Enhancing Inoculation: Examining the Relationships among Attack Certainty, Threat and Resistance

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Abstract This investigation explored the potential for enhancing the potency of inoculation’s strategy by examining the relationships among the certainty of the attack, threat, and resistance. Using different moderately involving issues for each, three experimental studies were conducted involving a total of 275 participants. In contrast with some previous findings, the combined results of the investigation suggest a positive and more linear relationship among these variables. As argued in the investigation, increasing the certainty in the occurrence of the attack seems to increase attitudinal threat and resistance; yet the best method to manipulate attack certainty remains in need of further exploration.

Keywords Resistance, Inoculation, Certainty of Attack, Threat, Attitude Change

1. Introduction
Inoculation theory has intrigued resistance scholars for over five decades. Its effectiveness has been demonstrated in a number of different contexts including interpersonal [e.g., 1], advertising [e.g., 2,3], political [e.g., 4], health [e.g., 5], cultural [e.g., 6], instructional [e.g., 7], and corporate/public relations [e.g., 8]. In line with Insko’s[9] intuition, much of the inoculation scholarship focus has shifted away from the traditional mechanisms of the theory—threat and counterarguing—in an attempt to uncover additional mechanisms responsible for inoculation’s success in the process of resistance [10]. Yet, Pfau [11] considered this shift to be rather premature and urged returning to the “construct’s core assumptions, refining and extending them and then testing the reformulated logic in laboratory studies” [11, p. 151-152].

More recent research has heeded Pfau’s[11] call as threat has become once again a focal point of interest for inoculation scholars [e.g., 10,12,13]. Threat is arguably the most important mechanism of the theory [14]. Compton and Pfau offer that, “inoculation is impossible without threat” [14, p. 100-101]. Despite the importance of threat to inoculation theory’s functioning, threat is the component that has received the least scholarly attention [15]. Compton posits that:

One might think that, because threat serves as a requisite for inoculation, we would have a nuanced understanding of what threat is, how threat functions, and how threat plays into the process of resistance to influence. But even as we have more nuanced understanding of how inoculation confers resistance…we know comparatively little about threat [15, p. 6].

One of the major remaining questions about the role of threat in inoculation theory is how to generate higher threat levels [10, 14]. Research has explored possible ways to boost threat levels including: language intensity of the inoculation message [16], the integration of reactance messages into the inoculation message [10], and a greater level of individual issue involvement and personal significance [13,17]. This body of work has provided some advancement, but also produced some ambiguity. More specifically, to increase threat, some studies have focused on manipulating the certainty of encountering counterattitudinal attacks ([13,16]. Yet, not only have these studies produced mixed results; but more importantly, some of the conclusions regarding the relationships among certainty, threat, and resistance have been inferred from, rather than confirmed with, the results [e.g., 16]. This has prompted Compton and Pfau to suggest that “[F]uture studies should examine varying certainty of an attitude attack, its relation to threat, and the ultimate effect on resistance” [16, p. 126].

The current investigation answers Compton and Pfau’s[14] call as it more carefully and systematically examines the relationships among these three variables—certainty of attack, threat, and resistance using three separate studies.

2. Study One
The first study focuses specifically on the relationship
between threat and attack certainty. Pfau et al.[13] attempted to boost the personal significance of the threat by increasing, among other things, the certainty of encountering counterattitudinal challenges. While their attempts were largely unsuccessful, the threat-enhanced inoculation messages did generate greater levels of attitudinal certainty. However, two important shortcomings of this study are important to mention in regard to the threat-attack certainty relationship. First, the manipulation of attack certainty was confounded with the manipulation of additional variables such as severity, salience, and immediacy; hence, the precise effects of attack certainty remain unknown. In addition, the attack certainty-boosted inoculation message did not generate significant boost in threat. Once again, this could possibly be a result of the confounding effect aforementioned or it may be an indication of lack of relationship between attack certainty and threat.

Burgoon and colleagues[16] conducted a more successful study linking certainty of attack to threat. The authors proposed that a person’s knowledge of certainty of impending persuasive attack impacts the inoculation process. More specifically, they suggested:

If it is certain that an attack will not occur, there should be no threat to existing attitudes, and people should not be motivated to prepare adequate defenses. Moreover, when an attack is certain, people can simply resign themselves to the fact that they will hear their positions attacked and will therefore not be optimally motivated to prepare defenses…However, when people are told that they may or may not have their attitude assailed, it will be uncertainty-producing and motivate them to prepare defenses. [16, p. 124]

The above proposition seems to render attack certainty as a boundary condition of threat, and consequently, inoculation theory in the same way as issue involvement [see 17,18]. If high and low levels of attack certainty fail to generate threat and defense motivation, then the effectiveness of inoculation under these conditions is limited. Consequently, Burgoon et al.[16] suggested that attack uncertainty (i.e., 50-50 chance of occurrence) provides the greatest level of attitudinal threat and motivation to resist. Their expectations were confirmed as individuals who were told that a counterattitudinal attack was uncertain (i.e., 50-50 chance) displayed greatest level of resistance. However, consistent with the early inoculation studies [19-21], threat was never assessed; but instead, inferred from the level of resistance displayed by inoculation-treated individuals. In fact, threat remained a primitive term in the inoculation literature until the late 1980s [22]. Hence, the true relationship between attack certainty and threat was not established in the study.

