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Thomas Ramsey Cain

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FEAR BIAS: THE IMPACT OF INCIDENTAL FEAR ON EXPLICIT AND IMPLICIT  
RISK PERCEPTION

by

THOMAS RAMSEY CAIN

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Lee Jussim

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## ABSTRACT OF THE DISSERTATION

Fear Bias: The impact of incidental fear on explicit and implicit risk perception

By THOMAS RAMSEY CAIN

Dissertation Director:

Lee Jussim

In previous research, fear has caused people to increase their perception of risk, regardless of what caused them to feel afraid (defined as incidental fear). Three studies were conducted to test and expand upon on this finding. In Study 1, a video fear manipulation was used to determine whether participants would show greater explicit risk perception, as well as greater implicit fear, as compared to participants who watched a funny film clip. Participants did show an increase in explicit risk perception after watching a frightening film clip, and showed an increase in implicit risk perception as measured by one of three implicit measures. In Study 2, a semi-unique model, the Fear Bias Model, was partially tested. Specifically, the Fear Bias Model predicts that cognitive dissonance may be at least partially responsible for an increase in risk perception when people are afraid. The results from Study 2 partially confirmed this finding. Finally, Study 3 attempted to extend the findings of the previous studies by testing whether incidental fear lead to an increase in bias against Muslims. Watching a frightening video clip, as opposed to a funny or neutral clip, did lead to an increase in implicit fear against Muslims, but not explicit bias. The implications of these findings, along with limitations and future directions, are discussed.

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## Introduction

Over the course of human history, there have been numerous instances of inter-group conflict and cruelty motivated, on some level, by fear. In the late 19<sup>th</sup> and early 20<sup>th</sup> century, the Ku Klux Klan (with a peak membership of four million Americans in 1924) intimidated, beat, and killed African-Americans (and later Catholics and Jews) in the south. They did this, in large part, because they were afraid of these groups and the perceived threat they posed to White supremacy. In 1930s and 40s Germany, the Nazis slaughtered Jews in part because they were genuinely afraid of them. Many believed their own propaganda, emphasizing the danger of a Jewish “conspiracy” supposedly hell-bent on world domination (Goldhagen, 1996). In Iraq, Saddam Hussein slaughtered and gassed hundreds of thousands of Kurds because he feared that they would align themselves with Iran and undermine his war effort (Power, 2002). More recently, the U.S. launched what is now believed to be an ill-founded and largely disastrous pre-emptive war in Iraq. This was done in part because the Sept 11, 2001 attacks created an environment of fear such that the U.S. government (and many Americans) grossly overestimated the danger of Iraqi weapons of mass destruction.

In each of the events mentioned above, it is likely that fear distorted people’s beliefs about the extent or even the existence of danger and threat. Recent empirical research (see Fischhoff et al., 2005; Lerner et al., 2003; Teachman et al., 2008) provides additional support for the theory that fear increases perceptions of risk. In this thesis, literature will be reviewed and three empirical studies will be presented suggesting that fear, in addition to causing an increase in risk perception, may help to explain some of the most reprehensible events in human history. This thesis will present theoretical and

empirical evidence demonstrating that fear systematically causes individuals to distort the subjective probability of various risks, which, in turn, may lead them to negatively perceive, dehumanize, and potentially harm other individuals.

Fear is a necessary and beneficial (especially in our evolutionary past) emotion. Fear, it is theorized, is accompanied by a series of symptoms that enable our body to prepare and protect ourselves from a given threat (see Marks, 1987). When we are afraid, epinephrine is released by the adrenal glands, increasing our heart rate and opening up air passageways, both of which better enable us to run or fight if we are in danger. And, although fear has the potential to be beneficial to an organism in the short run, long term exposure to fear or stress has been shown to have a variety of negative effects on health (see Schneiderman et al., 2005 for a review).

It can be fairly safely stated that most people perceive the symptoms linked with fear as negative and unwanted. Although people may seek out horror films so that they can voluntarily feel some of the symptoms associated with fear, most fans of horror movies likely feel comfortable doing so knowing that they are in the safety of a theater and not in any actual danger. One might imagine that ticket sales would be far less if, instead of showing a horror movie, the owners of the theater let several hungry lions loose.

