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Hindsight Bias and Guilt

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HINDSIGHT BIAS AND GUILT

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By

Jessica F. Johnson

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HINDSIGHT BIAS AND GUILT

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ABSTRACT

This study is an examination of the relationship between hindsight bias and posttraumatic guilt. There is some evidence that guilt following a trauma is caused, at least in part, by the hindsight bias. However, the researchers behind this theory have not tested this theory utilizing the hypothetical experimental design for hindsight bias or tested their conception of hindsight bias in terms of foreseeability and inevitability. This study attempted to do just that. Participants were presented with a scenario about a friend in a car accident. Participants in the foresight group received no outcome. Participants in the hindsight groups were told the outcome of the scenario (the friend died) and were then divided into four different groups: Guilt, No Guilt, List, No List. After reading their respective outcomes, half of the hindsight participants were instructed to list two alternative outcomes to the scenario. Previous research has demonstrated that this exercise can reduce or eliminate the hindsight bias. Participants did not demonstrate the hindsight bias in this study, and no support for previous research was obtained. The foresight group regularly expressed more distress and guilt cognitions than the hindsight group. Comparing hindsight groups revealed that listing two alternative outcomes caused participants to judge the outcome as less inevitable but not less foreseeable. This study suggests that the link between hindsight bias and posttraumatic guilt may not be a simple causal relationship, as previous research has suggested.

KEYWORDS: hindsight bias, guilt, posttraumatic guilt, foreseeability, inevitability

This abstract is approved as to form and content

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Harry Hom, PhD
Chairperson, Advisory Committee
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INTRODUCTION

To many, hindsight bias feels like a familiar concept, because they can readily recall a situation when it has occurred. To be precise, it is the inclination to overestimate how much we used to know about a certain event, before we discovered the truth (Pezzo, 2011). It is sometimes called Monday morning quarterbacking (Kubany, 1997), or the *I-knew-it-all-along phenomenon.* Some theorize that the reason it is so difficult to separate what we know *now* from what we knew and felt *in the past* is because new information is rapidly and seamlessly integrated with old information in our minds, making them almost indistinguishable (Dilich, Fessel, Goebelbecker, & Roese, 2011; Fischhoff, 1975).

Put another way, Roese & Vohs (2012) define hindsight bias as, "the inability to recapture the feelings of uncertainty that preceded an event" (p. 411). This definition cuts to the center of the danger of hindsight bias – if an individual cannot recall what they were feeling or thinking during a crucial moment, how can they look back and find justification for their actions? Hindsight bias, which is essentially knowledge of an outcome, skews our perception of our own behavior.

Research on hindsight bias stretches back several decades when a seminal article by Fischhoff (1975) was published demonstrating the effects of the phenomenon. In this study, participants were instructed to read an account of an historical event or a clinical event. Most of the participants were told the ending (he referred to them as the "After" groups), and one group for each story was not told an ending, but given four different *possible* endings (referred to as the "Before" group). Then all of the participants were given the list of possible outcomes, and had to make judgments about how likely each

one was. Participants who knew the ending to the story were told to ignore it, and be as objective as possible. Despite these instructions, participants in those groups were unable to ignore what they knew, and consistently rated the "real" outcome they read about as more likely than participants in the other group (who did know which ending was correct). This difference in judgments demonstrates hindsight bias. Since then, Fischhoff's "hypothetical" design has been used many times to capture the hindsight bias.

Yopchick & Kim (2012) pointed out the importance of the type and amount of relevant or irrelevant information in hindsight bias studies. They found that hindsight bias was only found when additional information in support of the outcome was present. They determined that one additional sentence with relevant information pointing towards a certain outcome was enough to cause hindsight bias in comparison to length scenarios that are more commonly used.

Researchers have divided hindsight bias into different components including inevitability and foreseeability (Roese & Vohs, 2012; Blank & Peters, 2010). These researchers argue that hindsight bias can, and should, be measured on the basis of these different types. Roese & Vohs (2012) give detailed explanations of each type of hindsight bias. Beliefs about inevitability encompass our view of the "objective state of the world," or our judgment about whether an event was predetermined or not (Roese & Vohs, 2012, p. 412). In contrast, beliefs about foreseeability are subjective, and address how a specific individual may come to believe that they knew it all along, where others could not have.

