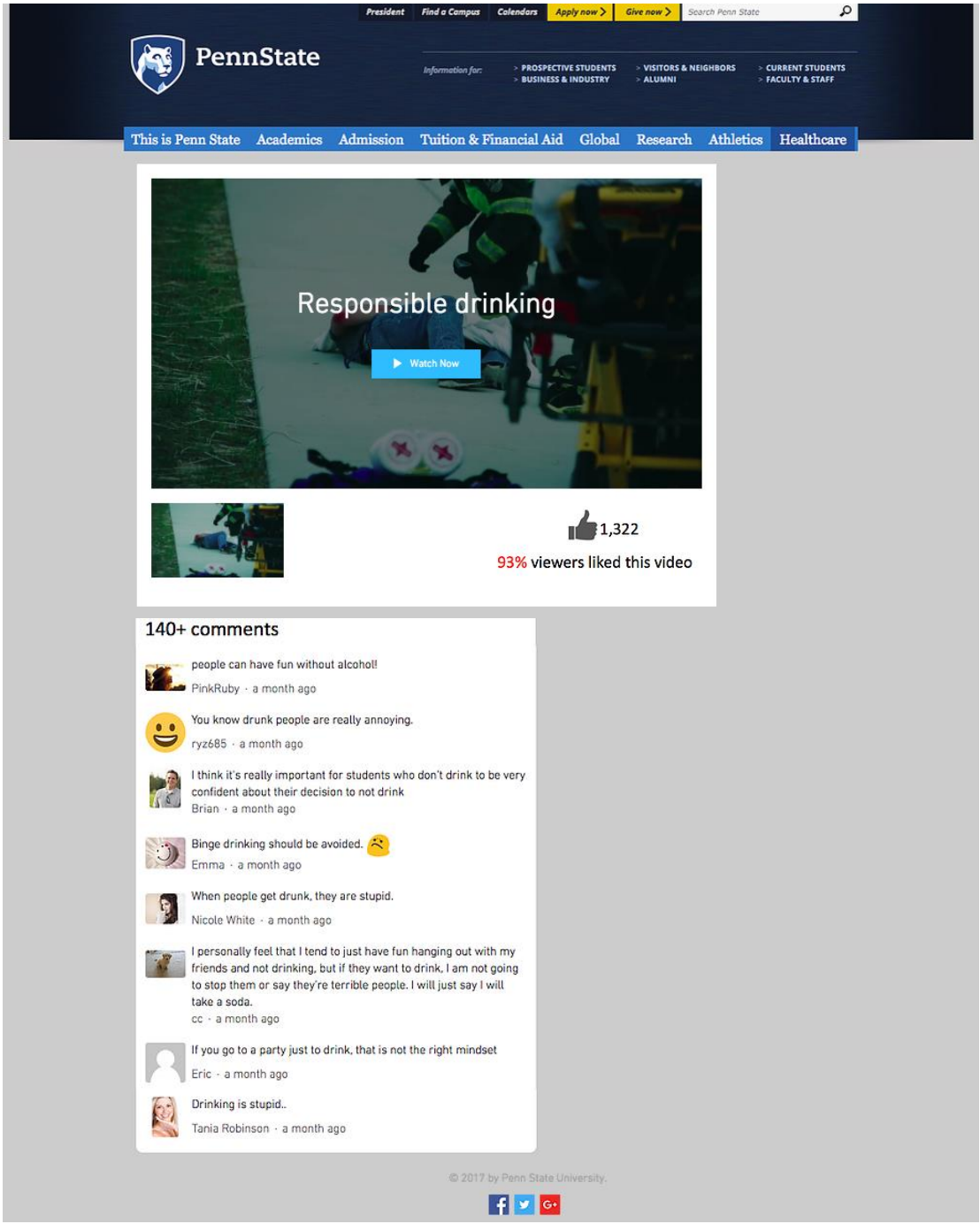
4. Screenshot of the low threat, low bandwagon, no comment action website:



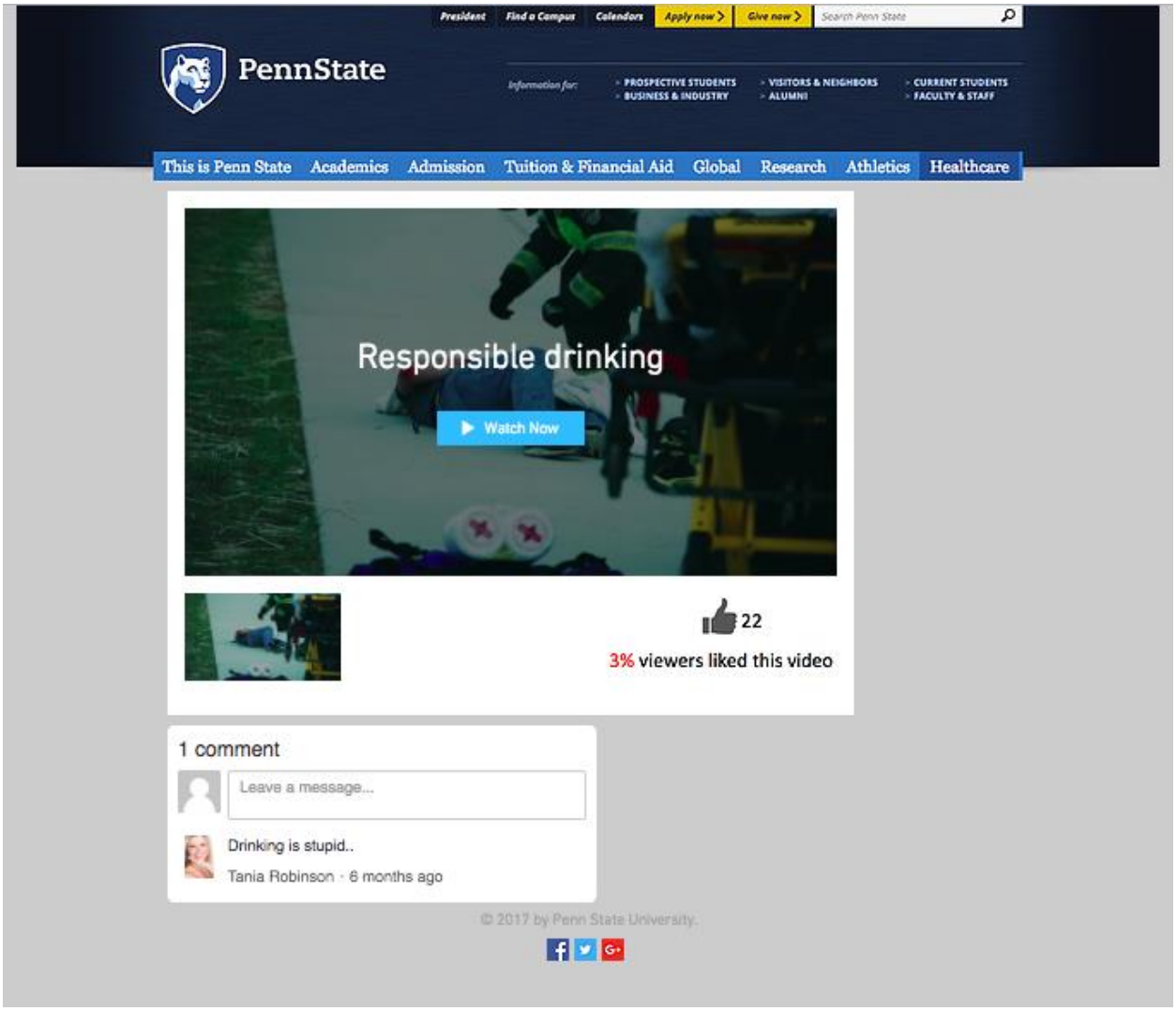
5. Screenshot of the high threat, high bandwagon, comment action website:



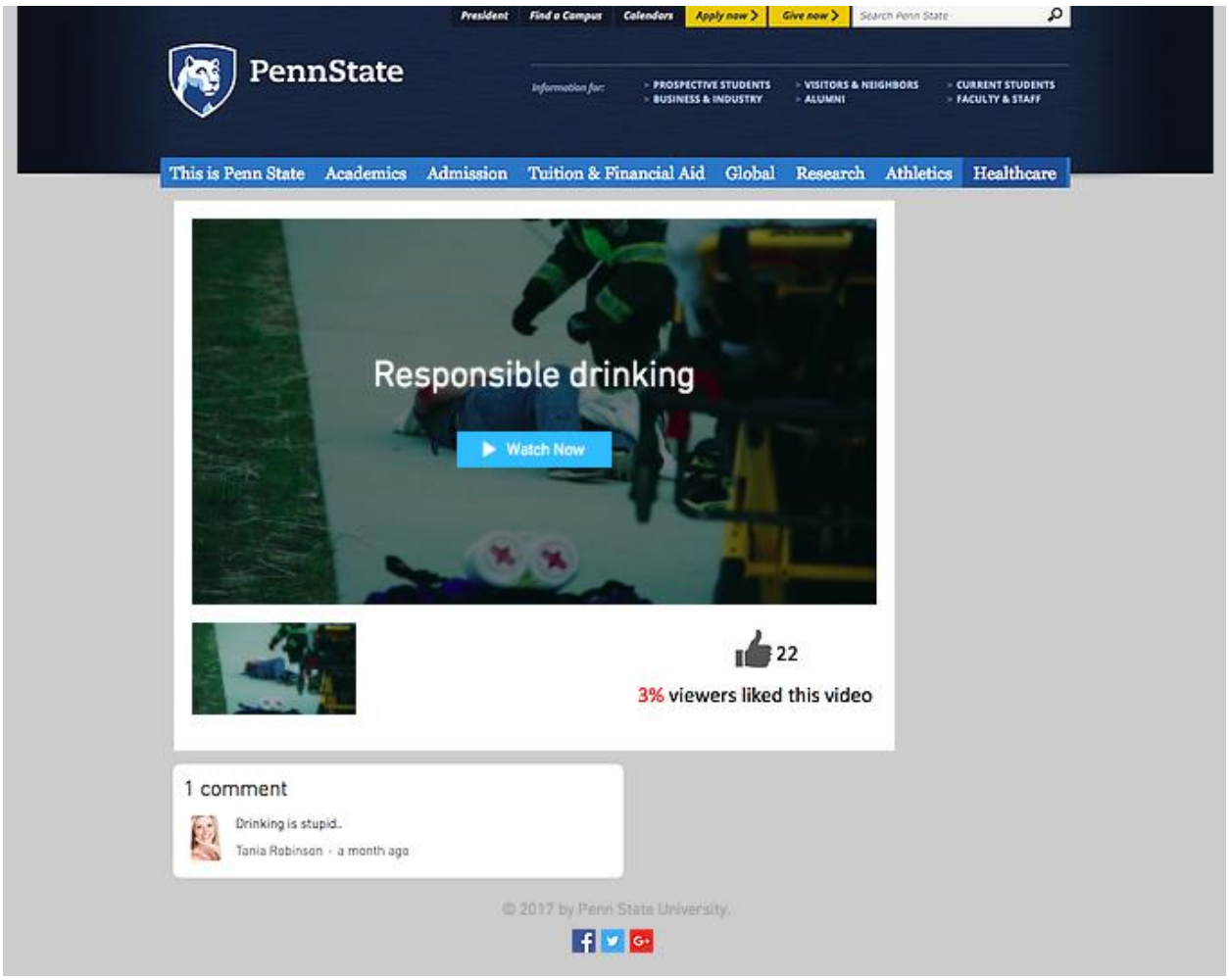
6. Screenshot of the high threat, high bandwagon, no comment action website:



7. Screenshot of the high threat, low bandwagon, comment action website:



8. Screenshot of the high threat, low bandwagon, no comment action website:



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SAMPLE PUBLICATIONS

- Dillard, J. P., **Li, R.,** Meczkowski, E., Yang, C, & Shen, L. (in press). Fear responses to threat appeals: Functional form, methodological considerations, and correspondence between static and dynamic data. *Communication Research*.

- Shen, F., Sheer, V. C., & Li, R. (2015). Impact of narratives on persuasion in health communication: A meta-analysis. *Journal of Advertising, 44*(2), 105-113.

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SERVICE AND AWARDS

- Editorial Assistant, Journal of Computer-Mediated Communication, 2015-2016

- Top Student Paper Award, Public Relations Division, International Communication Association, 2016

- Top Paper Award, Public Relations Division, Association for Education in Mass Communication & Journalism, 2016

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