In addition to being an emotion that people generally try to avoid feeling, fear seems to have much more of an influence on our perceptions and behaviors than was previously thought. Indeed, fear can impact behavior and attitudes across a variety of domains. Being in a state of fear (as opposed to calm) has been shown to cause people to increase their perceived likelihood of a terrorist attack (Fischhoff et al., 2005; Lerner et

al., 2003), be more likely to pay higher amounts of money to reduce a cancer risk and show less distinction in the probability between two cancer risks (Sunstein, 2003), be willing to pay relatively large amounts of money to avoid an unlikely electric shock (Rottenstreich & Hsee, 2001), be less likely to vote for a political candidate (Calantone & Warshaw, 1985), and to increase the tendency to associate African-Americans with danger (Schaller, Park, & Mueller, 2003). Fear can also affect visual perception; for example, those who are afraid of heights rate themselves as being further from the ground than those who feel less fear of heights (Teachman et al., 2008). Additionally, persuasive messages that incorporate fear have been shown in numerous studies to alter a person's attitudes, behavior, and/or behavioral intent relative to a variety of topics including smoking (Leventhal, Watts, & Pagano, 1967), dental hygiene (Leventhal & Singer, 1966), car safety (Leventhal & Niles, 1965), and atom bomb testing (Haefner, 1956), to name only a few studies in a prolific body of literature. Though very broad in scope, these examples share something in common: when individuals are afraid, their perceptions and judgments tend to differ from those of people who are not feeling fear. This thesis will expand upon and further elucidate how fear shapes an individual's perceptions, and how those perceptions may be shaped in such a way that they lead to prejudice towards other individuals.

In addition, this thesis will present a unique hypothesis as to why fear leads to increased perceptions of risk. This explanation is built into a semi-unique model, the Fear Bias Model. Before examining the Fear Bias Model, the next section will be a general overview of how influences on perception have been empirically examined, including



affect. This section will then be followed by an overview of the research on fear and perception specifically.

### Motivation and Perception

Research examining how a person's general motivational state influences their perception has a fairly long history within social psychology. Early research demonstrated that when poor children were shown different types of coins, they rated the coins as being larger than more affluent children who rated those same coins (Bruner & Goodman, 1947). More recent research has shown that, for participants who first exerted themselves by jogging, hills appeared steeper than those who had remained sedentary (Bhalla & Proffitt, 1999). Distances may also appear longer if participants are asked to strap on a backpack (Proffitt, Stefanucci, Banton, & Epstein, 2003).

This potential to alter participants' perception has been shown to occur implicitly as well as explicitly. Participants viewed an ambiguous figure (B or 13) differently depending on which figure the participant implicitly preferred (Balcetis & Dunning, 2006). The authors of this study concluded that "the impact of motivation on information processing extends down into preconscious processing of stimuli in the visual environment and thus guides what the visual system presents to conscious awareness". (Balcetis & Dunning, 2006, p. 612). In other words, motivation's influence on perception, if occurring on such an implicit level, seems to be rather deep seeded.

Although some have contended the methodology of these studies, particularly the 'new look' research conducted in the 1940s and 1950s (see Adkins, 1956; Eriksen & Browne, 1956; Wohlwill, 1966), a growing body of literature supports the notion that a person's motivational state can influence how they perceive their environment. Indeed,

motivation has been demonstrated to affect a wide variety of perceptual phenomena, such as evaluations of the self, judgments of others, predictions of the future, and perceptions of the past (for reviews, see Baumeister & Newman, 1994; Dunning, 2001; Kunda, 1990; Pittman, 1998). Directly stemming from these findings on motivation is the question of whether or not affect can have a similarly distorting effect on environmental perceptions. This research will be discussed next.

### Affect and Perception

In one of the earliest empirical studies suggesting that affect impacts perception, Razran (1940) put people in a positive mood by offering them a free lunch. Razran found that those who were offered a free lunch rated political slogans more favorably than those put in a negative mood by smelling unpleasant odors. Wehmer and Izard (1962) found that participants in a positive versus negative mood enjoyed a task more and performed better on the task. Griffitt (1970) reported that evoking negative affect with a hot and humid environment caused participants to rate a target person more negatively. Gouaux (1971; Gouaux & Summers, 1973) showed that watching a happy or depressing film led to participants liking or not liking a confederate. Indeed, social psychological research has generated a great deal of empirical support for the contention that affect can alter cognitions and perceptions.

Of course, these studies just scrape the tip of the iceberg when it comes to how affect has been studied in relation to psychological processes. Affect has been shown to influence social preferences (Gibbons, 1986; Veitch & Griffitt, 1976), social comparisons (Wheeler & Miyake, 1992), and social judgments (Berkowitz & Troccoli, 1990; Bodenhausen, Sheppard, & Karmer, 1994; Ciarrochi & Forgas, 1999; Forgas & Fiedler,

1996), to name but a few. As one might imagine, people in a good mood tend to perceive and rate things in their environment positively, while those in a bad mood tend to perceive and rate things negatively (Kenworthy, Canales, Weaver, & Miller, 2003).

### Fear and Risk Perception

Lichtenstein et al. (1978) showed that people tend to regularly overestimate causes of death that occur fairly infrequently, and to underestimate causes of death that occur more frequently. Additionally, people tend to overestimate causes of death that could be classified as more dramatic (such as homicide or getting struck by lightning), and underestimate deaths from more common or mundane sources (such as heart disease or stroke; Slovic et al., 1982). This tendency to overestimate more dramatic causes of death has been attributed to the availability heuristic (Tversky & Kahneman, 1973), or the tendency to believe that that which comes to mind more readily is more likely to occur (dramatic events tend to be portrayed in the media more often, and are thus more likely to gain people's attention and be viewed as more likely to happen). Although these early studies shed light on factors that impact the perception of risk, they all but ignored the effect of emotion (including fear) on risk estimates.

