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Published online: 06 Apr 2023.

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Protecting Against Disinformation: Using Inoculation to Cultivate Reactance Towards Astroturf Attacks

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ABSTRACT

The theoretically-driven inoculation strategy has increasingly become used to counter disinformation regarding pivotal societal issues such as COVID-19 and climate change. The current study examines its ability to cultivate psychological reactance toward unethical public relations attacks called astroturf, ultimately making the disinformation less persuasive. To do so, a between-subjects online experiment ($N = 534$) was conducted. Results show: 1) the use of inoculation messages outperforms the often-recommended paracrisis no response strategy, 2) combining inoculation with explicit details and autonomy support can elicit reactance toward disinformation, and 3) the use of this strategy can influence attitudes and future behavioral intentions to engage with the attacked organization. Guidance and implications for increasing the development of proactive PR messages within research and practice are discussed.

Introduction

The counter-persuasive strategy of inoculation has been increasingly initiated throughout communication efforts in hopes of preemptively countering false information about societal hot topics such as climate change (e.g., Maertens et al., 2020), combatting COVID-19 (mis/dis)information (e.g., Van der Linden et al., 2020), and fake news (e.g., Roozenbeek and van der Linden, 2019; Roozenbeek & van der Linden, 2020). Inoculation has been empirically tested and applied to a wide variety of topics, with its application within the field of public relations ample as it can be strategically used to protect, shape, or defend attitudes (Ivanov et al., 2020). The theory's applicability within public relations has been highlighted due to its acknowledgment of the importance of campaigns to support an audience's ability to think through decisions critically (Compton, Wigley, et al., 2021). As such, ongoing research is needed to examine how the theoretically-driven strategy of using forewarning and counter-argument mechanisms within a message can continue to be harnessed in public relations to counter prominent issues such as disinformation.

While disinformation has been widely discussed recently, knowingly sharing manipulated information for organizational or political gain through what is known as *astroturf* can be traced back to at least the early 20th century (Leiser, 2016). One of the first documentations of this specific form of disinformation was a social movement that attempted to sway community members to use cheaper renewable paper cups instead of tin cups to dip into well buckets to limit the spread of disease (Leiser, 2016). However, it was never disclosed that the founder of the campaign was the Public Cup Vendor Company, later renamed the Dixie Cup Company (Leiser, 2016). Astroturf has since become a tactic commonly used for political and corporate gain. Studying the consequences stemming from the persuasive effects of disinformation-based astroturf campaigns is essential for two reasons.

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First, as a public relations tactic, the practice of sharing disinformation has been largely left out of mainstream conversations regarding societal issues (Edwards, 2021). Instead, conversations have circled the responsibility of social media platforms, media organizations, and media literacy education to decrease fake news (Edwards, 2021). However, the topic is relevant to PR in several ways, including the industry's continual use of the unethical tactic of disinformation-based astroturf campaigns and how PR professionals respond to these crisis-inducing campaigns when their organizations or clients come under attack. Astroturfing, which falls under the umbrella of a stealth campaign, provides a unique issue as it presents itself as a grassroots campaign supported by an individual's peers or members of the general public (Franziska et al., 2021). However, as the name suggests, it is not organically grown and is considered "fake grassroots" produced by shell organizations, usually for political or organizational gain. This can be particularly troubling for organizations on the receiving end of an astroturf attack. It has been found that stealth campaigns led by corporate-front groups, similar to astroturf, are effective at eroding public attitudes toward the issues in question (Pfau et al., 2007). However, initial evidence suggests that stealth campaigns could be challenged and made less persuasive by revealing the campaign's intent prior to exposure and post-exposure (Pfau et al., 2007).

Secondly, there is a need to further examine how organizations can proactively work to overcome the damage that a PR disinformation attack can ensue. One such way is to cultivate resistance to the persuasive attempts within the attack. Notably, C. H. Miller et al. (2013) found success when examining how inoculation messages used prior to attacks sponsored by stealth groups can influence resistance through the mechanisms of psychological reactance to increase anger and negative cognitions. The researchers examined how inoculation can *induce* reactance to thwart persuasive attempts, whereas much of the reactance literature focuses on *reducing* the motivational response. To do so, the researchers tested the effectiveness of inoculation messages to combat this issue and introduced the idea of varying intensity and controlling language to increase its potency. It was found that combining the mechanisms of inoculation with psychological reactance outperformed not providing a message and using a traditional inoculation message (C. H. Miller et al., 2013). This finding suggests that the success of traditional inoculation messages found throughout persuasion literature can be boosted through manipulating message language control.

Thus, extending upon the previous successes of using inoculation to prebunk disinformation shared by disingenuous front groups, this study looked to increase the potency of inoculation messages to influence cognitive and affective responses. To do so, autonomy support and explicit details were infused into inoculation messages to aid in the cultivation of resistance to persuasive disinformation attacks. An online quasi-experimental design was used to examine how inoculation message strategies can increase the level of psychological reactance individuals experience from receiving disinformation. Moreso, the mitigating effects of reactance toward the disinformation were investigated through structural equation modeling to determine how it influences attitudes and behavioral intentions toward the attacked organization after receiving countering information. By doing so, the current investigation provides additional clarity into not only the effect astroturf has on individual outcomes such as attitudes and psychological reactance, but also how optimizing inoculation messages can influence future behavioral intentions to engage with an attacked organization.

Literature review

Crises stemming from disinformation attacks

Disinformation at its most abstract level can be "understood as [i]naccurate or manipulated information/content that is spread intentionally" (Weedon et al., 2017, p. 5). Under this umbrella term is *astroturf*, where a message's origins and intention are unknown (Leiser, 2016). The practice of astroturfing has two main characteristics. The first is that it involves the use of deception to disguise the true origins behind the campaign, and second, it lacks transparency, which hides the identity of the campaign's backers (Leiser, 2016). Such tactics fall under issue advocacy, a form of corporate

communication intended to influence public policy to protect an organization. Astroturf campaigns focus on values that resonate with a broad base and anticipate that receivers will not be motivated to question the message or intent (Pfau et al., 2007).

What sets the practice of astroturf apart from other persuasion-based tactics, including grassroots campaigns, is the motivation behind the content. It gives a false impression of public support for or against a specific topic, which serves an agenda (Farkas, 2018). The intention behind corporate astroturf-based messages can be seen as wanting to attack a rival company instead of promoting one's product. The practice can include many approaches, including company-employed bloggers posting product reviews intended to be seen as unbiased, pay-for-play deals, and advertisements that redirect to corporate-written pages. In these cases, the act can be a tactic to counter negative attention toward a brand.

When classifying a disinformation-based astroturf attack within crisis communication literature, the attacks are considered an advanced form of a paracrisis (Boman & Schneider, 2021). This attack type falls under the umbrella of a paracrisis because it is "a publicly visible crisis threat that charges an organization with irresponsible or unethical behavior" (Coombs & Holladay, 2012, p. 409). An example is the ongoing campaigns a shell organization called Humane Watch produces against the Humane Society of the United States (HSUS). The ads, many of which include a cute talking dog, are meant to pull at heartstrings while making the viewer feel unintelligent for wanting to support HSUS and call for viewers to shop at local adoption agencies (Humane Watch, 2013). However, when researching Humane Watch, it becomes apparent that it is a shell company for the Center for Consumer Freedom (CCF), founded by a Washington D.C. millionaire (Slattery, 2015). CCF frequently attacks organizations that have spoken out against large corporations. The organization dissuades individuals from adopting from the HSUS because it has advocated against practices that benefit the CCF, such as inhumane animal treatment.

Using inoculation theory to create resistance

Studies examining inoculation have found that resistance to persuasive attacks can occur when individuals become aware of their vulnerabilities. Inoculation theory is based on a biological metaphor which suggests that an individual's beliefs and attitudes can be protected against persuasive attacks in the same way that one's body can be protected against attacks by viruses (e.g., Banas & Rains, 2010; Banas & Richards, 2017; Ivanov et al., 2016). Often referred to as the "grandparent theory of resistance to attitude change" (Eagly & Chaiken, 1993, p. 561), inoculation theory puts forth that an individual who is presented with or inoculated with a forewarning message about an attack will be less affected by the persuasive attempt (McGuire, 1961). This is similar to the basis of a conventional vaccination in that resistance to more robust challenges can occur after pre-exposure to a weakened challenge (Compton, van der Linden, et al., 2021; McGuire, 1964).

Rather than trying to persuade an individual, attitudinal-based inoculation strategies use two-sided messages to create resistance to persuasion (Banas & Rains, 2010). To do so, it relies on two mechanisms, threat and counter-arguing (Banas & Richards, 2017). These mechanisms use two elements: 1) a forewarning of future attack to elicit threat and 2) preemptive refutation (or prebunking) to counter-argue future persuasive attacks (McGuire, 1964). The act of including a counter-argument provides individuals with both materials and guidance to use in defense against future attacks. Attitudes are protected from future threats due to threat motivating counter-arguing in response to receiving an attack message (McGuire, 1964).