Hindsight Bias and the Multidimensional Model of Guilt

Trauma survivors frequently express feelings of irrational guilt (Kubany, 1997; Kubany & Watson, 2003).The relationship between trauma and guilt extends to survivors of many different types of trauma: victims of accidents, natural disasters, crimes, and wars. Kubany and Watson (2003) define guilt as the, "unpleasant feeling with accompanying beliefs that one should have thought, felt, or acted differently (with implications of responsibility, wrongdoing, and/or insufficient justification)" (p. 53). Not everyone who suffers a traumatic event develops feelings of guilt, however. Understanding the elements that must be present for guilt to develop is the first step to discovering why some people feel guilt after a traumatic event, while others do not.

Kubany & Watson (2003) developed a multidimensional model of guilt, placing emphasis on hindsight bias within this theory. They proposed that outcome knowledge leads to hindsight biased thinking, which leads to guilt cognitions, specifically one's *perceived* (1) insufficient justification for actions taken, (2) responsibility for a negative outcome, (3) violation of values, (4) preventability and foreseeability of the trauma, and (5) the distress caused by the negative outcome. These *guilt cognitions* largely determine the presence or absence of guilty feelings, and the strength of those feelings. Therefore, they propose that eliminating or minimizing guilt cognitions should also affect guilty feelings regarding a certain event.

Thus far, the multidimensional model of guilt has not been tested while utilizing the hypothetical design to assess hindsight bias originally used by Fischoff (1975), which requires a foresight and hindsight group. In an unpublished study using college students with six different experiments, Kubany, Watson, Leisen, & Kaplan (2002) tested the

model, using a pre-post test to measure guilt cognitions and Kubany's own scale of hindsight bias/responsibility. In two of the experiments, participants read a scenario with a traumatic outcome, rated their responses to that scenario, were given prevention information, and then rated their responses again. Kubany theorized that information that could have prevented an unfortunate outcome if only it had been known before the outcome (therefore making the negative outcome appear more predictable) would increase guilt and distress. The presence of hindsight bias was assumed by increases in the amount of guilt cognitions (responsibility, justification, wrongdoing, preventability) and distress participants admitted to after receiving preventability information. After reading that information, participants believed they should have known better than to behave as they did, and they could only have based that judgment on information they received *after* the outcome was known. Without the presence of a foresight to hindsight comparison, it is not clear whether Kubany's measure of hindsight bias is accurate. Whether or not this measure of "hindsight bias" is equivalent to the hindsight bias found by measuring inevitability and foreseeability in a hypothetical model has not been established.

In a previous, unpublished study, we (Hom & Johnson, 2014) combined the foreseeability/inevitability measures of hindsight bias with Kubany's Trauma Related Guilt Inventory (which measures guilt cognitions, including hindsight bias/responsibility). This study used a repeated measures design with college students randomly assigned to foresight, hindsight-positive, and hindsight-negative groups. They made hindsight and guilt judgments after reading a traumatic scenario about a car accident, and then made the same judgments again after being presented with prevention

information (information that, had they known it at the time, would have changed the outcome of the scenario). No evidence of hindsight bias was found before or after receiving the prevention information when the measure was comprised of foreseeability and inevitability. However, Kubany's hindsight bias/responsibility scale did show significant differences between foresight-hindsight conditions, particularly after the prevention information was known.

In addition, our study did show part of the pattern of hindsight bias and guilt that is described in the multidimensional model of guilt, where guilt and hindsight bias/responsibility occur together. After the preventability information, both hindsight bias/responsibility and guilt cognition scores significantly increased for the hindsight group. Hindsight bias/responsibility scores for the foresight group increased as well, but their guilt scores were not significantly affected.

Reducing Hindsight Bias

If hindsight bias results from the rapid and seamless integration of new information into our memories without being able to remember how much we used to know, then eliminating hindsight bias should be very difficult. If an individual cannot make sense of a series of events and how they relate to the outcome, hindsight bias will not develop (Pezzo, 2011). In fact, if a person cannot make sense of an outcome or does not understand a series of events, then the outcome is surprising, and such participants express feelings of never having been able to predict the outcome (sometimes known as reverse hindsight bias; Pezzo, 2003).

Being able to eliminate hindsight bias becomes particularly important if Kubany and Watson's multidimensional model of guilt is accurate, and feelings of guilt and guilt cognitions really are based on the hindsight bias. In that case, reducing the influence of outcome information from a trauma survivor's mind would greatly decrease their guilt (Kubany and Watson, 2003).

It has been demonstrated that simply informing people of the effect does not reduce the bias (Fischhoff, 1977; Davies, 1987). Davies (1987) also found that providing participants with a record of their thoughts and predictions before learning an outcome reduces hindsight bias but has little real-world utility.