Subsequent research reported that emotions might influence and distort perceptions and decision-making processes. One of the earliest illustrations of this effect was found in a series of studies conducted by Johnson and Tversky (1983). Participants were asked to read a descriptive story of a death caused either by leukemia, homicide, or fire. Participants were then presented with 17 other causes of death and asked to estimate how likely each occurs in the population. Reading about homicide led to an increase in estimates of the 17 causes of death, while reading a positive story led to lower estimates.

A topic that has recently received a growing amount of attention in the area of emotions and risk perception is the role that fear and anger play in decision-making. The appraisal-tendency hypothesis (Lerner & Keltner, 2000) suggests that fear and anger elicit contrasting responses. Fear tends to cause people to perceive uncertainty and higher situational control (believing that one has little personal control and that the environment has a great deal of control) in new circumstances, which then causes them to perceive those situations as being riskier. Lerner and Keltner (2001) state that “each emotion activates a predisposition to appraise future events in line with the central appraisal dimensions that triggered the emotion” (p. 147). It seems, then, that uncertainty and perceptions of high situational control triggers fear, and that future feelings of fear trigger uncertainty and the perception of high environmental control.

Anger, on the other hand, has a tendency to cause people to perceive certainty and individual control in new situations, which then causes them to perceive less risk across those new situations. Several empirical studies (Lerner & Keltner, 2000; 2001) confirmed that fearful participants tended to have higher predicted risk assessments, while angry participants had lower predicted risk assessments (see also Lerner et al., 2003). Fischhoff, et al. (2005) found that fear that had been primed a year earlier still affected perceptions of risk when later measured.

Lerner and Keltner’s (2000, 2001) theory is based on Smith and Ellsworth’s (1985) research, which identified six distinct cognitive dimensions that underlie different emotions: certainty, pleasantness, attentional activity, control, anticipated effort, and responsibility. Fear is characterized by low certainty and low control, which, Lerner and Keltner (2000, 2001) argue, is responsible for inflated risk assessments. In other words, if

people experience feelings of uncertainty and also have the sense that they have no control over a situation, fear is likely to ensue. For example, an individual may be walking home along a dark street and hear an unidentified noise behind them. If they have no means to protect themselves, they would likely feel fear. They would be experiencing both uncertainty (“What could that threatening noise possibly have been? A mugger? An animal?”), and low control (“I have no weapon, I am untrained in self-defense, I am alone and subject to whatever may happen to me,” etc).

In addition to work on the appraisal-tendency hypothesis, additional research has examined why fear may lead to inflated risk perception. The probability neglect hypothesis (Sunstein, 2003) states that if a person’s emotions are intensely engaged, they will focus on the negative outcome of a fearful event and will tend to ignore the actual likelihood of such an act occurring. For example, if someone fears a terrorist act in their town, they will focus on how tragic the terrorist act would be if it actually occurred, and ignore the fact that the probability of it occurring is very low. Probability neglect does not specifically state that fear will cause a person to perceive the likelihood of the fearful object as more probable, but rather poses that fear causes people to draw attention toward the fearful object and draw attention away from (or even ignore) the probability of that event actually occurring. In essence, possible events that elicit intense emotional reactions increase the salience of negative outcomes, but do not prompt individuals to ask themselves how likely these outcomes actually are.

Sunstein (2003) tested the probability neglect hypothesis by asking participants to state the most they were willing to pay to reduce levels of arsenic in drinking water. Participants in a “graphic description” condition were more likely to pay higher amounts

and showed less distinction between two probabilities (were more likely to ignore the difference in probabilities of 1 in 1,000,000 vs. 1 in 100,000 after they read the graphic description of what cancer does to the body).

This study suggested that people will alter their behavior in order to address a perceived threat. However, if fear made individuals truly neglect the probability of certain events occurring, researchers would likely expect to find fearful individuals over, as well as under-estimating, the probability of acts occurring. Because it has mostly been observed that participants systematically over-estimate the probability of events occurring when in a state of fear, it appears that something more than mere ‘neglect’ is occurring.

Another recent model that attempts to explain why fear leads to variations in risk perception is the Risk as Feelings model (Lowenstein et al., 2001). The Risk as Feelings model is a dual process model suggesting that affect and cognition diverge when reacting to and perceiving a risky situation. Lowenstein et al. (2001) suggest that emotional reactions have a direct effect on perception, and will override cognition to end up driving behavior. This model, and its relationship to the model being proposed in this paper, is discussed in more detail in the description of the model below.