While the effectiveness of attitudinal inoculation has been replicated throughout literature, there is ongoing research to strengthen its use. For instance, recent efforts have clarified the role of prior attitudes by differentiating between *prophylactic* and *therapeutic* inoculation (Compton, 2020). Departing from traditional prophylactic inoculation, where individuals hold the desired attitude, therapeutic inoculation is being explored. Therapeutic inoculation can be applied to individuals who already hold an initial attitude or belief that runs counter to the inoculation message (Ivanov

et al., 2017; Wood, 2007). Simply, the individual is already infected and given a therapeutic inoculation treatment (Compton, 2020). While inital results have shown that inoculation works on individual's holding neutral or negative attitudes (Wood, 2007; Ivanov et al., 2017), it has been questioned on whether effects are from inoculation mechanisms. Instead, it is suggested that motivational threat may better capture the process of message rejection (Ivanov et al., 2022). The researchers hypothesized that instead of engaging in counter-arguing, those with neutral or negative attitudes would dismiss the attack message altogether. Therapeutic inoculation seems of particular interest to crisis communication as an organization experiencing a disinformation-based crisis attack has little control over who has or has not been infected by the attack message. Within a crisis circumstance, an ideal message would be able to "create resistance in individuals who hold the 'right' attitude and at the same time persuade those with neutral and opposed positions to move in the 'right' attitudinal direction" (Compton & Ivanov, 2013, p. 276).

Inoculating individuals from persuasive attacks

As stated previously, a disinformation-based astroturf attack is considered a paracrises threat due to stakeholders making public claims that an organization is acting irresponsibly (Coombs, 2019). A paracrisis requires an organization to manage the risk publicly with the potential for the situation to escalate to a crisis (Coombs & Holladay, 2012). Since it is a threat and has not yet developed into a crisis, actions to mitigate potential damages emerge at the start of a crisis life cycle within the prevention stage.

While it is impossible for those charged with overseeing issue management to forecast all future crises, it is possible to identify potential vulnerabilities during the pre-crisis phase. To do so, an organization uses the warning signs from signal detection to target and communicate about situations prior to them becoming a crisis (Coombs, 2019). According to Coombs (2019), the pre-crisis stage is where crisis managers conduct environmental scanning to gauge what crises are most likely to occur and their impact. Stemming from this phase is the potential to design proactive messaging (Compton, Wigley, et al., 2021). Proactive strategies such as stealing thunder and inoculation theory have been noted as potential proactive strategies to deploy (Compton, Wigley, et al., 2021).

In particular, the strategy of inoculating stakeholders has been found of benefit when examining crisis outcomes such as organizational credibility, reputation, attitudes, and behavioral intentions (Boman & Schneider, 2021; Einwiller & Johar, 2013; Wan & Pfau, 2004; Wigley & Pfau, 2010). One example of inoculation being applied to pre-crisis communication is a study showing inoculation-based messages may be useful in enhancing the public's belief that government protective agencies can prevent and minimize the effects of politically motivated acts of violence (Ivanov et al., 2016). Efforts have also been made to explore the concern that inoculation could cause further damage to an organization if a crisis does not come to fruition after an individual is forewarned (Dillingham & Ivanov, 2015; Wigley & Pfau, 2010). For example, Wigley and Pfau (2010) found that inoculation slightly enhanced the organization's image even when a crisis did not occur.

While over the last 50 years, there has been an abundance of literature showcasing the efficacy of inoculation (see Compton, van der Linden, et al., 2021; Compton, Wigley, et al., 2021; Ivanov et al., 2018; Pfau et al., 2007; Wan & Pfau, 2004), Compton (2020) called for ongoing research to examine critical issues facing society. One such area of interest is enhancing inoculation content further to confer resistance to potential persuasive effects of information that may arise from a disinformation-based paracrisis.

Psychological reactance theory in public relations

Psychological reactance theory (PRT) theorizes that reactance is activated when freedom, choice, or autonomic behavior is threatened or eliminated (J. Brehm, 1966). This motivates individuals to restore their threatened freedom (S. S. Brehm & Brehm, 1981). The theory is comprised of four components:

freedom, threat to freedom, reactance, and restoration of freedom. Freedom in PRT refers to concrete behavioral realities, including actions, emotions, and attitudes. However, anything that makes it more difficult for an individual to engage in a free behavior is called a threat to freedom (J. Brehm, 1966; S. S. Brehm & Brehm, 1981). Threat to freedom is the attempt to shape, reinforce, or change responses and can be perceived as threatening individuals' freedom to make their preferred decisions (R. L. Miller, 1976; Shen, 2015). When an individual's freedom is threatened, reactance occurs as the "motivational state" (S. S. Brehm & Brehm, 1981, p. 37) that makes people act to reestablish their freedom (i.e., restoration of freedom) (Quick, 2013). To restore freedom, individuals may engage in the forbidden behavior, increase favorable attitude toward the threatened choice, derogate the source of threat, or gain different freedom to restore the feeling of control (Quick, 2013). It has been shown throughout reactance literature that this motivational state can aid individuals in overcoming persuasive attempts (C. H. Miller et al., 2013).

Researchers continue to test and improve how PRT mechanisms are measured (Rosenberg & Siegel, 2018). Over the years, research has introduced several models operationalizing reactance as solely negative cognitions (single process cognitive model); solely anger (single process affective model); both anger and negative cognitions (dual-process model); anger as the proximal antecedent to negative cognitions (two-step linear process model); and anger and negative cognitions (intertwined model) (Reynolds-Tylus et al., 2020). While multiple models are supported, studies spanning a vast range of topics have suggested that the intertwined model has the best fit (e.g., Clayton et al., 2019; Quick et al., 2015).

Research has shown that antecedents of psychological reactance can influence attitudinal and behavioral outcomes such as perceived levels of autonomy (Youn & Kim, 2019), fight or flight responses (Clayton et al., 2019), influencing health behaviors (H. Kim et al., 2021), adoption of technologies (Feng et al., 2019), and resistance to persuasion (Akhtar et al., 2020). For example, psychological reactance has been applied to crisis communication to examine how publics may view tactics within crisis responses (Xu & Wu, 2017). It has been suggested that using explicitly persuasive messages may make message receivers feel they have a decreased ability to form their judgments, which triggers reactance. Research has shown that to restore freedoms threatened individuals may be motivated to reject the message, take the opposite action or attitude suggested, or derogate the source (C. H. Miller et al., 2020).

The causation between attitude and behavioral intention has been well-established in previous studies stemming from theories of reasoned action and planned behavior (Ajzen, 1988, 2001; Fishbein & Ajzen, 2011). Findings suggest that an individual's intention or readiness to perform a behavior is formed by their "attitude toward the behavior, perceived norm, and perception of behavioral control" (Fishbein & Ajzen, 2011, p. 21). Dillard and Shen (2005) tested this relationship when examining message effects on flossing and drinking behavior. The researchers found a relationship between attitudes and behaviors when applied to flossing. However, no relations were found in the context of binge drinking. Researchers hypothesized that these inconsistent results could be caused by differing behavioral types (i.e., flossing being planned behavior generated by attitudes, drinking being unplanned behavior influenced by social norms and commercial promotions of binge drinking). Given these mixed findings, it is necessary to replicate the examination of the relationship between attitudes and behavioral intentions when applied to the topic of disinformation and engaging with an attacked organization. Thus, this study hypothesized:

Hypothesis 1a-b: Enhanced psychological reactance will confer resistance toward the influence of the attack video, which will be positively related to **a)** more favorable attitudes toward the attacked organization, which will, in turn, be **b)** positively associated with desired behavioral intentions toward the attacked organization.

Generating reactance through inoculation

Research suggests that psychological reactance may be one mechanism that allows inoculation messages to successfully provide resistance to persuasion through eliciting anger and negative

cognitions (e.g., counter-arguing) toward the reactance-generating messages (C. H. Miller et al., 2013). Since inoculation messages contain forewarnings of future threats to an individual's beliefs and attitudes, it may prime psychological reactance in response to those anticipated threats. Both anger and counter-arguing, two prime mechanisms induced through inoculation, are also present in reactance (Dillard & Shen, 2005; S. Kim, 2013). These intertwined feelings presented through inoculation should enhance the ability of a message to "motivate the counter-arguing processes thought to occur between inoculation and attack" (C. H. Miller et al., 2013, p. 131). Since the forewarning within the inoculation message highlights the potential for an individual's freedom to be threatened, there should be higher motivation to restore these freedoms by rejecting the persuasive attack. When reactance is triggered, the interaction of these mechanisms has been found to increase resistance toward the attack message source, enhance counter-arguing, and lead to increased levels of resistance toward a persuasive effort (C. H. Miller et al., 2013).