One method that has been found to be effective for reducing hindsight bias involves having participants consider (i.e. list) alternative outcomes (Arkes, Guilmette, Faust, & Hart, 1988; Roese & Vohs, 2012; Sanna & Schwarz, 2007; Sanna, Schwarz, & Small, 2002;Sanna, Schwarz, & Stocker, 2002; Slovic & Fischhoff, 1977). Davies (1987) referred to this technique as the "availability-of-reasons" mechanism, and concluded that this method may even be more effective in reducing hindsight bias than reinstating the "foresight state of mind" by providing pre-outcome thoughts to participants. It is possible that listing a few alternative outcomes may lessen the error in logic that comes from hindsight bias.

It has been shown that instructing people to consider only a few alternative outcomes is effective in reducing hindsight bias, while forcing them to produce many alternative outcomes actually increases hindsight bias (Roese & Vohs, 2012 Sanna, Schwarz, & Small, 2002;Sanna, Schwarz, & Stocker, 2002;). This finding has to do with the difficulty of the task. Listing only two alternative outcomes is relatively easy, making

all outcomes seem equally probable; forcing participants to think of many alternatives is relatively difficult, making all those alternatives seem less likely than the "real" outcome (increasing hindsight bias in the process).

The Current Study

The current study combines measures of hindsight bias (foreseeability and inevitability) and Kubany's Trauma Related Guilt Inventory (TRGI). Participants in foresight and hindsight conditions will make judgments based on a scenario about a car accident involving a friend who may die, for which each group will receive a different ending (or, in the case of the foresight group, no ending). The scenario was based on one used by Howell (2006).

A 2 (Outcome: guilt vs. no guilt) X 2 (List: list vs. no list) factorial design with one comparison group was utilized, meaning there is a total of five groups. Four of the groups were be in the hindsight condition with a foresight condition representing the baseline. The hindsight condition was further split into guilt and no guilt groups. The hindsight - guilt condition was added to more specifically address the guilt cognitions that are supposed to control the strength of guilty feelings. Participants in the hindsight – no guilt group simply read, "Before she could be rescued, your friend dies." The hindsight – guilt group read that information and another paragraph about the guilt cognitions the participant experiences as a result of the friend's death. This was done in an attempt to intensify the guilt cognitions for the guilt group as compared to the no guilt group, and therefore increase the guilt group's guilty feelings and hindsight bias. Half of

the hindsight conditions (guilt and no guilt groups) were instructed to list two alternative outcomes before making any judgments.

In this study, I planned to determine whether hindsight bias was present through the foreseeability and inevitability measures along with Kubany's hindsight bias/responsibility scale, using the hypothetical method (the presence of foresight and hindsight groups). In order to better understand the role of guilt cognitions, I used the hindsight-guilt condition, where guilty feelings are made more explicit in the outcome (for example, by directly telling the participant that they feel terrible about not saving the friend).

Following those objectives, I predicted that the participants who were in the listing condition would exhibit less hindsight bias and fewer guilt cognitions, than participants who were not in the listing conditions. As guilt cognitions are, in theory, heavily dependent on measures of foreseeability, inevitability, and Kubany's measure of hindsight bias/responsibility (Kubany & Watson, 2003), I also predicted that the hindsight group would exhibit more guilt cognitions than the foresight group. Further, the hindsight – guilt group was expected to experience more hindsight bias and guilt cognitions than the hindsight – no guilt group.

METHODS

A total of 167 Missouri State University students were used as participants in this study (78 males and 89 females).

Prior approval for this project was obtained from the Missouri State University IRB (October 10, 2014; approval #15-0144). There were five different conditions, with approximately 35 participants randomly assigned to each group. A 2 (Outcome: guilt vs. no guilt) X 2 (List: list vs. no list) design (with one baseline group) was used for this study. Four of the groups were in the hindsight condition and a foresight condition represented the baseline. Each condition was balanced for sex so that a proportional number of men and women were randomly assigned to each group.

Participants in the foresight condition (baseline group) were not told an outcome. Immediately after reading the scenario about a friend in a serious car accident, foresight participants were instructed to consider what different outcomes may result. Then, in the instructions given for completing the measures of inevitability, foreseeability, emotionality, and the TRGI, the participants were instructed to make those judgments *as if* the friend died.

Participants in the hindsight conditions were given the scenario about a car accident to read, with the outcome consisting of their friend dying in the wrecked car. The hindsight condition has no guilt, guilt, list, and no list groups.