#### Integral vs. Incidental Affect

Prior theorizing has distinguished between two broad types of affect (Bodenhausen, 1993; Lerner & Keltner, 2000; 2001). Before describing the model that is being proposed in this paper, the terms integral and incidental affect (Bodenhausen, 1993) in general, and integral and incidental fear specifically, will be further distinguished.

Incidental fear is fear resulting from something other than that which one is currently perceiving, judging, or evaluating. It has also recently been defined as fear with

no direct connection to the message topic (DeSteno et al., 2004). For example, the fear felt after watching a horror movie may have an influence on rating the likelihood of a terrorist attack. In contrast, integral fear is defined as fear that influences perceptions, judgments, or evaluations of that which caused the fear. An example of integral fear would be the fear felt after watching a video of the terrorist attacks on September 11<sup>th</sup> and how that influences the perceived likelihood of a future terrorist attack on a major city.

Incidental fear, which is the type of fear examined in the current research, has a main advantage in the experimental setting - it is easier to isolate the effects of fear from the effects of information that is related to the fear stimulus. More broadly, incidental fear offers a better opportunity to conclude that fear (rather than some other confounding variable) is responsible for biasing perceptions. For example, a participant may be prompted to feel fear by watching a video about the effects of cancer on the body. Next, they would be asked to rate how likely it would be for they themselves to get cancer. The researcher in this scenario would not be sure whether it was fear alone that influenced the participant's answer, or whether information conveyed in the video played a role in the response. If, on the other hand, a participant watched a clip from a movie about a chainsaw murderer, and was then asked to provide their perceived likelihood of getting cancer, one could safely assume that no information about cancer was gleaned from the slasher movie.

The current thesis is proposing a new dual-process model, the Fear Bias Model, which attempts to further explain why risk perceptions are exaggerated under the influence of incidental fear. The Fear Bias Model is similar to the Risk as Feelings model (Lowenstein et al., 2001) in that both suggest that affect and cognition diverge when

perceiving a risky situation. The Fear Bias Model, however, differs from previous models in that it proposes that fear alters cognition because people are motivated to reduce feelings of dissonance between affect and cognition. This model is discussed in detail next.

### The Fear Bias Model

The Fear Bias Model (FBM) is not the first model to suggest that fear can alter perceptions and attitudes. However, the Fear Bias Model is the first to propose that an individual's desire to seek out consonance between conflicting cognitions and affective experiences of fear may be causing an inflated perception of risk.

In fact, the idea that a disconnect between fear and cognitive appraisal may cause people to alter their cognitive appraisal to be more in line with their emotion was one of the original inspirations for Leon Festinger and his theory of cognitive dissonance (1957). Specifically, Festinger was interested in an earthquake that occurred in India in 1934. Those who survived the earthquake began circulating, and readily believing, the rumor that the earthquake was just the first in a series of natural disasters that was about to strike. As Festinger wondered about why so many people believed these seemingly irrational rumors, he proposed the idea that the survivors of the earthquake were frightened, yet there was nothing in their environment that currently warranted their fear. Because there was a disconnect between how people felt and what they perceived, a feeling of dissonance occurred, and in order to reduce this dissonance, people invented and quickly believed outlandish rumors of future natural disasters.

The current model (see Figure 1) suggests that, first, people will immediately feel fear (and the symptoms associated with fear) when involved in or witness to a potentially



threatening situation. People will then use their knowledge base (cognitions) to seek an explanation as to why they are feeling the emotion of fear. This immediate feeling of fear is proposed to occur before cognition and it may occur subconsciously, although this part of the model is not tested in this thesis. The model posits that people then use cognitions from their knowledge base to determine the likelihood of these new, fear-inducing events happening to them. So, for example, if you live on a farm and see a tornado in the distance, you will first feel fear related symptoms, and then determine the likelihood of the tornado hitting your house. If you determine that the likelihood is low, you may continue to watch the tornado to make sure it doesn't make a turn for the worse. If you determine the likelihood is fairly high that the tornado will hit your house, you may call family and neighbors, get the family into the basement, etc.

In the next step of the FBM, the cognitive conclusion derived from our pre-existing knowledge base (using the above example, you determine that the likelihood of the tornado hitting your home is fairly low) interacts with the emotion of fear and raises the perceived likelihood of risk. This process, it is proposed, occurs due to a procedure related to cognitive dissonance (Festinger, 1957; Festinger & Carlsmith, 1959). In other words, our cognitive appraisal of a situation, while attempting to make sense of and reduce our immediate fear, is in turn affected by our emotional reaction such that our estimates of the probability of risk are increased. Thus, if there is a gap between our automatically-activated experience of fear and our cognitive assessment of the fear-inducing stimuli, the more reasonable (and likely more reflecting of reality) cognition may be modified to become more consistent with the threat of harm associated with feeling fear. Festinger (1957) argued that if two things, such as thoughts and behavior, are

dissonant with one another, people will be most likely to alter what is easiest (thoughts in this case) in order to reduce the dissonance. So, for example, if I smoke cigarettes and I know that smoking is bad for my health, this will produce dissonance (I am engaging in a behavior that I know to be bad for me). Rather than quitting smoking, which would be a relatively difficult task, I might instead change my thoughts, such as rationalizing that it isn't really that bad to smoke, that I don't really smoke as much as other people, that cancer doesn't run in my family, etc. I have taken the path of least resistance in order to reduce dissonance, and I can now smoke (relatively) happily.