A second issue deals with the assumption that individuals who are told that an attack is imminent would simply resign themselves to the attack and become unmotivated to prepare defenses for the impending challenge. This proposition should be bound by the level of issue involvement [17]. If the level of involvement with the issue is low, then the above proposition would be in accordance with inoculation theory as the authors claim and consistent with the suggestions by Pfau and colleagues. More specifically, if the level of issue involvement is low, then the certainty of an attack may render individuals less motivated to engage in defense-building effort, given the lack of issue importance. The Burgoon et al.[16] study design and issue used may suggest such a possibility. Burgoon and colleagues protected the newly created attitude toward a publisher-provided free supplemental textbook that was not supposed to increase the overall course workload. The attack was presented as coming from a second publisher offering an alternative supplemental textbook under the same conditions. Given that the two textbooks seemed to be equivalent, free, and non-additive to course load, it would be conceivable to reason that the level of motivation to protect one of the choices over the other was not high. As such, one cannot “expect an uninvolved decision maker to care enough to generate a significant number of cognitive thoughts” [23, p. 361], inoculation’s formidable defensive tool. Involvement, however, was not controlled for or captured in the Burgoon et al.[16] study.

Contrary to Burgoon and colleagues’[16] conclusions that the findings of their study are consistent with the theory, the contention made in the current investigation is that the Burgoon et al. findings are inconsistent with the theoretical expectations of inoculation in situations of elevated issue involvement, the condition under which inoculation may be most effective [17,18,24]. Under conditions of elevated issue involvement, individuals should be motivated to protect attitudes due to their greater personal relevance. Under such conditions, “people acknowledge the vulnerability of their choices…and thus act to bolster them” [23, p. 361; also see 25] by generating more counterarguing [26]. So, the notion that individuals would simply resign to the fact that the attitudes will be assailed and consequently, as a result, fail to mount defenses to protect the threatened attitude ignores the notion that the attitudes are of some personal import. As such, individuals should be even more likely to prepare defenses to preserve the threatened attitudes if they know with certainty that the attitudes will be attacked.

Pfau and colleagues[17] found inoculation to be less effective with highly, compared to moderately, involving issues precisely because highly involving issue generate high rate of personal importance that may place a ceiling effect on inoculation-generated resistance. Stated differently, highly motivated individuals, Pfau et al. argued, are likely to have already shored up their attitudinal defenses inspired by personal importance of the issue; thus the opportunity for inoculation to contribute to resistance is smaller compared to moderately involving issues. On the other hand, moderately involving issues should both generate necessary personal relevance that should prevent individuals from simply resigning to the dangers of a certain attack as well as create the most conducive environment for inoculation’s success.
Consequently, this investigation departs from the proposition advanced by Burgoon and colleagues[16] regarding the relationship between attack certainty and threat (i.e., an inverted U shape curve) and instead proposes the following more linear relationship between these two variables when the level of involvement with the issue is elevated in general and moderate in particular:

**H1:** When initial issue involvement is moderate, inoculation treatments will generate the (a) greatest level of threat when the attack on the attitude in place is virtually certain to occur. Inoculation treatments will generate the (b) smallest level of threat when the attack on the attitude in place is virtually certain to not occur. Inoculation treatments that are uncertain to occur (i.e., 50-50 chance) will generate (c) threat levels that fall in the middle of, and are statistically different from, the above two extremes.

### 3. Study One Method

#### 3.1. Issue Selection

The issue used in this study—whether the U.S. should completely legalize the sale and use of marijuana—has been featured with success in a number of inoculation studies [12,17,27-29]. The issue is appropriate for the current study as it meets two important criteria necessary for inoculation: (1) opinions on the issue that are firmly in place at the time of inoculation, and (2) a division of opinions in support and opposition of the issue [29]. In addition, a test of topic involvement conducted by Pfau and colleagues [17] on multiple issues showed the participant involvement with the current topic to be moderate.

#### 3.2. Participants and Procedure

Students, N = 101 (71 female, 30 male, Mage = 20.93 years, age range: 19-31), enrolled in strategic communication courses at a large Southeastern university served as participants in this investigation in exchange for course credit. Participants were selected with IRB approval via email and recruitment flyers. All of the recruitment materials included a URL address indicating the location of the study’s questionnaire.

Data collection required a single phase. In the questionnaire, participants were initially instructed to provide demographic information. Subsequently, they were asked to provide their initial attitudes toward, and involvement with, the issue before being presented with a two item question asking them to indicate their overall position on the issue (i.e., for or against legalizing the sale and use of marijuana). Based on initial attitude position, 54.5% of respondents were placed in the condition favoring the issue, and 45.5% were placed in the condition opposing the issue. All individuals then received inoculation messages; however, following Burgoon and colleagues[16] design, one third of the individuals received a message ending suggesting a counterattitudinal attack was very likely and almost certain to be forthcoming. One third was told that an attack was very unlikely and almost certain not to occur. The final third was told that the chance of facing a counterattitudinal attack was about 50 percent. Finally, threat levels were assessed for all participants prior to their dismissal.