Participants in the no guilt condition simply read that their friend died. Participants in the guilt condition read a more detailed outcome, describing how the friend's death affected their subsequent moods and thoughts. The additional details were

based directly on the types of guilt cognitions Kubany & Watson (2003) stated cause guilty feelings, which are *perceived* wrongdoing, personal responsibility, lack of justification for one's actions, and preventability of the trauma (for example, lack of justification was addressed with the sentence, "Things you could have done differently in the moments before her death haunt you…").

Half of the participants in the guilt and the no guilt groups were told to list two alternative outcomes to the one they read about after they read the scenario. The other half did not list anything, but proceeded directly to the dependent measures.

The participants then made ratings on a hindsight bias measure, separated into foreseeability and inevitability. Participants also described their emotional response to the scenario (surprise, disappointment, regret, disgust). The Trauma-Related Guilt Inventory (TRGI) is a scale developed by Kubany et al. (1996) to measure distress, hindsight bias/responsibility, wrongdoing, and lack of justification for one's actions, which are all different types of guilt cognitions. All measures utilize Likert scales, where higher numbers indicate agreement (Totally agree/Extremely True) and lower numbers express disagreement (Do not agree/Not at all True).

At the end of the study, participants were also asked to complete an open-ended question about their thoughts and feelings about the study. Participants were asked to provide demographic information, including gender, ethnicity, and age. An opportunity for interested participants to be debriefed about the purpose of the study was offered.

RESULTS

Composite Scores

Before analyses, data were checked for accuracy and outliers. Missing data were determined to be random, and mean substitution was utilized. Five multivariate outliers were removed. Data were found to be multivariate normal and linear, and homogeneity was met.

The foreseeability, inevitability, and emotionality composites utilized in this study were based on Blank & Peters' (2010) measures. The emotionality composite included participants' judgments of disappointment, regret, disgust, and how upset the outcome made them overall. The foreseeability composite included participant's judgments about how predictable the outcome was, how difficult it would be to predict the outcome, and how anticipated the outcome was. The inevitability composite included judgments about how objectively probable, unavoidable, and certain the outcome was. The internal consistencies of each factor were checked, and determined to be satisfactory, with Cronbach's αs of .78 (foreseeability), .74 (inevitability), and .82 (emotionality). Surprise was not part of a composite scale, but was measured by asking how surprising they found the outcome to be, employing the same Likert scale used for the other measures.

Kubany et al.'s (1996) TRGI scales were also checked for internal consistency. Of these scales, the Distress Scale (Cronbach's α=.88), the Guilt Cognitions Scale (α=.86), the Hindsight Bias/Responsibility Subscale (α=.80), the Wrongdoing Subscale (α=.72), and the Lack of Justification Subscale (α=.65) all had satisfactory to good reliability. The

Global Guilt Scale was the only one with poor reliability (α=-.24), and it was removed from analyses.

Hindsight Effects

In our previous study (Hom & Johnson, 2014), sex proved to be an influential factor, and therefore was included in all analyses. To establish the presence of hindsight bias, a 2 (groups: foresight vs. hindsight no guilt, no list) X 2 (male vs. female) MANOVA was used to compare the foreseeability and inevitability composite scores. The test showed that the main effect for groups approached significance [$F(2, 59)=2.94$, $p=.06$, $n^2=.091$]. There was not a main effect for sex [$F(2, 59)=.366$, $p=.695$, $n^2=.012$], and there was not a signification interaction [$F(2, 59)=1.06$, $p=.354$, $n^2=.035$]. Descriptive statistics for each group are included in Table 1.

There were no significant univariate differences for the inevitability composite based on groups [$F(1, 60)=1.42$, $p=.239$, $n^2=.023$]. Foreseeability composite scores were different for the hindsight and foresight groups [$F(1, 60)=25.98$, $p=.017$, $n^2=.091$]. Had the main effect for groups reached significance, it could safely be said that the participants showed the hindsight bias, due to the fact that the hindsight (no guilt, no list) group reported higher scores on the foreseeability measure than the foresight group.

Another 2 (groups: foresight vs. hindsight no guilt, no list) X 2 (male vs. female) MANOVA tested emotionality and surprise. Those scores did not show significant differences between groups [$F(2, 59)=1.53$, $p=.225$, $n^2=.049$], sex [$F(2, 59)=.967$, $p=.386$, $n^2=.032$], or in the interaction [$F(2, 59)=1.50$, $p=.231$, $n^2=.048$].