The FBM contends that when fear and cognitions are at odds with one another, producing dissonance within individuals, those individuals will adjust their cognitions (risk perception in this case) because of the relative ease of adjusting thoughts compared to altering one's emotional state. This process will be described in more detail below. Most broadly, the FBM proposes that individuals will synch their thoughts with their emotional state, such that an initial perception that there is a small chance of a risky event occurring (such as the initial perception that the tornado is far away and not likely to hit your home), will be altered in order to synch with initial feelings of fear. It is proposed that this is why incidental fear causes an inflation in risk, even towards events that did not originally cause the fear.

In other words, it is commonly believed that if a person perceives a risky or dangerous situation, they will feel fear. The FBM suggests that if someone is feeling fear, they will come to the conclusion, whether consciously or not, that they are feeling fear because there must be some risk in the environment. This proposal is similar to Singer and Schacter's (1966) classic research in which participants were injected with an emotionally

neutral drug and observed their environment to determine what they were feeling. The difference is that, in the FBM, rather than observing their environment, and those in it, to get a sense of how they are feeling, people may observe their own emotional state in order to guide their perception of how likely it is that a fearful event will occur. It is further proposed that this occurs through a process related to cognitive dissonance. In other words, if fear and perception of risk are not consistent with one another (i.e., I am feeling afraid and yet there is nothing in my environment that I consciously perceive as a threat), this disconnect causes dissonance which an individual will then strive to reduce.

Somewhat unique to this model is the argument that fear is extremely difficult to extinguish using processes of cognitive rationalization. Most individuals have likely found themselves in a state of fear or panic, and then tried to calm themselves down by rationalizing their fear and panic away (i.e., there is no need to be nervous in front of this class of 400 undergraduates. They are nervous too and probably not judging my every word). Most people have also likely found that no matter how hard they tried to rationalize their fear away, the butterflies, increased heart-rate, and sweating are likely to be relatively unaffected. Lowenstein et al. (2001), in their Risk as Feelings model, also argue that emotions override cognition. Several findings support this claim, including the fact that the amygdala sends more information to the cortex than vice-versa (LeDoux, 1996), as well as the fact that the amygdala may respond to a fearful stimulus before a person is consciously aware that they are afraid (Ohman & Mineka, 2001). We may know consciously that the probability of a terrorist attack is quite low. That knowledge tells us that we are safe. However, the symptoms of fear that may be outside of our conscious

awareness are telling us that we are in danger. In an attempt to explain or justify our feeling afraid, the cognitive knowledge base and the affective systems of fear interact.

To briefly summarize the model up until this point, people first experience fear. They then make an assessment about risk. Their feelings of fear and their knowledge base (cognition) interact, and they alter their cognitive risk assessment to explain or justify their current feelings of fear. This, it is proposed, occurs through a process similar to cognitive dissonance. They then increase the perceived likelihood of a future risky event happening.

In the next step of the model, a person will then behave in accordance with their new likelihood estimates (this component of the model was not empirically tested in the current research). In this way, risk estimation enhancement, even on a relatively small scale, can powerfully bias future perceptions and behavior. For example, after 9/11, many people bought gas masks, radioactivity detectors, plastic sheeting and duct tape. This is the behavioral aspect of the model, in that fear-inflated risk perceptions lead to altered behavior. In the very real case of genocide and mass murder, as was described in the introduction, fear may cause people to increase the perceived likelihood that a group of people are somehow a threat to them. The behavior in this extreme case would be to eliminate the group of people who are perceived as a threat (or support government policies designed to eliminate that group). In turn, this behavioral component also acts to further reduce fear (if we eliminate all of them, then we will be safe and can finally relax/stop feeling fear).

Because fear causes people to exaggerate the likelihood of something harming them, and because people may wish to counteract that fear-inducing situation with some

sort of action that will eliminate that fear, the action that we implement to counteract our fear may appear irrational to an outside observer who is not experiencing the fear. In fact, our efforts to counteract the fear may be objectively “irrational” in that fearful people will take large steps to eliminate an objectively small threat. Yet to the individual who is afraid, the measures taken to counteract the fear may seem perfectly reasonable and rational. This is because they believe they are counteracting a threat that, in their mind, is very probable indeed. In this way, fear-biased behavior is distinct from clinical specific phobias, which are recognized as “excessive” or “unreasonable” by those suffering from them (APA, 1994). Thus, perceptual or behavior bias may be dangerously insidious and difficult to recognize or address, given that individuals affected by them may not acknowledge their perceptions or behavior as extreme.