Much of PRT literature has focused on enhancing reactance to diminish or eliminate resistance to a persuasive effort, while the effort to elicit resistance has received less attention (Reynolds-Tylus, 2019). However, several studies have examined how this strategy can successfully *cultivate* reactance to aid an individual in retaliating against future threats (e.g., Braddock, 2019; C. H. Miller et al., 2013). With this in mind, inoculation messages targeting future astroturf attacks may aid in inducing reactance toward the astroturf by producing counter-arguing and anger in response to the attack. Thus:

Hypothesis 2a-b: Individuals who receive an inoculation message will experience higher levels of **a)** anger and **b)** counter-arguing toward the astroturf attack video than individuals who did not receive an inoculation message.

Enhancing inoculation efficacy in thwarting persuasiveness

While the success of using inoculation to prebunk information has been well tested (for metanalysis see Banas & Rains, 2010), there is an ongoing need to continue enhancing its efficacy (C. H. Miller et al., 2007, 2013; Pfau et al., 2007). Two strategies previously used throughout psychological reactance literature are the level of control and explicitness. For example, C. H. Miller et al. (2013) examined the influence of autonomy controlling language within inoculation messages on attitude change and credibility. It was found that reactance-enhanced, messages eliciting higher control, resulted in lesser attitude change. The current study works to further this finding by exploring how psychological reactance can make inoculation treatments more effective by combining autonomy support and explicit detail.

The self-determination theory (SDT) theoretical framework was used to explore this topic, which addresses when people will be internally motivated to engage in a behavior (Ryan & Deci, 2017). It has been suggested that SDT could be used to further understand how reactance motivation is connected to autonomy need (Leander et al., 2016). Autonomy-supportive communication is perceived as legitimate, less threatening, and less demotivating. Autonomy support-based messaging includes providing meaningful choices, acknowledging potential anxieties, and providing strategies that allow a person to actively explore options. There is autonomy support when all three items are met within a message. This strategy has previously been presented within inoculation-based messages in what is referred to as restoration postscripts. These are brief statements at the end of a message that emphasize to the message recipient that the decision to comply with the message recommendations is their choice (Bessarabova et al., 2017; C. H. Miller et al., 2007). For instance, Bessarabova et al. (2017) examined postscript messaging regarding high-threat and low-threat messages regarding recycling. The researchers found that individuals who received the postscript within the high-threat message had increased intentions to recycle. When the postscripts followed a low-threat message, no significant differences were found. The current

study works to include such messaging throughout the inoculation message to explore if including support outside of a postscript is warranted.

To enhance the autonomy supportive messaging, it was also of interest to the current study to infuse the messages with explicit details. Within inoculation literature, previous studies have examined the effectiveness of stating the future threat through implicit and explicitly-based inoculation messages (e.g., Compton & Ivanov, 2012). An implicit forewarning message is included in the refutational preemption component of the inoculation message. On the other hand, an explicit forewarning message contains concrete information that states that a future attack on an individual's beliefs is not only possible but a forthcoming threat (McGuire, 1964). To provide explicit details in the current study, content was provided regarding what astroturf is, along with the motivation of the shell organization behind the campaign. The goal of this strategy was to provide source derogation, which has been found to be successful at reducing persuasive effects (Tannenbaum & Norris, 1965). According to C. H. Miller et al. (2020), when threats or sources are perceived as illegitimate, it provokes reactant responses that are highly arousing. The current study provided explicit details to enhance the information individuals could use to counter-argue against the astroturf video and deem it illegitimate.

As such, this study extends upon previous research examining the solo effects of autonomy support and explicit details on outcomes such as psychological reactance by examining the combined effects of these strategies. By doing so, the goal is to increase the efficacy of inoculation messages to thwart the persuasive influence of astroturf by eliciting psychological reactance toward the future attack. Both strategies have been effective when used independently. However, it was hypothesized by C. H. Miller et al. (2007) that combining concrete descriptiveness (explicit details) within persuasive appeals may reduce the ambiguity presented through autonomy-supportive language. Thus, the following research questions were posed:

Research Question 1a-b: **a)** Will messages using the combined strategy of autonomy support and explicit details cause greater levels of psychological reactance (i.e., anger and counter-arguing) toward the attack video compared to messages using a solo strategy (i.e., autonomy support or explicit details)? **b)** Moreso, will there be an indirect effect of using the combined strategy (vs. solo strategies) on increasing positive attitudes and behavioral intentions toward the attacked organization?

Figure A1 illustrates the hypothesized framework for these proposed hypotheses and research questions.

Methods

A between-subject online experiment was conducted to examine how to increase the effectiveness of using inoculation strategies to elicit psychological reactance toward a disinformation-based crisis. In addition, the relationship between psychological reactance toward disinformation and the attacked organizational crisis outcomes, such as attitudes and behavioral intentions, was explored. To do so, individuals were randomized to receive one of five messages from the attacked organization, including a control condition that did not provide a message, inoculation only, inoculation with autonomy support, inoculation with explicit details, and a combined inoculation strategy using autonomy support and explicit details.

Participants

The experiment participants were recruited via Amazon's Mechanical Turk (MTurk).[1] After individuals who incorrectly answered the attention checks, did not have audio or video, or did not complete the questionnaire were removed ($n = 431$), a total of 965 participant responses were captured. Since the current study specifically explores how inoculation influences reactance, only individuals in the

inoculation or control "no message" condition was analyzed ($N = 534$). The average age of the sample was 38.89 ($SD = 12.60$), and there were slightly more females ($n = 271$, 50.7%) than males ($n = 258$, 48.3%), with .9% preferring not to say ($n = 5$). More details regarding participant demographics can be found in Appendix B, Table A1.

Stimuli development and pretest

The experiment encapsulated the previously described ongoing situation experienced by the Humane Society of the United States (HSUS), which comes under frequent attack from astroturf campaigns sponsored by a shell organization called Humane Watch. To enhance ecological validity, the stimuli for this experiment were guided by content previously published by both HSUS and Humane Watch. The only edits between conditions were those needed for the manipulation, helping to ensure that the rest of the content stayed the same throughout all conditions. For individuals randomized into the inoculation conditions, one of four messages was randomly displayed to participants: inoculation only, inoculation with autonomy support, inoculation with explicit details of astroturf attack, and inoculation with both autonomy support and explicit detail. Previously conducted inoculation studies guided the development of the inoculation messages that state the message should enact a sense of threat by forewarning individuals they may see an attack ad and providing counter-arguments to what will be shared in the attack (Banas & Miller, 2013). Within the current study, the base inoculation message stated that individuals might see an ad by Humane Watch that would try to persuade them about HSUS misdeeds (forewarning), along with information that counter-argue (refute) points brought up by Humane Watch, such as the number of animals HSUS has aided.

In addition, this study manipulated if autonomy support (e.g., providing individuals with control, freedom, and support) and explicit details (e.g., sharing specific information within the attack video) were present. For instance, the autonomy supportive condition used wording such as "you might be just as suspicious about our motivations, as you are about the motivations of Humane Watch – that is perfectly understandable in these confusing times." The explicit detail manipulation contained wording such as "The Humane Watch video being spread online tells viewers that HSUS misuses its funds" (further exemplars of stimuli can be found in Appendix B, Table A2).

Pretest

Before launching the current study, a pretest was conducted using MTurk participants within the United States ($N = 301$) to ensure that the manipulations to inoculation and autonomy support mechanisms had the desired effect on messages published by HSUS. Following the procedure set forth by Banas and Richards (2017), motivational threat was measured as a key mechanism of inoculation using four items, including "I feel motivated to resist persuasive messages about alternative accounts of Humane Society" ($M = 4.69$, $SD = 5.40$, $a = .89$). An independent samples t-test found significant differences between participants who received the message containing the base inoculation message and those who received the control message ($M_{inoc} = 4.91$, $SD_{inoc} = 1.13$; $M_{control} = 4.14$, $SD_{control} = 1.62$; $t(1, 121.54) = 3.23$, $p = .002$, two-tailed).

To analyze if the manipulations for autonomy support were successful, perceived autonomy support was also pre-tested. Guided by the self-determination theory, the manipulation check asked, "While reading the message, I felt like HSUS provided me with choices" ($M = 5.30$, $SD = 1.26$). An independent samples t-test found significant differences between the inoculation message containing autonomy support and the base inoculation message ($M_{AS} = 5.44$, $SD_{AS} = 1.15$; $M_{base} = 4.97$, $SD_{base} = 1.15$; $t(1, 137) = 2.07$, $p < .04$, two-tailed.

Thus, autonomy support and inoculation mechanisms were induced.

Procedure

After participants read and hit "I agree" on the informed consent script approved by the Institutional Review Board at a large research university in the U.S., they received a pre-crisis feeling thermometer with questions about their perceptions of several organizations, including the two presented within this study (i.e., Humane Society of the United States and Humane Watch). Once this initial measurement was collected, participants were randomized into three groups. The first group ($n = 413$) was randomized into one of four inoculation HSUS response conditions which forewarned participants about the impending astroturf video, along with counter-argument points (exemplars of stimuli can be found in Appendix B, Table A2). Participants were then shown a 30-second astroturf video produced by Humane Watch that provided inaccurate information regarding HSUS's use of funds. The second group ($n = 121$) was randomized into the control "no message" condition seeing only the astroturf video.[2] After stimuli were presented, participants were given measures including psychological reactance toward the video, attitudes toward HSUS, and future behavioral intentions. Additionally, several attention checks were present to ensure that participants understood the stimuli and to monitor straight lining. Lastly, demographics were collected, debriefing occurred, and a randomized code to receive payment was presented.