#### 3.3. Experimental Materials

This study relied on messages designed and used with success in previous inoculation studies [e.g., 10,30]. Depending on the initial position on the issue (i.e., the attitude toward the issue), participants were presented with a position (i.e., attitude) consistent inoculation massage that either favored or opposed the issue of legalizing the sale and use of marijuana.

Consistent with previous inoculations studies [e.g., 2], in an effort to generate threat, the first paragraph of each inoculation message provided an explicit forewarning of an impending challenge to the present attitude. The subsequent two paragraphs presented the refutation preemption component of the inoculation message operationalized by raising and refuting two distinctive counterattitudinal challenges. The final paragraph of each inoculation message indicated the likelihood, or certainty, of encountering the attack. One third of participants were told that an attack was very likely and almost certain to occur; another third was told that the attack was very likely or almost certain not to occur; and one third was told that the likelihood of encountering an attack was about 50 percent.

Becker, Bavelas, and Braden’s[31] Index of Contingency was used to ensure readability equivalence across messages. The index showed relative equivalence across inoculation messages, 13.8 to 14.2 (302 to 303 words).

#### 3.4. Dependent, Covariate, and Manipulation Check Variables

**3.4.1. Threat**

Threat to the established attitudinal position was assessed using a standard, 6-item, 7-point (1-7) scale [e.g, 12], which included the following bipolar adjectives: nonthreatening/threatening, not harmful/harmful, not dangerous/dangerous, not risky/risky, calm/anxious, and not scary/scary. These items demonstrated excellent internal consistency, α = .93.

**3.4.2. Initial Attitude**

To control for a potential impact of the initial attitude on the effectiveness of inoculation [e.g, 2], a 7-item (1-15) semantic differential scale was used anchored by the following bipolar adjective pairs: negative/positive, bad/good, dislike/like, desirable/undesirable, unfavorable/favorable, unacceptable/acceptable, and wrong/right. This
measure demonstrated excellent internal consistency, \( \alpha = .97 \). must be created at a minimum resolution of 300 dpi to avoid bad printing quality. For fuzzy or jagged figures, authors are required to replace it or send the original figure file to us for reproduction.

3.4.3. Initial Issue Involvement

In addition, to control for the impact of individual involvement with the issue on the effect of the inoculation messages [e.g., 2], Zaichkowsky’s [32] PII scale was used in its abbreviated version [33]. The 7-item (1-15) scale included the following bipolar adjectives: unimportant/important, irrelevant/relevant, on-essential/essential, of no concern/of concern to me, does not matter/matters to me, useless/useful, and trivial/fundamental. This scale also demonstrated excellent internal consistency, \( \alpha = .97 \).

4. Study One Results

4.1. Manipulation Check

The focus of this study was to specifically use an issue that is of moderate involvement. As the study of Pfau and colleagues [17]) has indicated, the issue of legalizing the sale and use of marijuana represents a moderately involving issue. This finding received support in the present study as well (M = 7.39, 1-15 scale).

4.2. Main Analyses

A univariate ANOVA test was conducted with the certainty of attack (very likely or almost certain not to occur / chance of occurrence about 50-50 / very likely or almost certain to occur) serving as a predictor variable and threat as an outcome variable. The initial attitude toward the issue and the involvement level with the issue served as covariates in the analysis. No statistically significant impact at the \( \alpha = .05 \) was discovered for the covariates [attitude toward the issue: \( F(1, 96) = .17, p = .68 \); involvement with the issue: \( F(1, 96) = 3.18, p = .08 \)] on the dependent variable. In addition no main effects was discovered for certainty of attack, \( F(2, 96) = 2.01, p = .14 \).

However, even though the univariate result for the main effect was not significant, conducting planned mean comparisons is justified as long as the simple effects are theoretically predicted [34]. Consequently, Dunn’s planned comparisons [e.g., 35] were conducted showing no significant differences on threat between the high uncertainty of attack group (50:50 condition; M = 3.03; SE = .27; n = 32) and the group led to believe there is high certainty an attack will not occur (M = 2.79; SE = .23; n = 39), \( F(1, 69) = .46, p = .50 \). In addition, the high uncertainty of attack group (50:50 condition) did not significantly differ on threat from the group led to believe that there is high certainty that an attack will occur, (M = 3.50; SE = .27; n = 30), \( F(1, 60) = 1.65, p = .20 \). Finally, as predicted, significant differences were discovered between the two high certainty groups as participants told they were very likely and almost certain to face an issue attack reported greater levels of threat compared to the participants informed that such an attack was very unlikely and almost certain not to occur, \( F(1, 67) = 4.06, p < .05, \eta^2 = .03 \). Consequently, although all of the means were in the predicted direction, differences were discovered only between the two extreme conditions; thus the hypothesis received partial support.

5. Study One Discussion

Overall, the pattern of means and the partial hypothesis support seem to suggest that the certainty of the attack does have an impact on the level of perceived threat as suggested by Burgoon and colleagues [16]. However, as proposed in this investigation and consistent with inoculation’s theorizing [e.g., 23], the relationship seems to be more linear than curvilinear [16], at least when the experimental issue is moderately involving. Hence, individuals who are led to believe that the attack is imminent are likely to experience higher levels of threat, given the virtual certainty of occurrence. Consequently, the findings of the first study augment the Burgoon and colleagues proposed relationship between threat and attack certainty in situations of moderate issue involvement.