#### The FBM and its Relationship to Previous Models

The FBM is a semi-unique model. It proposes a novel contribution, that risk perception increases, at least partially, due to an attempt to resolve dissonance between emotion and cognition. The FBM is also influenced by, and draws upon, previous models, in particular the Risk as Feelings model (Lowenstein et al., 2001). Specifically, the FBM and Risk as Feelings model are most similar in that they both propose that cognition and emotion may exert separate, and potentially contrasting, influences on behavior and decision making. This is in contrast to what Lowenstein et al. (2001) term the ‘consequentialist perspective’, which is their term for past assumptions in the judgment and decision making literature that ‘risky decision making is essentially a cognitive activity’ (pg. 267). These past perspectives have mainly focused on how participants expect themselves to feel in the future as a result of their current decision making, and all

but ignored how emotion may be affecting decision making in the present. The Risk as Feelings model was influenced by previous research indicating that emotion has an influence on decision making that is distinct from cognition (e.g. Bargh, 1984; Damasio, 1994; Zajonc, 1980). Lowenstein et al. (2001) also cite Schwarz and Clore's (1983) affect-as-information hypothesis, as well as work by Paul Slovic and others (e.g., Finucane et al., 2000) on an 'affect heuristic', as inspiration for their model.

#### Overview of the Current Studies

Three studies were conducted to test specific aspects of the FBM. Study 1 was an exploratory analysis of several implicit and explicit measures that were administered to participants after they watched either a frightening or a funny film clip. The purpose of Study 1 was to determine if implicit fear can be measured, and whether it, as well as explicit risk perception, could be influenced by the experimental manipulation of having participants watch a frightening or a funny film clip. Study one employed three implicit measures of fear in order to determine which measure was the most effective. The most effective measure of implicit fear from Study 1 was then used in the two subsequent studies.

Study 2 was a specific test of one of the unique aspects of the FBM – that fear causes an exaggerated perception of risk due to a feeling of dissonance between emotion and cognition. All participants in Study 2 watched a frightening film clip, and participants were randomly assigned to either have a chance to reduce feelings of cognitive dissonance or not. Finally, Study 3 extended the results of the first 2 studies by testing the impact of fear on implicit as well as explicit person perception. Specifically, the fear manipulation

was used to determine whether participants who were feeling incidental fear tended to see outgroup members, specifically Muslims, as more implicitly and explicitly threatening.

## STUDY ONE

Study 1 was conducted for two main purposes. First, Study 1 was an attempt to establish an effective measure of implicit fear. Implicit fear is important to measure, in addition to explicit fear, because people may not be willing to admit when they are afraid, or they may have difficulty accessing their internal emotional state. Therefore, Study 1 directly compared three separate measures of implicit fear: an IAT (Greenwald, McGhee, & Schwartz, 1998), LDT (Wittenbrink, Judd, & Park, 1997), and an Implicit Mood Measure (Hass, Katz, Rizzo, Bailey, & Moore, 1992; Koole, Smeets, van Knippenberg, & Dijksterhuis, 1999), in addition to questions that assessed fear explicitly.

Second, Study 1 was an attempt to replicate the finding that fear leads to an exaggeration of risk perception. Additionally, the fear manipulation used in Study 1 (a 10 minute clip from the film ‘The Ring’, discussed below) has not been established as a manipulation of fear in past research. Therefore, Study 1 was conducted to determine whether the unique fear manipulation would, in fact, lead participants to exaggerate their perception of risk. The FBM proposes that the initial feelings of fear that are experienced after witnessing a fear-inducing situation will affect perceptions and judgments of situations unrelated to the stimulus that originally evoked the fear. This proposal is not unique to the FBM and has been previously defined as incidental affect (Bodenhausen, 1993). Previous research has empirically demonstrated incidental fear using explicit measures (Lerner & Keltner, 2001; Lerner et al., 2003). It has also been observed in past research that fear may occur non-consciously (Ohman & Mineka, 2001). Study 1 was a general test, using both implicit and explicit measures, of whether watching a frightening film clip (compared to watching a humorous film clip) caused an increase in implicit and



explicit fear. Implicit fear is defined as a faster association or preference for fear related words than non-fear related words, without necessarily being aware of such a preference. The concept of implicit fear will be elaborated in detail below. Explicit fear is defined as an increase in self-reported perceptions of the likelihood of various threats, compared to a control group, as measured by an explicit questionnaire.

Implicit measures were utilized in this research because there may be social desirability factors when participants report explicit fear. Some participants may not wish to admit that they are afraid, or that they perceive a threat as likely to occur, due to possible concerns of being perceived as weak or overly sensitive. Others may simply not be able to accurately report their explicit feelings of fear. Additionally, it is beneficial to measure both implicit and explicit fear in order to determine how, if at all, the two are related to one another.