The experimental design flow and the number of participants in each condition can be found in Figure A2 (Appendix A).

Dependent variables

Attitudinal feeling thermometer
Participants were asked at the beginning of the experiment to evaluate a series of organizations, including HSUS and Humane Watch, on a 100-point attitudinal feeling thermometer in which 0 indicated the lowest possible evaluation and 100 indicated the most positive possible evaluation (Pre-astroturf attack HSUS: $M = 77.29$, $SD = 20.74$; Post-astroturf attack HSUS: $M = 67.24$, $SD = 27.16$; Pre-astroturf attack Humane Watch: $M = 61.41$, $SD = 20.40$).

Anger
Participants were presented with a three-item scale indicating how much they felt anger, irritation, and frustration in response to the astroturf video (Ivanov et al., 2009; Pfau et al., 2005). Each item was presented as a Likert scale ranging from 1 (none at all) to 7 (a great deal) ($M = 4.48$, $SD = 1.64$, $\alpha = .95$).

Counter-arguing
Counter-arguing refers to people's ability to consider refutations as arguments when faced with attack messages. Guided by previous literature, a single quantitative self-assessment item was used for this study (Braddock, 2019; Parker et al., 2016). Participants were asked for their response to the counter-attitudinal viewpoints presented in the attack message on a one-item, seven-point Likert-type scale ranging from 1 (I accepted all of the points made in the message) to 7 (I argued against all of the points made in the message) ($M = 4.57$, $SD = 1.65$).

Behavior intentions
Lastly, participants were asked if they would adopt from HSUS, donate, or recommend the organization in the future after receiving the experimental treatments. Consistent with reactance research (Dillard & Shen, 2005), behavioral intentions were measured by a 100-point, three-item estimate of the likelihood that participants would adopt from the HSUS, donate to HSUS, and recommend HSUS ($M = 56.91$, $SD = 29.56$, $\alpha = .91$).

The means, standard deviations, reliability estimates, and zero-order correlations for key constructs are shown in Table A3 (Appendix B).

Results

Preliminary analysis

An induction check was used to ensure that the manipulations to autonomy support ($M = 5.44$, $SD = 1.379$) were perceived by participants at appropriate levels using the exact item as in the pretest (i.e., "While reading the message, I felt like HSUS provided me with choices"). An ANOVA was conducted and confirmed that there were significant differences between the four inoculation messages, $F(3, 409) = 6.81$, $p < .001$, Power $= .98$, $\eta^2 = .05$. While not all statistically significantly different, post-hoc analysis revealed the desired effects took place when examining the average mean score order (Table A4, Appendix B). Messages focused only on providing autonomy support had the highest mean score ($M = 5.76$, $SD = 1.07$), followed by the message with the combined autonomy support and explicit detail strategy ($M = 5.72$, $SD = 1.38$). Individuals who received the two messages without autonomy support present within the inoculation base message ($M = 5.35$, $SD = 1.32$) and explicit detail message ($M = 4.92$, $SD = 1.70$) reported the lowest levels of perceived autonomy support.

Structural modal testing

The hypothesized model was tested using structural equation modeling (SEM) with the lavaan package for R (Rosseel, 2012). The model was estimated using robust Maximum Likelihood (MLR) unless bootstrapping was employed, in which case ML estimation was adopted. Prior to assessing the structural model, a confirmatory factor analysis (CFA) was conducted. Following guidance from Hu and Bentler (1999),[3] the model was found to have acceptable fit, $\chi^2(13) = 44.735$, $p < .001$, robust root mean square error of approximation (rRMSEA) = .077 [.053, .103], robust comparative fit index (rCFI) = .987, robust non-normed fit index/Tucker Lewis index (rNNFI/TLI) = .979, standardized root mean residual (SRMR) = .029. As such, the structural model was assessed.

Consistent with contemporary practice in psychological reactance research (Dillard & Shen, 2005; Rains & Turner, 2007), a structural model was fit. Psychological reactance served as a higher-order latent variable compromised of the latent construct of anger and a single item of negative cognitions through counter-arguing (Rosenberg & Siegel, 2018). The latent construct of reactance was regressed on perceived attitudes toward HSUS, and this was subsequently regressed on the behavior intention latent variable. To test hypothesis 1 and research question 1a-b, the model described above was fit with dummy condition variables (i.e., 0 = did not receive treatment, 1 = treatment) for the exogenous variables of inoculation base, inoculation with autonomy support, inoculation with explicit detail, and inoculation with combined strategy. The reference ("control") condition was set to represent those who only received the attack video and not an inoculation message. Pre-attitudes toward HSUS and Humane Watch were used as control variables.

Following Kline's (2015) two-step process examining both local and global fit, a measurement model was first fit to verify the factor structure of anger toward the astroturf video and future behavioral intentions toward the Humane Society of the United States (HSUS). This study examined the values of the Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR) to assess the model fit. An initial model was fit controlling for pre-attitudes toward HSUS and Humane Watch, $\chi^2(69) = 254.825$, $p < .001$, rRMSEA $= .071$ [.062, .080], rCFI $= .953$, rNNFI/TLI = .939, SRMR $= .045$. After examining the correlation between variables and to achieve the recommended RMSEA below .06 for a close fit (Hu & Bentler, 1999), two anger variables and two behavioral intention variables were correlated. The second model was accepted, $\chi^2(67) = 190.068$, $p < .001$, rRMSEA $= .059$ [.049, .069], rCFI $= .969$, rNNFI/TLI = .959, SRMR $= .043$.

Hypotheses and research question testing

The first hypothesis predicted that participants higher in psychological reactance would have a) more positive attitudes toward HSUS and, therefore, b) higher behavioral intentions to engage with HSUS post-attack. Consistent with this hypothesis, increased reactance toward the astroturf video was associated with more positive attitudes toward the attacked organization (HSUS) ($\beta = .426$, $se = 1.915$, $p < .001$) while controlling for prior attitudes and compared to the referent condition. Further, higher positive attitudes toward HSUS were associated with greater behavioral intentions to engage with the organization ($\beta = .678$, $se = .003$, $p < .001$). There was a significant indirect effect of reactance through the influence of attitude on behavioral intentions, as evidenced by a 5000 bootstrapped confidence interval that did not contain zero [$\beta = .289$, CI $=.257, .565$]. These results are consistent with H1a-b.

The second hypothesis predicted that individuals who receive an inoculation message would experience stronger levels of reactance through a) anger and b) counter-arguing toward the astroturf attack video than individuals who did not receive a forewarning message. Two t-tests were conducted to test this hypothesis, comparing individuals who did and did not receive an inoculation message. When examining anger, results indicated that there were no statistically significant differences between the inoculation ($M = 4.49$, $SD = 1.63$) and control condition ($M = 4.43$, $SD = 1.70$), $t(1, 532) = -3.78$, $p = .71$, $d = 1.64$). As such, H2a was not upheld. When examining counter-arguing, results indicated that there were significant differences between the inoculation ($M = 4.73$, $SD = 1.56$) and control conditions ($M = 4.05$, $SD = 1.85$), $t(1, 172.88) = -3.68$, $p < .001$, $d = 1.63$), which means that individuals who received an inoculation message (vs. no response) experienced greater levels of counter-arguing to the contents of the astroturf video. Thus, supporting H2b.

Research question 1a-b asked if the combined effects of autonomy support and explicit details would outperform the solo effects on outcome variables (i.e., reactance, attitude, and behavioral intention). More specifically, it explored if using the combined strategy would increase reactance toward the astroturf video, therefore, positively affecting attitudes and behavioral intentions toward the attacked organization. The model showed that when compared with the condition that did not receive a message and controlling for attitudes, the inoculation message containing the combined strategy caused individuals to have the highest reactance toward the astroturf video ($\beta = .287$, $se = .052$, $p = .002$). This was closely followed by explicit details only ($\beta = .233$, $se = .059$, $p = .007$). The effects of inoculation base were found statistically insignificant ($\beta = .134$, $se = .106$, $p = .089$), as was autonomy support only ($\beta = .168$, $se = .080$, $p = .060$).