Yet, study one was limited to examining the relationship between threat and attack certainty and did not assess the level of attitudinal resistance. As such, the relationship between the attack certainty and resistance reported by Burgoon and colleagues [16] remained unexamined in the first study. Could this relationship still persist as proposed by Burgoon et al. even under conditions of moderate issue involvement? Even more importantly, is the attack certainty-elicited level of threat predictive of the level of resistance?

6. Study Two

Study two was conducted to answer the remaining study one questions and to more closely examine the relationship among attack certainty, threat, and attitudinal resistance. In addition, study two used a different moderately involving issue (i.e. the government should restrict violent content on TV) in order to examine whether the results from study one were spurious or issue specific. To examine the replicability of study one results, the hypothesis from the first study was repeated in study two.

H1: When initial issue involvement is moderate, inoculation treatments will generate the (a) greatest level of threat when the attack on the attitude in place is virtually certain to occur. Inoculation treatments will generate the (b) smallest level of threat when the attack on the attitude in place is virtually certain to not occur. Inoculation treatments...
that are uncertain to occur (i.e., 50-50 chance) will generate (c) threat levels that fall in the middle of, and are statistically different from, the above two extremes.

The next question pertains to the relationship between attack certainty and resistance (i.e., attitude change). According to inoculation theory [see 14]) and research [e.g., 27], it could be expected for this relationship to be influenced by the level of elicited threat. According to the extent inoculation literature [14, 27, 36], an increase in message-elicited threat should result in greater resistance (i.e., less attitude change). Consequently, the following hypothesis is advanced:

**H2:** Increase in threat will be positively associated with increase in resistance (i.e., less negative attitude change).

If the threat-resistance relationship is indeed positive (i.e., more threat leads to greater resistance) as prescribed by inoculation theory and research, then, as argued in study one, it could be expected the level of attack certainty to have (i.e., at least in part via threat) a similar effect on resistance as it has on threat, at least with moderately involving issues. Hence, the following hypothesis is proposed:

**H3:** When initial issue involvement is moderate, inoculation treatments will generate the (a) greatest level of resistance when the attack on the attitude in place is virtually certain to occur. Inoculation treatments will generate the (b) smallest level of resistance when the attack on the attitude in place is virtually certain to not occur. Inoculation treatments that are uncertain to occur (i.e., 50-50 chance) will generate (c) resistance levels that fall in the middle of, and are statistically different from, the above two extremes.

### 7. Study Two Method

**7.1. Issue Selection**

The issue used in study two—whether the government should restrict violent content on TV—has also been featured with success in a number of inoculation studies [27,28,30] and meets the criteria necessary for studying inoculation (see study one for criteria).

**7.2. Participants and Procedure**

Using the same method from study one, students, N = 96 (72 female, 24 male, Mage = 20.93 years, age range: 19-31), enrolled in strategic communication courses at a large Southeastern university served once again as participants in this two-phase investigation.

The first phase was identical to that of study one as participants were initially asked to provide information regarding their demographics and initial attitudes toward, and involvement with, the issue. Afterward, they were presented with a two-item question asking them to indicate their overall position on the issue (i.e., for or against government restriction of violent content on TV). Based on initial attitude position, 40.5% of respondents were placed in the condition favoring the issue, and 59.5% were placed in the condition opposing the issue. All participants subsequently received an attitudinally consistent inoculation message, which ending was varied as one third of the individuals received a message ending suggesting a counterattitudinal attack was very likely and almost certain to be forthcoming. One third was told that an attack was very unlikely and almost certain not to occur. The final third was told that the chance of facing a counterattitudinal attack was about 50 percent. At the conclusion of the first phase, threat levels were assessed for all participants.

The second phase commenced after a two week delay and presented the returning participants with counter-positional (i.e., counterattitudinal) attack messages. After the presentation of the attack, participants’ final attitudes were assessed prior to dismissal.

**7.3. Experimental Materials**

Study two also relied on proven (both inoculation and attack) messages designed and used with success in previous inoculation studies [e.g., 10,30]. The standard inoculation format included a forewarning message component alluding to the vulnerability of the held attitude. The forewarning was followed by weakened counter-positional (counterattitudinal) arguments subsequently refuted. As with study one, the final paragraph of each inoculation message indicated the likelihood, or certainty, of encountering the attack. Once more, a third of participants were told that an attack was very likely and almost certain to occur; another third was told that the attack was very likely or almost certain not to occur; and one third was told that the likelihood of encountering an attack was about 50 percent. Becker, Bavelas, and Braden’s[31] Index of Contingency once again showed relative equivalence across inoculation messages (for and against the issue), 13.0 to 14.1 (both 303 words).

The attack messages, used in previous studies [e.g., 10,30], challenged the held position on the attitude. Two types of attack messages were used to correspond to the valance of the attitude held (for and against the issue). The Becker, Bavelas, and Braden’s[31] Index of Contingency showed equivalence between the two attack messages; index value of 13.9 for both (both 404 words).