### Hypotheses

It was hypothesized that participants who watched a scene from a frightening movie would have significantly higher implicit and explicit fear scores than those who watched a scene from a movie unrelated to fear. Additionally, it was hypothesized that a 10-minute film clip taken from the movie 'The Ring', which has not been established as a fear manipulation, would serve as a sufficient fear manipulation as compared to a clip from the movie 'Meet the Parents'.

## Method

### Participants

123 Rutgers University students participated as a way to receive class credit in their introduction to psychology course. Of 123 participants, 71 were male and 52 were female. 63 participants were White, 8 were Black, 34 Asian, 11 Latino, 1 mixed race, and 6 classified themselves as other. 5 participants were under the age of 18, 56 participants were eighteen, 34 participants were age 19, 8 participants were age 20, 12 participants were age 21, 6 participants were age 22, and 6 participants were older than 22 years old. Of the 123 participants, 97 claimed to have seen the entire movie from which the clip was taken.

### Design

Study 1 incorporated multiple implicit measures in order to determine the most effective implicit measure of fear that was to be utilized in the subsequent studies. Because three separate implicit measures were used, each implicit measure was compared three separate times across the two video conditions. So, for the IAT and Implicit Mood Measure, each used a one-way design with two groups. For the LDT, the design is a 2 x 3 mixed model (for reasons to be discussed below). Because the explicit measures were the same for everyone, the design for the explicit measures for Study 1 was collapsed across all implicit measures, leaving a single one-way design with two groups.

### Stimuli and Measures

Fear-inducing video clip. This was a ten minute clip taken from the film The Ring (2002), directed by Gore Verbinski and starring Naomi Watts. This film is widely

perceived to be a frightening movie. It follows the story of a girl who was murdered and who then haunts and kills those who watch a possessed videotape.

Funny video clip. The funny video clip was a ten minute clip selected from the film Meet The Parents (2000), directed by Jay Roach and starring Ben Stiller and Robert De Niro. The film is an interesting and lighthearted story about Ben Stiller's character meeting and spending a weekend with his girlfriend's parents. This film was not expected to induce fear and was chosen based on the idea that it would cause participants to relax and become calm.

Implicit fear IAT. Some participants completed an IAT (Greenwald, McGhee, & Schwartz, 1998), a reaction time-based method that has been used extensively to measure implicit attitudes, self-esteem, and self-concepts (Lane, Banaji, Nosek & Greenwald, 2007). The IAT has not yet been used to measure implicit affect, but a self-related IAT has been shown to be responsive to various threats (Rudman, Dohn, & Fairchild, 2007). The IAT used in Study 1 can be found in Appendix A.

The implicit fear IAT first employed two practice tasks in which participants had to first distinguish between "Self" and "Other" (I, self, me, mine vs. other, them, they, theirs), followed by "Fear" versus "Calm". The fear related words that participants sorted into the category of "Fear" were fear, terror, horror, and panic, and the calm-related words that participants sorted into the category of "Calm" were calm, relax, peace, and rest. The IAT effect was then computed by subtracting response latencies when participants associated words related to "Fear/Other" and "Calm/Self", from the time it took to categorize "Fear/Self" and "Calm/Other" (a positive score reflects greater implicit fear). Higher IAT scores in the fear clip condition relative to the non-fear clip condition

suggests the presence of implicit fear in those participants who watched ‘The Ring’.

Following recommended procedures, the D statistic was used to score the IAT (Greenwald, Nosek, & Banaji, 2003).

Lexical decision task. In the lexical decision task (LDT; Appendix B), stimuli was presented on the computer screen and participants had to determine as quickly as possible whether the stimuli were words or non-words by pressing the appropriate key (Wittenbrink, Judd, & Park, 1997). The words that appeared on the screen were either related to fear or to calm (using the same stimuli as described for the IAT). Non-words were random letter strings (e.g., glytx). Participants saw 90 trials; the fear, calm, or non-words appeared randomly. A practice session with control words (e.g., desk, table, chair) was administered before data collection to allow participants to become familiar with the process. It was hypothesized that participants who watched the frightening film clip would identify fear related words more quickly than calm or control words. Past research has shown media effects on the lexical decision task (Rudman & Borgida, 1995).

Implicit mood measure. The implicit mood measure (Hass et al., 1992; Koole et al., 1999) is the third measure of implicit fear that was used in Study 1 (Appendix C). The implicit mood measure has been recently used to measure implicit anger (Krieglmeyer, Wittstadt, & Strack, 2009). Participants were told to attend to “words” flashed on a computer screen. What actually appeared on the screen were not words, but rather a nonsense letter jumble (e.g., tdoftp). The non-word was presented for 20 milliseconds and masked for 40 milliseconds so that participants could not read it. After the mask, three words appeared and the participant was asked to choose the word that they believed they saw, “based on their gut feeling”. The word options were either fear related (e.g., terror,

horror), calm related (e.g., relax, serene), or neutral words (e.g., chair, desk). Word options were all similar in appearance and in length. Participants saw 27 trials, 13 of which were filler (no fear or calm related words). It was hypothesized that those in the frightening video condition should report “seeing” more fear related words than those who watched the funny film clip.