The indirect effects for each condition were significant, as evidenced by a 5000 bootstrapped confidence interval that did not contain zero. The indirect effect of the inoculation base message on attitudes through psychological reactance was significant [$\beta = .057$, CI $=.028, 6.072$] and increased behavioral intentions as a result [$\beta = .039$, CI $=.001, .225$]. The indirect effect of inoculation containing autonomy support on attitudes through psychological reactance was significant [$\beta = .072$, CI $=.199, 5.373$] and increased behavioral intentions as a result [$\beta = .049$, CI $=.007, .194$]. The indirect effect of inoculation with explicit details on attitudes through psychological reactance was significant [$\beta = .099$, CI $=.564, 4.547$] and increased behavioral intentions as a result [$\beta = .067$, CI $=.020, .163$]. The indirect effect of inoculation with the combined strategy on attitudes through psychological reactance was significant [$\beta = .122$, CI $=.650, 4.335$] and increased behavioral intentions as a result [$\beta = .083$, CI $=.023, .157$].

To summarize, the inoculation message strategy using the combined strategies resulted in greater effects than the solo use of inoculation base, autonomy support, and explicit details strategy. The final model is presented in Figure A3.

Discussion

Grounded in inoculation, psychological reactance, and self-determination theory, this study examined the plausibility and effectiveness of organizations using proactive communication by inoculating individuals against potential future persuasion attacks. By focusing on enhancing an individual's

motivation during the inoculation process, the results from this study provide further understanding of what content inoculation messages should contain to induce reactance toward astroturf campaigns. Messages using the combined strategy with autonomy support and explicit detail consistently outperformed the traditionally used content within inoculation messages. Findings from the current study provide additional support for interweaving components of the self-determination theory, such as autonomy support, into public relations strategies when combating disinformation attacks. In addition, being transparent about the nature of the impending disinformation attack and what motivates the attacker with an explicit statement about the situation could be beneficial.

Theoretical implications

Building off C. H. Miller et al. (2013) findings of maximizing resistance, the primary theoretical contribution of this study is its utilization of four different inoculation strategies to induce future psychological reactance for individuals who may receive disinformation. The use of inoculation has been increasingly studied to prevent misperceptions, including (mis/dis)information and propaganda (Compton, van der Linden, et al., 2021). In addition, inoculation theory has been shown to be equally important within the field of public relations (Compton, Wigley, et al., 2021; Wan & Pfau, 2004). Both public relations and inoculation theory literature acknowledge "the importance of audiences making their own decisions and reaching their own conclusions" Compton, Wigley, et al. (2021), p. 2). To further this connection, the current study examined how providing individuals with autonomy support throughout the message, which included meaningful choices and acknowledging potential anxieties, influenced research outcomes when combined with explicit details. All inoculation strategies were successful at either directly or indirectly increasing positive organizational outcomes through stronger attitudes and behavioral intention than not using an inoculation message. While this finding is not surprising based on the well-documented success of inoculation when applied to other topics, it further extends insights into characteristics of successful inoculation messages and a direct application to crisis communication.

Inducing reactance toward disinformation

It has been hypothesized in prior literature that if an individual's reactance toward a future message is induced, they will be more likely to reject the message (S. Kim, 2013). The current study hypothesized (H2a-b) that inoculated individuals via inoculation would experience greater reactance traits toward the astroturf video than non-inoculated individuals. The current study demonstrates that individuals who receive a forewarning message through inoculation strategies are more likely to experience psychological reactance through anger and counter-arguing toward disinformation.

This study also provided insights into the mechanisms of psychological reactance by using SEM. While the levels of anger were not statistically different between the two strategies, those in the inoculation condition reported higher levels of anger when comparing average mean scores. The lack of statistically significant differences when comparing levels of anger between inoculation and the control message supports previously published work suggesting that the negative emotional effect of anger does not act as a standalone (Dillard & Shen, 2005; Shen, 2015). Instead, reactance toward future threats is an amalgam of counter-arguing (negative cognitions) and anger which are deeply intertwined and cannot be extricated from one another. Similar support for the intertwined model has been replicated throughout psychological reactance literature (e,g., Braddock, 2019; C. H. Miller et al., 2013; Dillard & Shen, 2005; Rains & Turner, 2007).

Influencing behavioral intentions

Going further than examining perceived attitudes toward an organization as done in previous literature, this study also sheds light on potential impacts on future behavioral intentions. This provides further insight into the guidance C. H. Miller et al. (2013) work demonstrated on cultivating resistance which examined outcome variables such as source credibility and attitude change.

Specifically, the current research endeavor examined if the message strategy used by HSUS, or the astroturf attack itself, deterred individuals from stating they would donate money, volunteer, adopt, or recommend others to be involved with HSUS in the future. It was found that those in the inoculation condition were more likely to engage with HSUS in the future than individuals who did not receive a forewarning message from HSUS. This finding supports and expands upon current inoculation research using refutational content, which has found that inoculation helps render attitudes resistant and influences future behavioral intentions (Compton & Pfau, 2004). When breaking down the inoculation message content, solo and combined factors outperformed no message. Within this research endeavor, it was observed that the motivational threat and counter-arguing element accompanied by autonomy support and explicit details strengthened this observation. Research regarding explicit threat warnings within inoculation has been explored (e.g., Compton, 2021; Wan & Pfau, 2004). However, examining it through the lens of warning about a disinformation paracrisis further supports that explicit versus implicit warnings could benefit proactive crisis communication efforts.

Boosting potency of inoculation

Extending upon current inoculation literature, research question 1a examined if specific message strategies used within an inoculation message could enhance the reactance individuals experienced toward the disinformation provided. Overall, it was found that inoculation messages with explicit details significantly outperformed the effects of strategies that contained solely autonomy support and the base inoculation message on all outcome variables. This study found that if individuals are given specific details of the motivation behind the disinformation attack, they may experience an increase in reactance toward the attack compared to those who received a traditional inoculation message. This suggests that by increasing counter-arguing and anger (i.e., reactance) through inoculation with explicit details, individuals may begin to doubt the information being given via disinformation, increasing resistance to the astroturf. In addition, the use of explicit details provided source derogation, which could have enhanced the individual's hostility toward the attacking organization after viewing the inoculation message. It has been shown that such feelings of anger and hostility directed at a source cause immediate adverse outcomes and potentially extend undesirable effects into the future (C. H. Miller et al., 2020).

Practical implications for inoculating persuasive disinformation attacks

The use of inoculation within the public relations industry is not novel (Compton, Wigley, et al., 2021). The strategy can be seen in communication strategies spanning Mobil Oil's efforts to protect against future image attacks (Burgoon et al., 1995) to combat customer dissatisfaction due to a service failure (Mikolon et al., 2015). The current study shows that organizations, when able, should proactively respond to astroturf attacks rather than ignore the attack. These findings show that responding proactively with an inoculation message significantly improved crisis outcomes such as attitudes and behavioral intentions compared to the no response. This is an important finding, as crisis literature does not explicitly recommend that organizations respond to all paracrisis situations (Coombs, 2019). However, it appears that when the scenario involves disinformation regarding financial spending or an organization's intent, a response is warranted.

Secondly, this study builds upon Wan and Pfau's (2004) initial work of applying inoculation to public relations by providing professionals with clearer guidance on what content to include in forewarning messages. Public relations professionals are increasingly discussing the use of prebunking through initiatives such as PRSA's Voices4Everyone (Everyone, 2022). This study further supports its usage and provides guidance on message content strategies for professionals to deploy. Specifically, findings show that using autonomy support, stating that individuals have the freedom to choose what to believe and acknowledging that it could be a confusing situation, is beneficial. In addition, combining this with explicit details explaining what astroturf is and the goals of the astroturf campaign could lead to individuals rejecting the persuasive attack attempt.

Limitations and suggestions for future research

As with any study, this project has limitations that should be expressed to guide future research endeavors. Participants were purposely exposed to stimuli they otherwise might not encounter, for example, because they do not use social media or because social media algorithms do not allow for every posting to be shown. While this is the case with any controlled experimental endeavor, the phenomenon found in this study most likely over-estimates the effects found in the real world as a whole. Within this same vein, the lifecycle of this scenario played out in a 20-minute capsule which does not represent the actual timescale in which crises occur. Ideally, future research endeavors should test the effects of having a time delay between each element of this experiment to accurately depict what occurs in the naturalistic environment.

In addition, while participants' attitudes toward Humane Watch and HSUS prior to receiving the stimuli were accounted for, there was no direct measurement of whether the astroturf ad was seen prior to participating in this study. While therapeutic inoculation has been shown to be effective even if an individual has had previous contact with the attack message, it would be beneficial to compare the effects of both prophylactic and therapeutic inoculation. An additional area of future research should explore trait reactance when examining the influence of an individual's personality traits and the success of inoculation messages. Lastly, future research should examine how inoculation can be bolstered by pairing it with strategies found throughout crisis communication literature, such as stealing thunder and reactive strategies presented within situational crisis communication theory.

Conclusion

The current study demonstrates how the persuasive attempts stemming from astroturf can be counteracted by cultivating psychological reactance to protect organizational crisis outcomes such as attitudes and future behavioral intention. While the success of using threat and counter-arguing within inoculation to confer resistance has been documented, this study provides support and guidance for infusing inoculation messages with a combination of explicit details and autonomy support as an antidote to astroturf attacks. The findings presented in this study highlight the ongoing use of interweaving crisis communication, social psychology, and persuasion communication theory in both research and practice to motivate individuals to overcome the persuasive effects of disinformation prevalent throughout society.