**7.4. Dependent, Covariate, and Manipulation Check Variables**

Threat (α = .94), initial involvement (α = .96), initial attitudes (α = .97), and final attitudes (same scale as initial attitude - α = .98) were assessed using the same scales introduced in the first study. All of the scales once again showed excellent reliability levels.

### 8. Study Two Results
8.1. Manipulation Check

To ensure that the results reached in the first study are not issue-specific, study two relied on a different moderately involving issue used with success in previous studies (e.g., 10, 30). A manipulation check seems to indicate that the issue of government imposed restriction on violent TV content is indeed moderately involving (M = 7.45, 1-15 scale). The involvement levels of the two issues (study one – legalization of marijuana and study two – government restriction of violent TV content) were statistically undifferentiated, t(229) = .14, p = .91.

8.2. Main Analyses

A MANCOVA test was conducted with the certainty of attack (very likely or almost certain not to occur / chance of occurrence about 50-50 / very likely or almost certain to occur) once again serving as a predictor variable. Threat and attitude change (i.e. the difference between final Phase 2 and initial Phase 1 attitudes) served as outcome variables. The involvement level with the issue served as covariate in the analysis and the omnibus results indicated a significant impact of involvement, F(2, 91) = 5.70, p < .01, partial η2 = .11. The univariate results indicated involvement to have a significant impact on both threat, F(1, 95) = 7.41, p < .01, η2 = .07, and attitude change, F(2, 95) = 4.30, p < .05, η2 = .04. The omnibus test showed no significant effects for certainty of attack, F(4, 184) = 1.72, p = .15. Once again, even though the univariate results for the main effects were not significant, conducting planned mean comparisons on the dependent variables is justified as long as the simple effects are theoretically predicted [34; see 10]. Dunn’s planned comparisons [e.g., 35] were conducted for both dependent variables, threat and attitude change.

Planned comparisons showed no significant difference between the uncertainty conditions for both threat (50:50 condition; M = 2.79; SE = .21; n = 33) and attitude change (50:50 condition; M = .37; SE = .59; n = 33) compared to either certainty conditions; that is whether compared to the group led to believe there is high certainty an attack will occur, threat – (M = 3.17; SE = .22; n = 29), F(1, 60) = 1.54, p = .22 and attitude change – (M = .95; SE = .62; n = 29), F(1, 60) = .46, p = .50, or the group led to believe that there is high certainty that an attack will not occur, threat – (M = 2.45; SE = .21; n = 34), F(1, 65) = 1.34, p = .25 and attitude change – (M = .06; SE = .58; n = 34), F(1, 65) = .28, p = .60. Finally, significant differences were discovered in the hypothesized direction for threat, F(1, 61) = 5.53, p < .05, η2 = .05, but not attitude change, F(1, 61) = 1.42, p = .24, between the two high certainty groups. Although all of the means for both dependent variables, threat and attitude change, were in the predicted direction, the only significant differences were those discovered between the two extreme conditions and only for threat. Thus, the first hypothesis received partial support, while the third hypothesis was not supported.

The second hypothesis posited that increase in the level of perceived threat will be positively associated with increased resistance (i.e., less attitude change). A regression analysis supported this hypothesis, F(1, 94) = 41.74, p < .01, standardized b = .56, SE = .23, adjusted R2 = .30.

9. Study Two Discussion

The results of the second study provide further support for those of the first one with a new issue topic. Once again all of the mean patterns were in the predicted direction, although only the mean difference between the two attack certainty conditions (i.e., attack is very likely or almost certain not to occur vs. attack is very unlikely or almost certain to occur) for threat was statistically significant. In addition, as established in previous inoculation studies [e.g., 27], threat was a significant predictor of attitudinal resistance. Thus, the second study further establishes the link between threat and resistance, but also provides some evidence that the certainty of the attack manipulated in the inoculation message may have an influence on the level of generated threat, which in turn does impact resistance. Although, differences were not established directly between attack certainty and resistance (i.e., attitude change), the pattern of means suggests that certainty may have an impact on resistance as well. In addition, the patterns of mean for both threat and attitude change, consistent with study one, suggest a more linear relationship between certainty, threat and resistance, which is consistent with our predictions but diverges from the findings of Burgoon and colleagues[16].

As previously argued, the divergent findings could be tied to the level of issue involvement. We made the argument that the level of involvement with the issue in the Burgoon et al.[16] study was likely low compared to the issues in both of our studies which were moderately involving. We argued that when the issue importance is elevated, then the relationship between attack certainty, threat, and resistance (i.e., attitude change) is more likely to be linear than curvilinear as proposed by Burgoon and colleagues. Thus far, we have provided some support to indicate the presence of a more linear relationship with moderate issues. Yet, what has not been established in the Burgoon et al. study, as well as the first two studies in this investigation, is whether the certainty manipulation was indeed successful. We can only speculate or infer from the rest of the variables in the studies that, for example, the high certainty attack did indeed generate greater uncertainty compared to the rest of the conditions. Yet, this assumption remains unconfirmed and in need of empirical support.