A 2 (groups: foresight vs hindsight no guilt, no list) X 2 (male vs. female) MANOVA was conducted to examine whether outcome information had any effect on the TRGI. A significant main effect was found for groups [$F(5, 56)=2.50$, $p=.041$, $n^2=.182$], but not for sex [$F(5, 56)=.179$, $p=.970$, $n^2=.016$]. There was not a significant interaction between these variables [$F(5, 56)=.179$, $p=.410$, $n^2=.084$].

Foresight and hindsight scores differed on the Guilt Cognitions Scale [$F(1, 60)=8.56$, $p=.007$, $n^2=.125$], Distress Scale [$F(1, 60)=7.77$, $p=.007$, $n^2=.115$], Hindsight Bias/Responsibility Subscale [$F(1, 60)=5.94$, $p=.018$, $n^2=.090$], and Wrongdoing Subscale [$F(1, 60)=8.87$, $p=.004$, $n^2=.129$]. Those scores were not different for the Lack of Justification Subscale [$F(1, 60)=2.11$, $p=.152$, $n^2=.034$]. The hindsight (no guilt, no list) condition reported lower scores than the foresight group for the Guilt Cognitions Scale, Distress Scale, Hindsight Bias/Responsibility Subscale, and Wrongdoing Subscale.

The data show that the hindsight bias was not demonstrated, and likewise no significant differences between groups were found for emotionality or surprise. However, the hindsight participants did show lesser scores for the Guilt Cognitions Scale, Distress Scale, Hindsight Bias/Responsibility Subscale, and Wrongdoing Subscale in comparison to the foresight participants, which demonstrates that outcome information (or lack thereof) did have an effect on participants, but only in respect to the TRGI scales.

Guilt and Alternative Outcomes

In order to examine the relationship between the other independent variables (guilt and listing), the four hindsight groups were examined independently of the foresight group. The focus here is the different types of outcome information presented to

participants, and how they interact with each other to influence hindsight judgments and guilt cognitions.

A 2 (guilt vs. no guilt) X 2 (listing vs. no listing) X 2 (male vs. female) MANOVA was used to determine these independent variables' effects on the foreseeability composite and the inevitability composite. Only the hindsight groups were used. A significant main effect for listing [$F(2, 126)=6.13$, $p=.003$, $n^2=.089$] was found, but not for guilt [$F(2, 126)=1.16$, $p=.318$, $n^2=.018$], sex [$F(2, 126)=.306$, $p=.737$, $n^2=.005$], or any interaction between listing, guilt, and/or sex ($p>.05$).

Univariate differences were significant for only the inevitability composite [$F(1, 127)=9.69$, $p=.002$, $n^2=.071$]. Inevitability scores were significantly lower for participants who made a list of alternative outcomes after they learned the outcome than they were for participants who did not make a list of alternatives. This shows that asking participants to consider how the outcome could have been different (i.e. listing alternative outcomes) did change they how viewed the outcome, in that they found it to be less inevitable than the other hindsight groups.

To examine emotionality and surprise, another 2 (guilt vs. no guilt) X 2 (listing vs. no listing) X 2 (male vs. female) MANOVA was conducted. Significant main effects for guilt [$F(2, 126)=3.61$, $p=.03$, $n^2=.054$] and sex [$F(2, 126)=5.01$, $p=.008$, $n^2=.074$] were found. Significant main effects were not found for listing [$F(2, 126)=.035$, $p=.966$, $n^2=.001$] or between any of the interactions ($p>.05$).

Univariate differences for surprise scores were found for the guilt condition [$F(1, 127)=7.12$, $p=.009$, $n^2=.053$]. In this case, the participants in the no guilt condition reported they were significantly more surprised by the outcome than participants in the

guilt condition. Guilt scores were not significantly different for the emotionality composite ($p>.05$).

Males and females differed significantly on emotionality [$F(1, 127)=9.27$, $p=.003$, $n^2=.068$]. Females reported more negative affect as a result from the outcome than males did.

Thus far, it has been shown that making participants list alternative outcomes did mitigate inevitability judgments, as compared to the hindsight groups who were not requested to make a list of how else the scenario might have ended. The presence of guilty thoughts and feelings in the outcome did not have an effect on foreseeability or inevitability judgments or negative affect, but did make the outcome less surprising to participants.