Notes

1. MTurk is a web-based platform for recruiting and paying subjects to perform tasks (Berinsky et al., 2012). Following the advice from Berinsky et al. (2012), attention checks were used throughout the study (such as a simple math equation) to ensure quality data was being collected. The qualified MTurk workers were those located in the United States with more than 50 approved tasks.
2. It should be noted that there was a third group ($n = 431$) who mirrored the first group, with the only difference being that the astroturf video was seen first, followed by the reactive refutational-based message from HSUS. As such, this group was not of interest to determine the effects of inoculation on psychological reactance toward the astroturf video.
3. As proposed by Hu and Bentler (1999) the RMSEA value of .06 or less shows a close fit, between .06–.08 an acceptable fit, and between .08–.10 a mediocre fit. A CFI value of more than .90 shows an acceptable fit and a value more than .95 signals a close fit to the model. An SRMR value between .08–.10 indicates a moderate fit, and a value less than .08 is a good fit.

Disclosure statement

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References

Ajzen, I. (1988). *Attitudes, personality, and behavior*. Open University Press.

Akhtar, N., Nadeem Akhtar, M., Usman, M., Ali, M., & Iqbal Siddiqi, U. (2020). COVID-19 restrictions and consumers' psychological reactance toward offline shopping freedom restoration. *The Service Industries Journal*, *40*(13–14), 891–913. https://doi.org/10.1080/02642069.2020.1790535

Banas, J. A., & Miller, G. (2013). Inducing resistance to conspiracy theory propaganda: Testing inoculation and metainoculation strategies. *Human Communication Research*, *39*(2), 184–207. https://doi.org/10.1111/hcre.12000

Banas, J. A., & Rains, S. A. (2010). A meta-analysis of research on inoculation theory. *Communication Monographs*, *77* (3), 281–311. https://doi.org/10.1080/03637751003758193

Banas, J. A., & Richards, A. S. (2017). Apprehension or motivation to defend attitudes? Exploring the underlying threat mechanism in inoculation-induced resistance to persuasion. *Communication Monographs*, *84*(2), 164–178. https://doi.org/10.1080/03637751.2017.1307999

Berinsky, A. J., Huber, G. A., & Lenz, G. S. (2012). Evaluating online labor markets for experimental research: Amazon. Com's mechanical turk. *Political Analysis*, *20*(3), 351–368. https://doi.org/10.1093/pan/mpr057

Bessarabova, E., Miller, C. H., & Russell, J. (2017). A further exploration of the effects of restoration postscripts on reactance. *Western Journal of Communication*, *81*(3), 385–403. https://doi.org/10.1080/10570314.2016.1254815

Boman, C. D., & Schneider, E. J. (2021). Finding an antidote: Testing the use of proactive crisis strategies to protect organizations from astroturf attacks. *Public Relations Review*, *47*(1), 102004. https://doi.org/10.1016/j.pubrev.2020.102004

Braddock, K. (2019). Vaccinating against hate: Using attitudinal inoculation to confer resistance to persuasion by extremist propaganda. *Terrorism and Political Violence*, *34*(2), 240–262. https://doi.org/10.1080/09546553.2019.1693370

Brehm, J. (1966). *A theory of psychological reactance*. Academic Press.

Brehm, S. S., & Brehm, J. W. (1981). *Psychological reactance: A theory of freedom and control*. Academic Press.

Burgoon, M., Pfau, M., & Birk, T. S. (1995). An inoculation theory explanation for the effects of corporate issue/advocacy advertising campaigns. *Communication Research*, *22*(4), 485–505. https://doi.org/10.1177/009365095022004006

Clayton, R. B., Lang, A., Leshner, G., & Quick, B. L. (2019). Who fights, who flees? An integration of the LC4MP and psychological reactance theory. *Media Psychology*, *22*(4), 545–571. https://doi.org/10.1080/15213269.2018.1476157

Compton, J. (2020). Prophylactic versus therapeutic inoculation treatments for resistance to influence. *Communication Theory*, *30*(3), 330–343. https://doi.org/10.1093/ct/qtz004

Compton, J. (2021). Threat and/in inoculation theory. *International Journal of Communication*, *15*, 13.

Compton, J., & Ivanov, B. (2012). Untangling threat during inoculation-conferred resistance to influence. *Communication Reports*, *25*(1), 1–13. https://doi.org/10.1080/08934215.2012.661018

Compton, J., & Ivanov, B. (2013). Vaccinating voters: Surveying political campaign inoculation scholarship. *Annals of the International Communication Association*, *37*(1), 251–283. https://doi.org/10.1080/23808985.2013.11679152

Compton, J., & Pfau, M. (2004). Use of inoculation to foster resistance to credit card marketing targeting college students. *Journal of Applied Communication Research*, *32*(4), 343–364. https://doi.org/10.1080/0090988042000276014

Compton, J., van der Linden, S., Cook, J., & Basol, M. (2021). Inoculation theory in the post-truth era: Extant findings and new frontiers for contested science, misinformation, and conspiracy theories. *Social and Personality Psychology Compass*, *15*(6), e12602. https://doi.org/10.1111/spc3.12602

Compton, J, Wigley, S., & Samoilenko, S. A. (2021). Inoculation theory and public relations. *Public Relations Review*, *47* (5), 102116. https://doi.org/10.1016/j.pubrev.2021.102116

Coombs, W. T. (2019). *Ongoing crisis communication: Planning, managing, and responding* (5th ed.). Sage Publications.

Coombs, W. T., & Holladay, J. S. (2012). The paracrisis: The challenges created by publicly managing crisis prevention. *Public Relations Review*, *38*(3), 408–415. https://doi.org/10.1016/j.pubrev.2012.04.004

Dillard, J. P., & Shen, L. (2005). On the nature of reactance and its role in persuasive health communication. *Communication Monographs*, *72*(2), 144–168. https://doi.org/10.1080/03637750500111815

Dillingham, L. L., & Ivanov, B. (2015). Boosting inoculation's message potency: Loss framing. *Communication Research Reports*, *32*(2), 113–121. https://doi.org/10.1080/08824096.2015.1016152

Eagly, A., & Chaiken, S. (1993). *The psychology of attitudes*. Harcourt Brace Jovanovich College Publishers.

Edwards, L. (2021). Organised lying and professional legitimacy: Public relations' accountability in the disinformation debate. *European Journal of Communication*, *36*(2), 168–182. https://doi.org/10.1177/0267323120966851

Einwiller, S. A., & Johar, G. V. (2013). Countering accusations with inoculation: The moderating role of consumer-company identification. *Public Relations Review*, *39*(3), 198–206. https://doi.org/10.1016/j.pubrev.2013.03.002

Farkas, J. (2018). Disguised propaganda on social media: Addressing democratic dangers and solutions. *The Brown Journal of World Affairs*, *25*(1), 1–16.

Feng, W., Tu, R., Lu, T., & Zhou, Z. (2019). Understanding forced adoption of self-service technology: The impacts of users' psychological reactance. *Behaviour & Information Technology*, *38*(8), 820–832. https://doi.org/10.1080/0144929X.2018.1557745

Fishbein, M., & Ajzen, I. (2011). *Predicting and changing behavior: The reasoned action approach*. Psychology press. https://doi.org/10.4324/9780203838020

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Humane Watch. (2013, December 19). *Humane Society of The US: Tony is Mad* [Advertisement]. https://www.youtube.com/watch?v=axKXH4VGVBg&t=1s

Ivanov, B., Burns, W. J., Sellnow, T. L., Petrun Sayers, E. L., Veil, S. R., & Mayorga, M. W. (2016). Using an inoculation message approach to promote public confidence in protective agencies. *Journal of Applied Communication Research*, *44*(4), 381–398. https://doi.org/10.1080/00909882.2016.1225165

Ivanov, B., Parker, K. A., & Dillingham, L. (2020). Inoculation theory as a strategic tool. In *The handbook of applied communication research* (pp. 11–28). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781119399926.ch1

Ivanov, B., Pfau, M., & Parker, K. (2009). The attitude base as a moderator of the effectiveness of inoculation strategy. *Communication Monographs*, *76*(1), 47–72. https://doi.org/10.1080/03637750802682471

Ivanov, B., Rains, S. A., Dillingham, L. L., Parker, K. A., Geegan, S. A., & Barbati, J. L. (2022). The role of threat and counterarguing in therapeutic inoculation. *The Southern Communication Journal*, *87*(1), 15–27. https://doi.org/10.1080/1041794X.2021.1983012

Ivanov, B., Rains, S. A., Geegan, S. A., Vos, S. C., Haarstad, N. D., & Parker, K. A. (2017). Beyond simple inoculation: Examining the persuasive value of inoculation for audiences with initially neutral or opposing attitudes. *Western Journal of Communication*, *81*(1), 105–126. https://doi.org/10.1080/10570314.2016.1224917

Ivanov, B., Sellnow, T., Getchell, M., & Burns, W. (2018). The potential for inoculation messages and postinoculation talk to minimize the social impact of politically motivated acts of violence. *Journal of Contingencies and Crisis Management*, *26*(4), 414–424. https://doi.org/10.1111/1468-5973.12213

Kim, S. (2013). Does corporate advertising work in a crisis? An examination of inoculation theory. *Journal of Marketing Communications*, *19*(4), 293–305. https://doi.org/10.1080/13527266.2011.634430

Kim, H., Seo, Y., Yoon, H. J., Han, J. Y., & Ko, Y. (2021). The effects of user comment valence of Facebook health messages on intention to receive the flu vaccine: The role of pre-existing attitude towards the flu vaccine and psychological reactance. *International Journal of Advertising*, *40*(7), 1187–1208. https://doi.org/10.1080/02650487.2020.1863065

Kline, R. B. (2015). *Principles and practice of structural equation modeling* (4th ed.). The Guilford Press. Fourth edition.