10. Study Three

Study three was performed to further explicate the relationship among the three key variables of this investigation, i.e. attack certainty, threat, and attitudinal resistance. In addition, the third study was conducted in
order to investigate whether the experimental manipulation of certainty was indeed successful as well as to confirm the results of the first two studies with a new moderately involving issue (i.e., banning the manufacture, sale and possession of handguns throughout the U.S.). Consequently, in order to further examine the proposed relationships in the initial two studies, all of the hypotheses from the first two studies were repeated in study three.

**H1:** When initial issue involvement is moderate, inoculation treatments will generate the (a) greatest level of threat when the attack on the attitude in place is virtually certain to occur. Inoculation treatments will generate the (b) smallest level of threat when the attack on the attitude in place is virtually certain to not occur. Inoculation treatments that are uncertain to occur (i.e., 50-50 chance) will generate (c) threat levels that fall in the middle of, and are statistically different from, the above two extremes.

**H2:** Increase in threat will be positively associated with increase in resistance (i.e., less negative attitude change).

**H3:** When initial issue involvement is moderate, inoculation treatments will generate the (a) greatest level of resistance when the attack on the attitude in place is virtually certain to occur. Inoculation treatments will generate the (b) smallest level of resistance when the attack on the attitude in place is virtually certain to not occur. Inoculation treatments that are uncertain to occur (i.e., 50-50 chance) will generate (c) resistance levels that fall in the middle of, and are statistically different from, the above two extremes.

Besides investigating the replicability of the first two studies’ results, the purpose of study three was to examine whether the current experimental manipulation borrowed from Burgoon and colleagues [16] was indeed successful. Stated differently, the assumption made in the Burgoon et al. study, as well as in the first two studies of the current investigation, is that the inoculation conditions generated the desired level of certainty in the occurrence of the attack. To test this assumption, the following hypothesis is advanced:

**H4:** When initial issue involvement is moderate, inoculation treatments will generate the (a) highest level of certainty (i.e., perceived likelihood) in the occurrence of the attack when the inoculation message specifies that an attack on the attitude in place is virtually certain to occur. Inoculation treatments will generate the (b) lowest level of certainty (i.e., perceived likelihood) in the occurrence of the attack when the inoculation message specifies that an attack on the attitude in place is virtually certain to not occur. Inoculation treatments that specify that an attack is uncertain to occur (i.e., 50-50 chance) will generate (c) certainty levels (i.e., perceived likelihood) regarding the occurrence of an attack that fall in the middle of, and are statistically different from, the above two extremes.

Consistent with the above hypotheses, should the experimental manipulation be effective in generating the desired level of perceived certainty in the occurrence of the attack, the certainty (i.e., perceived likelihood) in the occurrence of the attack should be positively related with the level of generated threat and ultimately resistance [see 16]. Thus, the final two hypotheses are advanced:

**H5:** Increase in the certainty (i.e., perceived likelihood) of the occurrence of the attack will be positively associated with increase in threat.

**H6:** Increase in the certainty (i.e., perceived likelihood) of the occurrence of the attack will be positively associated with increase in resistance (i.e., less negative attitude change).

### 11. Study Three Method

#### 11.1. Issue Selection

As with the first two issues, the issue used in the third study—whether the government should ban the manufacture, sale, and possession of handguns throughout the U.S.—has also been featured with success in a number of inoculation studies [17,27] and meets the criteria necessary for studying inoculation (see study one for criteria).

#### 11.2. Participants and Procedure

Once again, the study one method and location was repeated using students, N = 78 (60 female, 18 male, Mage = 19.85 years, age range: 18-25), as participants in this two-phase investigation.

The first phase of the current study was nearly identical to that of study one as participants were initially asked to provide information regarding their demographics and initial attitudes toward, and involvement with, the issue. Next, they were presented with a two-item question asking them to indicate their overall position on the issue (i.e., for or against government banning the manufacture, sale, and possession of handguns throughout the U.S.). Based on initial attitude position, 30.8% of respondents were placed in the condition favoring the issue, and 69.2% were placed in the condition opposing the issue. Once again, all participants subsequently received an attitudinally consistent inoculation message, which ending was varied as one third of the individuals received a message ending suggesting a counterattitudinal attack was very likely and almost certain to occur. One third was told that an attack was very unlikely and almost certain not to occur. The final third was told that the chance of facing a counterattitudinal attack was equivocal or about 50 percent.

At the conclusion of the first phase, the levels of perceived certainty (i.e., perceived likelihood) in the occurrence of an attack and threat were assessed for all participants.

Study three’s second phase was identical to that of study two and commenced after a two week delay by presenting the returning participants with counter-positional (i.e., counterattitudinal) attack messages. After the presentation of the attack, participants’ final attitudes were once again assessed prior to dismissal.