A 2 (guilt vs. no guilt) X 2 (listing vs. no listing) X 2 (male vs. female) MANOVA testing the TRGI scales was conducted. Only the hindsight groups were included in this test. A significant main effect for the presence of guilt [$F(5, 123)=4.40$, $p=.001$, $n^2=.152$] and sex [$F(5, 123)=3.49$, $p=.006$, $n^2=.124$] was found, but not for listing [$F(5, 123)=.697$, $p=.627$, $n^2=.028$]. There was not a significant interaction between any of these variables ($p>.05$).

Univariate guilt scores were significantly different on the Lack of Justification Subscale [$F(1, 127)=17.27$, $p<.001$, $n^2=.120$], where participants in the guilt condition reported higher scores than participants in the no guilt condition. Differences in guilt scores were also significant for the Wrongdoing Subscale, [$F(1, 127)=3.89$, $p=.051$, $n^2=.030$]. As with the Lack of Justification Subscale, participants in the guilt condition reported higher scores for the Wrongdoing Subscale than the participants in the no guilt

condition. The Wrongdoing Subscale measures whether participants perceive their actions to have violated their personal standards, and the Lack of Justification Subscale measures how justified or warranted they believe their actions were. The pattern of these results shows that including guilty thoughts and feelings in the outcome made participants feel that their actions were less in line with their values and less justified than the other participants felt about their actions.

Males and females reported significantly different scores on the Distress Scale [$F(1, 127)=12.38$, $p=.001$, $n^2=.089$]. Females scored higher on this scale than males did. The result is very similar to what was found for the emotionality composite, where females again reported more negative affect than males.

Listing alternative outcomes did not have an effect on any of the TRGI scales, but did result in participants judging the outcome as less inevitable than participants in the other hindsight groups who did not list anything. The guilt manipulation did not affect their foreseeability and inevitability judgments, but did influence the TRGI scales. Specifically, the presence of guilty thoughts and feelings in the outcome made participants feel their actions were less justified given the situation, and possibly even more to blame for the ultimate outcome. These guilty thoughts and feelings also affected how surprised participants were. Overall, adding guilty thoughts and feelings to the outcome made participants less surprised by the outcome and more critical of their actions.

DISCUSSION

Hindsight and Foresight Differences

In the hypothetical method, hindsight bias is shown by a difference in hindsight and foresight conditions, where the hindsight condition judges the known outcome to be more likely than the foresight condition. Here I examined hindsight bias in terms of foreseeability and inevitability, and the same principle for proving the presence of the bias applies. In this case, the pattern of the foreseeability and inevitability judgments between the foresight and the hindsight (no guilt, no list) groups were in the direction that typifies hindsight bias, but they were not enough to reach significance. One explanation for this is that the scenario used in this study may not have had all the elements necessary to prompt the hindsight bias.

Another explanation comes from research on hindsight bias concerning self-relevant negative outcomes (Pezzo, 2003; Blank & Peters, 2010). Research has been able to demonstrate the hindsight bias in response to personally disappointing outcomes (Tycocinski, 2001). Other research has found that participants will not develop hindsight bias when the outcome reflects negatively upon themselves, but they will develop hindsight bias when the outcomes reflect positively on them (Louie, 1999). Louie theorized that this was because people were inclined to be surprised and attempted to make sense of what happened in the face of a negative outcome. Essentially, they must search for reasons behind different outcomes, which decreases the hindsight bias (Slovic & Fischhoff, 1977; Sanna &Schwartz, 2007).

An important caveat here is that participants in this study did not have the opportunity to make a decision or act in any way, and it may be called into question whether the fictional friend's death qualifies as a self-relevant negative outcome. The friend's death could be interpreted as a personal failure on the part of the participant, and so it is possible they did not demonstrate hindsight bias because a very effective neutralizer, negative implications for themselves, was built into the scenario. If they had admitted they knew what was going to happen, and did not prevent it, they would have to judge their actions to be grossly negligent.

To my knowledge, very few studies have attempted to examine the hypothetical model of hindsight bias as it pertains to posttraumatic guilt (Howell, 2006). The scenario used in this study was meant to be distressing and personal in order to examine the relationship between posttraumatic guilt and hindsight bias, but it is possible that the aspects of the scenario that were supposed to induce guilt interfered with the development of the bias.