Leander, N. P., vanDellen, M. R., Rachl-Willberger, J., Shah, J. Y., Fitzsimons, G. J., & Chartrand, T. L. (2016). Is freedom contagious? A self-regulatory model of reactance and sensitivity to deviant peers. *Motivational Science*, *2*(4), 256–267. https://doi.org/10.1037/mot0000042

Leiser, M. (2016). AstroTurfing, 'CyberTurfing' and other online persuasion campaigns. *European Journal of Law and Technology*, *7*(1), 1–27.

Maertens, R., Anseel, F., & van der Linden, S. (2020). Combatting climate change misinformation: Evidence for longevity of inoculation and consensus messaging effects. *Journal of Environmental Psychology*, *70*, 70. https://doi.org/10.1016/j.jenvp.2020.101455

McGuire, W. J. (1961). Resistance to persuasion conferred by active and passive prior refutation of the same and alternative counterarguements. *Journal of Abnormal & Social Psychology*, *63*(2), 326. https://doi.org/10.1037/h0048344

McGuire, W. J. 1964. Inducing resistance to persuasion: Some contemporary approaches. In C. Haaland & W. Kaelber. Eds., *Self and Society. An Anthology of Readings* (pp. 192–230). Ginn Custom Publishing. 1981 https://scinapse.io/papers/133740600

Mikolon, S., Kolberg, A., Haumann, T., & Wieseke, J. (2015). The complex role of complexity: How service providers can mitigate negative effects of perceived service complexity when selling professional services. *Journal of Service Research*, *18*(4), 513–528. https://doi.org/10.1177/1094670514568778

Miller, R. L. (1976). Mere exposure, psychological reactance and attitude change. *Public Opinion Quarterly*, *40*(2), 229–233. https://doi.org/10.1086/268290

Miller, C. H., Ivanov, B., Sims, J., Compton, J., Harrison, K. J., Parker, K. A., Parker, J. L., & Averbeck, J. M. (2013). Boosting the potency of resistance: combining the motivational forces of inoculation and psychological reactance. *Human Communication Research*, *39*(1), 127–155. https://doi.org/10.1111/j.1468-2958.2012.01438.x

Miller, C. H., Lane, L. T., Deatrick, L. M., Young, A. M., & Potts, K. A. (2007). Psychological reactance and promotional health messages: The effects of controlling language, lexical concreteness, and the restoration of freedom. *Human Communication Research*, *33*(2), 219–240. https://doi.org/10.1111/j.1468-2958.2007.00297.x

Miller, C. H., Massey, Z. B., & Ma, H. (2020). Psychological reactance and persuasive message design. *The Handbook of Applied Communication Research*, 457–483. https://doi.org/10.1002/9781119399926.ch27

Parker, K. A., Rains, S. A., & Ivanov, B. (2016). Examining the "blanket of protection" conferred by inoculation: The effects of inoculation messages on the cross-protection of related attitudes. *Communication Monographs*, *83*(1), 49–68. https://doi.org/10.1080/03637751.2015.1030681

Pfau, M., Haigh, M. M., Sims, J., & Wigley, S. (2007). The influence of corporate front-group stealth campaigns. *Communication Research*, *34*(1), 73. https://doi.org/10.1177/0093650206296083

Pfau, M., Ivanov, B., Houston, B., Haigh, M., Sims, J., Gilchrist, E., Russell, J., Wigley, S., Eckstein, J., & Richert, N. (2005). Inoculation and mental processing: The instrumental role of associative networks in the process of resistance to counterattitudinal influence. *Communication Monographs*, *72*(4), 414–441. https://doi.org/10.1080/03637750500322578

Quick, B. L. (2013). Perceived message sensation value and psychological reactance: A test of the dominant thought disruption hypothesis. *Journal of Health Communication*, *18*(9), 1024–1038. https://doi.org/10.1080/10810730.2013.768728

Quick, B. L., LaVoie, N. R., Morgan, S. E., & Bosch, D. (2015). You've got mail! An examination of a statewide direct-mail marketing campaign to promote deceased organ donor registrations. *Clinical Transplantation*, *29*(11), 997–1003. https://doi.org/10.1111/ctr.12620

Rains, S. A., & Turner, M. M. (2007). Psychological reactance and persuasive health communication: A test and extension of the intertwined model. *Human Communication Research*, *33*(2), 241–269. https://doi.org/10.1111/j.1468-2958.2007.00298.x

Reynolds-Tylus, T. (2019). Psychological reactance and persuasive health communication: A review of the literature. *Frontiers in Communication*, *4*, 1–12. https://doi.org/10.3389/fcomm.2019.00056

Reynolds-Tylus, T., Bigsby, B., & Quick, B. L. (2020). A comparison of three approaches for measuring negative cognitions for psychological reactance. *Communication Methods and Measures*, *15*(1), 43–59. https://doi.org/10.1080/19312458.2020.1810647

Roozenbeek, J., & van der Linden, S. (2020). Breaking harmony square: A game that "inoculates" against political misinformation. *The Harvard Kennedy School Misinformation Review*, *1*(8). https://doi.org/10.37016/mr-2020-47

Rosenberg, B. D., & Siegel, J. T. (2018). A 50-year review of psychological reactance theory: Do not read this article. *Motivation Science*, *4*(4), 281–300. https://doi.org/10.1037/mot0000091

Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, *48*(2), 1–36. https://doi.org/10.18637/jss.v048.i02

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Publications.

Shen, L. (2015). Antecedents to psychological reactance: The impact of threat, message frame, and choice. *Health Communication*, *30*(10), 975–985. https://doi.org/10.1080/10410236.2014.910882

Slattery, M. (2015). *Clearly someone hates the Humane Society. Why? Behind the Metro billboards*. Politico. https://www.politico.com/agenda/story/2015/05/humane-society-metro-billboards-000043/

Tannenbaum, P. H., & Norris, E. L. (1965). Effects of combining congruity principle strategies for the reduction of persuasion. *Sociometry*, *28*(2), 145–157. https://doi.org/10.2307/2785647

van der Linden, S., Roozenbeek, J., & Compton, J. (2020). Inoculating against fake news about COVID-19. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.566790

Voices4Everyone. (2022). Disinformation inoculation against misinformation. https://voices4everyone.prsa.org/disinformation/disinformation-inoculate/

Wan, H. H., & Pfau, M. (2004). The relative effectiveness of inoculation, bolstering, and combined approaches in crisis communication. *Journal of Public Relations Research*, *16*(3), 301–328. https://doi.org/10.1080/1532-754X.2004.11925131

Weedon, J., Nuland, W., & Stamos, A. (2017). Information operations on Facebook. https://about.fb.com/br/wp-content/uploads/sites/3/2017/09/facebook-and-information-operations-v1.pdf

Wigley, S., & Pfau, M. (2010). Communicating before a crisis: An exploration of bolstering, CSR, and inoculation practices. In W. T. Coombs & S. J. Holladay (Eds.), *The Handbook for Crisis Communication* (pp. 568–590). Wiley.