#### 11.3. Experimental Materials

As with the previous two studies, study three also relied on
proven (both inoculation and attack) messages designed and successfully used in previous inoculation studies [e.g., 10,17]. The format of the inoculation message included an explicit forewarning indicating vulnerability of the present attitude followed by a sample of weakened arguments subsequently refuted. Consistent with the first two studies, the final paragraph of each inoculation message indicated the likelihood, or certainty, of encountering the attack. To remind, a third of participants were told that an attack was very likely and almost certain to not occur; another third was told that the attack was very likely or almost certain to occur; and one third was told that the likelihood of encountering an attack was equivocal, i.e. 50-50. Becker, Bavelas, and Braden’s[31] Index of Contingency indicated relative equivalence across inoculation messages (for and against the issue), 13.8 to 14.4 (301 to 303 words).

As with the first two studies, the attack messages were adopted from previous successful studies [e.g., 10,17] and challenged the held position on the attitude. Two types of attack messages were used to correspond to the valance of the attitude held (for and against the issue). The Becker, Bavelas, and Braden’s[31] Index of Contingency showed equivalence between the two attack messages; 14.2 to 14.8 (401 to 404 words).

11.4. Dependent, Covariate, and Manipulation Check Variables

Once more, threat (α = .94), initial involvement (α = .96), initial attitudes (α = .97), and final attitudes (same scale as initial attitude - α = .98) were assessed using the same scales introduced in the first two study. All of the scales once again showed excellent reliability levels.

The perceived certainty (i.e., perceived likelihood) in the occurrence of the attack was assessed using a newly developed five-item, seven-point scale, which asked participant to indicate the likelihood of facing arguments contrary to their position on the issue of banning the manufacture, sale, and possession of handguns throughout the U.S. The semantic differential scale was bound by the following bi-polar adjectives: unlikely/likely, predictable/unpredictable, and decided/undecided (α = .94). An Exploratory Factor Analysis using Maximum Likelihood conducted on the dataset using Promax method of rotation with Kaiser Normalization cleanly loaded all five items on a single factor (Eigenvalue = 4.00) explaining significant portion of the variance (75.25%). Consequently, no adjustments to the scale items were necessary.¹

12. Study Three Results

12.1. Manipulation Check

To extend the contextual applicability of this investigation, study three used an issue different from those used in the first two studies. The issue of government banning the manufacture, sale and possession of handguns throughout the U.S, which has been used with success in previous studies [e.g., 10,17], has traditionally been identified as a highly, rather than moderately, involving issue [see 17]. However, a manipulation check conducted on the current dataset seems to indicate that this issue is, instead, moderately involving with this study’s participants (M = 7.92, 1-15 scale). In fact, the involvement levels of all three issues used in this investigation (study one – legalization of marijuana, study two – government restriction of violent TV content, study three – government ban on manufacture, sale, and possession of handguns) were statistically undifferentiated, F(2, 273) = .89, p = .41.

12.2. Main Analyses

A MANCOVA test was conducted with the certainty of attack (very likely or almost certain not to occur / chance of occurrence about 50-50 / very likely or almost certain to occur) once more serving as a predictor variable. Certainty (i.e., perceived likelihood) in the occurrence of the attack, threat and attitude change (i.e. the difference between final Phase 2 and initial Phase 1 attitudes) served as outcome variables. The involvement level with the issue once again served as covariate in the analysis; however the omnibus results did not indicated a significant impact of involvement on the dependent variables, F(2, 72) = .51, p = .68.

The omnibus test once again showed no significant effects for certainty of attack, F(6, 146) = 1.25, p = .28. Still, even though the univariate results for the main effects were not significant, conducting planned mean comparisons on the dependent variables is justified as long as the simple effects are theoretically predicted [34; see 10]. Dunn’s planned comparisons [e.g., 35] were conducted for all three dependent variables, i.e. threat, attitude change, and certainty (i.e., perceived likelihood) in occurrence of the attack.

Planned comparisons once more showed no significant difference between the uncertainty conditions for threat (50:50 condition; M = 3.43; SE = .27; n = 27), attitude change (50:50 condition; M = -1.17; SE = .55; n = 27), and certainty in occurrence of the attack (50:50 condition; M = 4.03; SE = .27; n = 27) compared to either certainty conditions; that is whether compared to the group led to believe there is high certainty an attack will not occur, threat – (M = 3.02; SE = .28; n = 26), F(1, 51) = 1.14, p = .29, attitude change – (M = -1.02; SE = .56; n = 26), F(1, 51) = .04, p = .84, and certainty (i.e., perceived likelihood) in occurrence of the attack – (M = 3.87; SE = .28; n = 26), F(1, 51) = .17, p = .68, or the group led to believe that there is high certainty that an attack will occur, threat – (M = 3.88; SE = .28; n = 25), F(1, 50) = 1.35, p = .25, attitude change – (M = - .41; SE = .58; n = 25), F(1, 50) = .97, p = .34, and certainty (i.e., perceived likelihood) in occurrence of the attack – (M = 4.46; SE = .29; n = 25), F(1, 50) = 2.52, p = .12.

Finally, once again significant differences were discovered in the hypothesized direction for threat, F(1, 49) = 4.92, p
<.05, η² = .06, but not attitude change, F(1, 49) = .60, p = .44, between the two high certainty groups. The difference between the two high certainty conditions regarding the participant perceived certainty (i.e., perceived likelihood) in the occurrence of the attack, F(1, 49) = 3.91, p = .05, η² = .05, approached significance. Although, with a single exception, the means of all dependent variables were in the hypothesized direction, only one difference between the high certainty conditions was significant (for threat) and one approached significance (for certainty in the occurrence of the attack). Consequently hypothesis one received a partial support, while hypotheses three and four were not supported.