The pattern of results that emerged between the foresight and hindsight (no guilt, no list) group in regards to the TRGI scales are difficult to interpret in light of the multidimensional model, as Kubany & Watson (2003) do not theorize what happens to the five different types of guilt cognitions when hindsight bias is not present. Hindsight participants consistently reported lower TRGI scores than the foresight participants, which is the opposite of what I hypothesized. This result is particularly noteworthy for the Hindsight Bias/Responsibility Subscale. This scale showed that foresight participants reported they felt the outcome to be less preventable and that their actions were less blameworthy. The scenario did not provoke the hindsight bias (in terms of foreseeability

and inevitability), so this calls into question whether or not the Hindsight Bias/Responsibility Subscale is related to hindsight bias. Had these measures all been examining hindsight bias, a similar pattern of results would be expected. On the other hand, an argument could be made that the Hindsight Bias/Responsibility Subscale addresses a different component of hindsight bias, aside from foreseeability and inevitability. Perhaps posttraumatic guilt (the focus of Kubany and Watson's research) is more closely related to this proposed component of hindsight bias than it is to foreseeability or inevitability, and that is why I found the pattern of results that I did.

As for the rest of the TRGI scales, hindsight participants reported lower Distress Scale, Wrongdoing Subscale, and Guilt Cognitions Scale scores, which could be a demonstration of defensive processing of negative affect, similar to what was discussed earlier in reference to self-relevant negative outcomes. The belief that the friend may have actually survived could have allowed the foresight participants to lay claim to more distress and negative self-evaluations without actually suffering from them, unlike the hindsight group. The hindsight group were left to cope with reality as best they could, which seemingly resulted in the minimization or denial of their guilty thoughts and feelings. In the wake of a tragedy, it is more adaptive to fairly assess and minimize guilt, self-blame, and distress than to magnify them (Kubany, 1997).

Guilt and Alternative Outcomes

Requesting participants to consider alternative outcomes mitigated inevitability (but not foreseeability) judgments in comparison to the other hindsight groups that did not list anything, partially fulfilling my original hypothesis. Much of the other research

examining the reduction of hindsight bias through listing alternative outcomes utilizes scenarios involving psychology experiments (Slovic & Fischhoff, 1977; Davies, 1987), medical case studies (Arkes, Guilmette, Faust, & Hart, 1988), or the infamous British-Gurkha War (Sanna, Schwarz, & Stocker, 2002; Sanna, Schwarz, & Small, 2002). It is doubtful that participants in these studies considered the scenarios very upsetting, but they did demonstrate hindsight bias through a foresight-hindsight comparison of scores. Researchers were able to show that listing alternatives reduced the bias by comparing different hindsight groups' scores, just as it was done in this study. However, none of the previous research cited here measured hindsight bias in terms of foreseeability and inevitability. The data demonstrates that listing alternative outcomes was an effective method for decreasing inevitability judgments amongst the hindsight groups for a personally upsetting scenario, but this method was not effective in influencing foreseeability judgments.

The apparent lack of effect that listing alternatives had on foreseeability judgments suggests that listing alternatives influences how participants view the probability of a series of events more than how they view the accuracy of their own judgment. Whereas inevitability concerns itself with objective probabilities ("*it*" was inevitable), foreseeability focuses on what an individual is capable of knowing at any one point in time, and how predictable an outcome is in light of that information ("*I"* could foresee it). As listing alternatives is primarily an exercise dealing with unbiased, real-life possible outcomes, it is reasonable that inevitability would be the component of hindsight bias most affected by it. Contrary to my hypothesis, listing alternatives also had no effect on guilt cognitions (the TRGI scales), which do tend to focus more on participants'

subjective perceptions of their behavior and the amount of knowledge they had during a certain event (concepts that are also related to foreseeability).

The guilt manipulation did have an effect on the TRGI scales. Kubany & Watson (2003) listed five different types of guilt cognitions, which are perceived lack of justification for one's actions, violation of personal values, responsibility for the outcome, preventability of the outcome, and distress caused by the outcome. The TRGI scales and subscales are based on these guilt cognitions. Current findings showed the manipulation did affect part of the scale on which it was based. Participants in the guilt condition did, overall, report that they felt their actions were less justified and more incongruent with their values than participants in the no guilt condition. The presence of guilt cognitions in the outcome did not make participants feel more distressed or influence how responsible they felt they were for the outcome. The hypothesis stating that participants in the guilt condition would experience more guilt cognitions than participants in the no guilt condition was moderately fulfilled, as I did not attempt to specify what types of guilt cognitions they would differ in.