Wood, M. L. M. (2007). Rethinking the inoculation analogy: Effects on subjects with differing preexisting attitudes. *Human Communication Research*, *33*(3), 357–378. https://doi.org/10.1111/j.1468-2958.2007.00303.x

Xu, J., & Wu, Y. (2017). Countering reactance in crisis communication: Incorporating positive emotions via social media. *International Journal of Business Communication*, *57*(3), 352–369. https://doi.org/10.1177/2329488417702475

Youn, S., & Kim, S. (2019). Understanding ad avoidance on Facebook: Antecedents and outcomes of psychological reactance. *Computers in Human Behavior*, *98*, 232–244. https://doi.org/10.1016/j.chb.2019.04.025

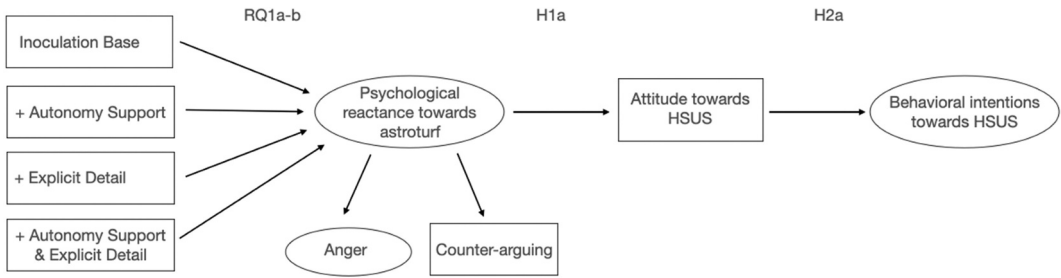# Appendix A – Figures
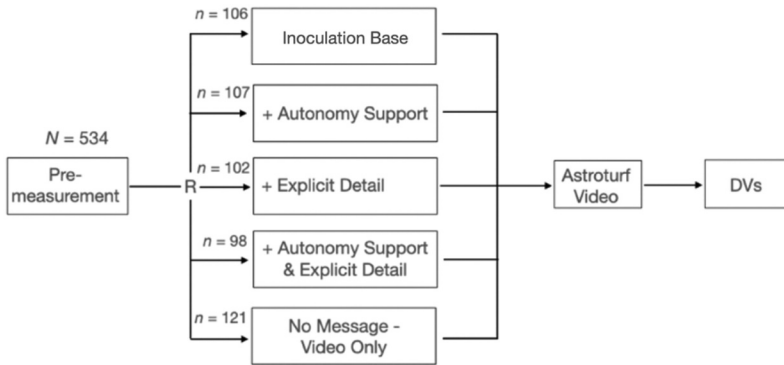

Figure A1. Hypothesized framework.

Figure A2. Experimental flow with participant numbers per condition.
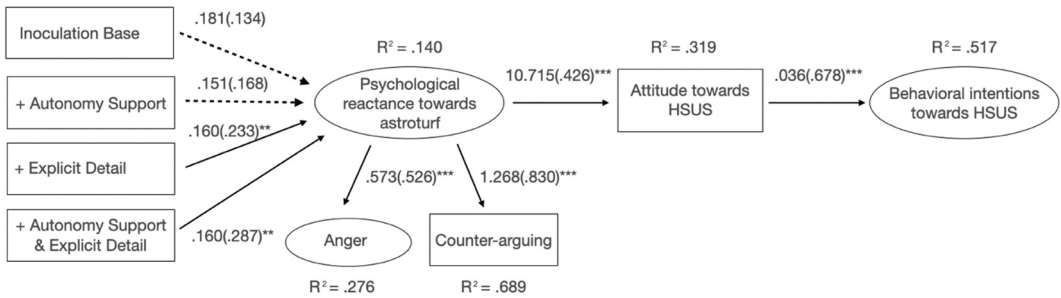

Figure A3. Final model ($N = 459$). Model used the control condition (no message/astroturf only) as the reference group. Conditions were coded so that 0 = treatment not present, 1 = treatment present. Both unstandardized (B) and standardized coefficients (β) are presented. Standardized coefficients are shown in parentheses. Dashed lines represent non-significant paths. *$p < .05$, **$p < .01$, ***$p < .001$.

Appendix B – Tables

Table A1. Participant Demographics.

	n (%)
Gender	
Female	271 (50.7%)
Male	258 (48.3%)
Prefer not to say	5 (.9%)
Race	
White	403 (75.5%)
Black/African American	82 (15.4%)
Asian	32 (6.0%)
Other	12 (2.2%)
American Indian/Alaska Native	4 (.7%)
Native Hawaiian/Pacific Islander	1(.2%)
Ethnicity	
Spanish/Hispanic/Latino	458 (85.9%)
Mexican/Mexican American/Chicano	18 (3.2%)
Puerto Rican	4 (.8%)
Cuban	8 (1.5%)
Other	33 (6.2%)
Prefer not to say	13 (2.4%)
Age (range)	36(19–78)
Marital Status	
Married	290 (54.3%)
Never Married	173(32.4%)
Divorced	53 (9.9%)
Separated	10 (1.9%)
Widowed	8 (1.5%)
Highest Level of Education	
Less than high school degree	1 (.2%)
High school diploma or GED	50 (9.4%)
Some college, no degree	88 (16.5%)
Associate degree or equivalent	54 (10.1%)
Bachelor degree	242 (45.3%)
Graduate or professional degree	99 (18.5%)
Household Income	
~ $30,000	86 (16.1%)
$30,000–$59,999	203 (38.0%)
$60,000–$99,999	179 (33.5%)
$100,000 ~	66 (12.4%)

Note. Cells display counts of each category with percentages in parentheses in the overall column, except for cells referred to *age* with the range in parentheses.

Table A2. Stimuli exemplars.

Condition	Exemplars
Inoculation base (Full inoculation message)	"At the Humane Society of the United States (HSUS), we sometimes get attacked by groups like Humane Watch that do not like the way we do things. The attack video being shared online by Humane Watch tries to persuade viewers that HSUS misuses the funds it collects. That we use the money for ourselves, instead of spending it on the animals. For example, you may hear that we do not use funds to support local shelters. Humane Watch wants you to believe that HSUS misleads the public on how we spend funds. That HSUS does not have the well-being of animals as our top priority. What this claim doesn't tell you is that in 2018 alone, HSUS spent $139.1 million on animal protection programs. This money provides emergency care and homes to more animals than any other organization in the United States. Since 1954, HSUS has taken on puppy mills, factory farms, trophy hunts, animal testing, and other cruel industries. With our partners, we rescue and care for thousands of animals every year. As you reflect on your beliefs about HSUS and our dedication to animal protection, remember our current wins and our fight for animal rights. Regardless of the false information Humane Watch provides, no organization in the world is more dedicated to protecting animals than we are."
+Autonomy support	" . . . Although we hope to convince you that the attack is not accurate or legitimate, we realize that you have the right to decide this for yourself. It's up to you, not us!. . ."
+Explicit detail	" . . . The Humane Watch video being spread online tells viewers that HSUS misuses its funds. It states that we use the money for ourselves, instead of spending it on animal welfare. For example, you may hear that we do not use funds to support local shelters. Humane Watch wants you to believe that HSUS misleads the public on how we spend funds. . ."
+Combined strategy	" . . . Sometimes at the Humane Society of the United States (HSUS), we get attacked by groups like Humane Watch. These groups spread misleading information in an attempt to defund us. We want you to know who Humane Watch is, so you can decide for yourself on what to believe. . ."

Table A3. Summary of correlations, means, standard deviations for pre-attitudes, anger, counter-arguing, post-attitude, and behavioral intention.

Measure	a	M (SD)	1	2	3	4	5	6
1. Pre-Attitudes HSUS[a]	-	77.288 (20.741)	1.00					
2. Pre-Attitudes Humane Watch[a]	-	61.414 (20.401)	.380**	1.00				
3. Anger	.95	4.478 (1.643)	.248**	.160**	1.00			
4. Counter-arguing[a]	-	4.575 (1.650)	.200**	.057	.448**	1.00		
5. Post-Attitudes HSUS[a]	-	67.236 (27.164)	.384**	.200**	.209**	.409**	1.00	
6. Behavioral Intention	.91	56.913 (29.563)	.336**	.179**	.253**	.359**	.644**	1.00
Scale Endpoints			0–100	0–100	1–7	1–7	0–100	1–100

Note. ** Correlation is significant at $p < .01$, two-tailed.
[a]Single-item measure; no reliability estimate calculated.

Table A4. ANOVA comparative summary of effects of inoculation treatments on autonomy support.

Condition	n	Autonomy Support M (SD)
Inoculation Base	106	5.35 (1.32)$_{abc}$
+ Autonomy Support	107	5.76 (1.07)$_{ad}$
+ Explicit Detail	102	4.92 (1.70)$_{bde}$
+ Combined Strategy	98	5.72 (1.38)$_{ce}$

Shared subscripts represent statistically significant differences using Fisher's LSD: $_c = p = .05$, $_{a,b} = p < .05$, $_{d,e} = p < .001$.

Table A5. Results of SEM model: effect of inoculation strategies on psychological reactance, attitude, and behavioral intentions.

Condition	Psychological Reactance β (se)	Indirect effect 1 Message → Reactance → Attitude β [CI]	Indirect effect 2 Message → Reactance → Attitude → BI β [CI]
Inoculation base	.134 (.106)	.057 [.028, 6.072]	.039 [.001, .225]
+Autonomy Support	.168 (.008)	.072 [.199, 5.373]	.049 [.007, .194]
+Explicit Details	.233 (.059)**	.099 [.564, 4.547]	.067 [.020, .163]
+Combined	.287 (.052)**	.122 [.650, 4.335]	.083 [.023, .157]

Notes. Path coefficients are standardized, CI from 5000 bootstrap replication.
The no response condition was used as the referent.
*$p < .05$.**$p < .01$.***$p < .001$.