As in study two, the second hypothesis posited that increase in the level of perceived threat will be positively associated with increased resistance (i.e., less attitude change). A regression analysis provided once again support for this hypothesis, F(1, 76) = 10.69, p < .01, standardized b = .35, SE = .21, adjusted R² = .11. In addition, hypotheses five and six were also supported as increase in the certainty (i.e., perceived likelihood) of the occurrence of the attack was also positively associated with increase in threat, F(1, 76) = 7.71, p < .01, standardized b = .30, SE = .11, adjusted R² = .08, and resistance (i.e., less attitude change), F(1, 76) = 12.34, p < .01, standardized b = .37, SE = .21, adjusted R² = .13.

In addition, a follow up hierarchical regression analysis was conducted to further test the relationships among the three regression variables. The occurrence of the attack entered the analysis in the first block and threat entered in the second block. Attitude change served as the dependent variable in the analysis. The first two variables were entered using separate blocks to account for the theoretically predicted influence of the certainty (i.e., perceived likelihood) in the occurrence of the attack on threat. The proposed model was statistically significant, F(2, 75) = 9.49, p < .01, adjusted R² = .18. As expected, both variables, the certainty (i.e., perceived likelihood) in the occurrence of the attack (t = 2.72, p < .01, standardized b = 29) and threat (t = 2.42, p < .05, standardized b = .26), were significant predictors of resistance (i.e., attitude change).

13. Study Three Discussion

Study three attempted to further explicate the relationship between attack certainty, threat, and resistance (i.e., attitude change). In addition, it restated the hypotheses generated in the initial two studies with a new issue and examined the attack certainty manipulation effectiveness of the Burgoon et al.[16] proposed experimental method. The combination of regression analyses provided support for the argument of a more linear relationship among attack certainty, threat, and resistance. Both studies two and three confirmed the presence of a positive relationship between threat and resistance, a finding that is consistent with inoculation theory [see 14] and research [e.g., 27]. In addition, study three provided evidence of a positive linear relationship between attack certainty and both threat and resistance. An increase in the certainty (i.e., likelihood) that an attack will occur seems to increase the level of threat, which ultimately boosts resistance. Both, threat and attack certainty, were significant predictors of resistance. Hence, boosting the level of attack certainty seems to suggest a more pronounced desired effect on threat and resistance.

The findings from the tests of association (i.e., regression) received cautious support from the differences tests (i.e., MANCOVA) conducted. Although a number of the difference tests were statistically insignificant, with a single exception, all of the means were in the predicted direction, thus supporting the argument that increase in certainty (i.e., perceived likelihood) that an attack will occur will generate increase in threat and resistance. The differences were most pronounced in the two certainty conditions (i.e., the certainty that an attack will occur and the certainty that an attack will
not occur) where all of the significant and nearly significant results were discovered.

The lack of clear evidence in the tests of differences may stem from the effectiveness of the manipulation, which produced findings just short of significance. More specifically, the replication of the Burgoon et al.[16] attack certainty experimental manipulation produced participant perceived level of attack certainty (i.e., perceived likelihood in the occurrence of the attack) that was just short of statistical significance in the two attack certainty conditions. Hence, the somewhat weaker experimental manipulation may be responsible for some of the mean differences falling short of significance.2

Consequently, considering all of the findings from the three studies together, some tentative conclusions may be drawn. Increasing the participant’s perception of the certainty (i.e., likelihood) in the occurrence of the attack may be an effective method to boost both threat and resistance, which provides initial tentative answers regarding the relationship among these three variables, thus answering Compton and Pfau’s[14] call. Yet, the question that remains unanswered is how to effectively boost attack certainty, initially in experimental studies and then the field. The method used by Burgoon and colleagues[16] and replicated in all three studies of this investigation, although somewhat successful, did not appear to provide enough potency. Future inoculation studies should not only continue to examine the relationships among attack certainty, threat, and resistance; but, it should also attempt to uncover a more effective method to increase perceptions of attack certainty.

Notes

1. We met the requirement of sufficient sample size (e.g., 5-20 cases per parameter estimate; or 1-14 ratio – [37]; 76 cases divided by 5 parameter estimates is just over 15 cases per estimate. Because Maximum Likelihood extraction requires the measured variables to be normally distributed and without severe problems (i.e., |skew| > 2, kurtosis > 7) [38], we first examined the distributions of all 5 items and found the absolute skew values ranging between .12 and .29, and kurtosis ranging between -.09 and -.81. We used the Promax method of rotation with Kaiser Normalization because, according to Fabrigar and colleagues[38], an oblique rotation produces better estimation of the true factors and a more concise simple structure than orthogonal rotation.

2. An alternative, or an additional, explanation for the somewhat equivocal results of the tests of differences may be sought in the relatively small sample size in each of the studies. Combining the sample size of all three studies for threat (N = 275) and the last two studies for resistance (N = 174) did not alter the results of this investigation despite the significant boost in sample size.

REFERENCES