In addition, the presence of guilt cognitions in the scenario's outcome caused participants to be less surprised by that outcome. One possible explanation for this is that the participants who read the guilt cognitions had more information to consider than the other participants. They may have felt the friend's death was just as surprising as the other participants did, but felt the guilty feelings and thoughts following the friend's death were not very surprising at all. Thus, their surprise would be less than participants who only learned of the friend's death.

These characteristics (feelings that they should have behaved differently and reduced surprise) are somewhat reminiscent of hindsight bias; after all, hindsight bias is characterized by the beliefs that one knew what was going to happen and should have behaved differently. However, the guilt manipulation had no effect on foreseeability or inevitability amongst hindsight groups, contrary to my hypothesis that it would influence those measures. Further examination of the relationship between guilt cognitions and hindsight bias is needed before firm conclusions about Kubany & Watson's (2003) multidimensional model of guilt can be drawn.

Current findings were not able to show relationship between hindsight bias and guilt cognitions. The effect for hindsight bias did not quite reach significant, and the hindsight group did not exhibit more guilt cognitions than the foresight group. Future research should pursue a better understanding of the relationship between hindsight bias and posttraumatic guilt, utilizing a scenario that has proven effective at triggering the hindsight bias in participants. Additionally, further research should address whether Kubany's Hindsight Bias/Responsibility Subscale is tapping into a new component of hindsight bias, similar to foreseeability and inevitability, utilizing the hypothetical model designed by Fischhoff (1975).

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Table 1. Descriptive statistics for TRGI scales and hindsight bias measures, divided by group.

Dependent Variable	Group			N	Mean	Std. Error
Global Guilt Scale	Foresight			32	3.20	.085
	Hindsight	Guilt	List	34	3.22	.083
			No List	36	3.24	.080
		No Guilt	List	34	3.14	.083
			No List	31	3.19	.087
Guilt Cognitions	Foresight			32	2.34	.097
Scale	Hindsight	Guilt	List	34	2.17	.094
			No List	36	2.25	.091
		No Guilt	List	34	2.11	.094
			No List	31	1.96	.098
Distress Scale	Foresight			32	4.23	.143
	Hindsight	Guilt	List	34	3.74	.138
			No List	36	3.87	.134
		No Guilt	List	34	3.81	.138
			No List	31	3.64	.145
Hindsight	Foresight			32	2.43	.128
Bias/Responsibility	Hindsight	Guilt	List	34	2.27	.124
Subscale			No List	36	2.30	.121
		No Guilt	List	34	2.32	.124
			No List	31	2.06	.130
Wrongdoing Subscale	Foresight			32	2.44	.136
	Hindsight	Guilt	List	34	1.97	.132
			No List	36	2.22	.128
		No Guilt	List	34	1.88	.132
			No List	31	1.81	.138

Note. The TRGI, Foreseeability, and Inevitability scales were rated on a 1-5 scale, with 1 meaning "Not at all true/Do not agree," and 5 meaning "Extremely true/Totally agree." Emotionality and surprise were rated on a 1 to 10 scale, with 1 meaning "Not at all" and 10 meaning "Very much."

Table 1, continued.

Dependent Variable	Group			N	Mean	Std. Error
Lack of Justification	Foresight			32	2.57	.138
Subscale	Hindsight	Guilt	List	34	2.99	.134
			No List	36	3.04	.130
		No Guilt	List	34	2.53	.134
			No List	31	2.35	.140
Emotionality	Foresight			32	8.43	.332
	Hindsight	Guilt	List	34	7.63	.322
			No List	36	7.75	.313
		No Guilt	List	34	7.79	.322
			No List	31	7.74	.337
Surprise	Foresight			32	6.16	.456
	Hindsight	Guilt	List	34	4.47	.451
			No List	36	5.17	.438
		No Guilt	List	34	6.44	.451
			No List	31	5.58	.472
Foreseeability	Foresight			32	2.44	.164
	Hindsight	Guilt	List	34	3.00	.159
			No List	36	2.94	.154
		No Guilt	List	34	2.82	.159
			No List	31	2.94	.166
Inevitability	Foresight			32	2.67	.135
	Hindsight	Guilt	List	34	2.65	.131
			No List	36	2.97	.127
		No Guilt	List	34	2.33	.131
			No List	31	2.86	.137

Note. The TRGI, Foreseeability, and Inevitability scales were rated on a 1-5 scale, with 1 meaning "Not at all true/Do not agree," and 5 meaning "Extremely true/Totally agree." Emotionality and surprise were rated on a 1 to 10 scale, with 1 meaning "Not at all" and 10 meaning "Very much."