Fear Survey Schedule II. There were two explicit questionnaires utilized along with the above implicit measures. The first (Appendix D) was a shortened version (10 questions) of the Fear Survey Schedule II (FSS II; Bernstein & Allen, 1969; Geer, 1965; Suls & Wan, 1987). The shortened version has been used to measure explicit fear in past research (Lerner & Keltner, 2001; Suls & Wan, 1987), and is based on the main factors obtained from the original 51 question Fear Survey Schedule (Geer, 1965). It was hypothesized that those in the fear film clip condition would rate themselves as being more afraid of the items in this survey as measured on a 7-point Likert scale. This prediction is based on past research showing that those who are feeling incidental fear rate higher levels of fear and worry on explicit questions than those who aren’t feeling fear.

Concern for Death. The second explicit questionnaire (Appendix E) asked participants to rate their concern over various causes of death (e.g., terrorism, war, stroke, flood). This questionnaire was taken from Johnson and Tversky’s (1983) classic study in which participant’s rated the likelihood of death from various causes after reading about fearful events. Participants rated their level of concern on a 9-point Likert scale with 1 being “not at all worried” and 9 being “very worried”. It was predicted that those in the fear clip condition would show a higher level of worry over various causes of death than those in the neutral clip condition.

Manipulation check. Finally, as a manipulation check, participants were asked how much they were feeling a variety of emotions (Appendix F). This questionnaire has been used in past research by Lerner, Small, & Lowenstein (2004), and asks participants to think back to the film clip they watched. An emotion related word appeared in the center of the screen and participants were asked to rate how much they felt the emotion while watching the film on a 9-point Likert scale, with 1 equaling “Not at all”, and 9 equaling “More strongly than ever”.

As an additional manipulation check, participants rated how frightening, funny, and interesting they perceived the film clip to be. Additionally, all participants were asked if they had seen the original movie that the film clip was taken from.

#### Procedure

Before participants entered the lab, the experimenter randomly determined whether the participants were going to be given the IAT, the LDT, or the Implicit Mood measure, and randomly determined what film clip they watched. The experimenter then set up the computers to reflect that condition. Participants entered the lab and were told that they were going to watch a 10-minute film clip. They were told that, as they watched the film clip, they should imagine how they would feel if they were involved in the situation on the screen. They were then randomly assigned to a computer and the film clip was played on the computer.

After participants watched the movie clip, they were first asked an open ended question about how they would feel if they were involved in the situation that they just witnessed. This was done to ensure that they were paying attention to the film clip, as well as to reinforce the mood inducement of the film. The instructions on the computer screen

then guided them to take the IAT, the LDT, or the Implicit Mood Measure. They then completed the explicit questionnaires (explicit questionnaires were counterbalanced), followed by the manipulation checks. When they were finished, they were fully debriefed and thanked for their participation.

## Results and Discussion

### Preliminary Analyses

Means and standard deviations for all explicit and implicit measures are presented in Table 1. Reliability analysis was calculated for two scales. The first, the FSS II scale (see Appendix D; Bernstein & Allen, 1969; Geer, 1965; Suls & Wan, 1987) consisted of 10 situations or words (e.g., speaking in front of a group, snakes, etc.), and participants were asked to rate how much each item caused “anxiety, uneasiness, or other unpleasant feelings”. Cronbach’s alpha for these ten items was  $\alpha = .75$  (.76 for analysis without the Limbo group, which is discussed below). The second scale, the Concern for Death scale (Johnson & Tversky, 1983), was comprised of 18 various dangerous occurrences (flood, homicide, electrocution; see Appendix E). Cronbach’s alpha for this scale was  $\alpha = .95$  (it was also .95 for analysis without the Limbo group).

Participants were asked to rate how frightening they found the film clip to be. Because some participants found the clip from the horror movie to be terrifying (9 on a 9 point scale), and others did not find it to be frightening at all (1 on a 9 point scale), participants were separated into three groups based on their emotional reaction to the film clips. The first group consisted of those participants who watched the frightening film clip and rated the clip as 7 or higher (on a 9 point scale) to the question “How frightening was

the film clip?”, with 1 being “Not at all frightening” and 9 being “Very frightening”. This group will be referred to as the “Afraid” group.

The second group consisted of participants who watched the funny film clip and rated the clip as 3 or lower on the question, “How frightening was the film clip?”. Although this group included most (but not all) participants in the control condition, it was performed to ensure that no one had been in any way frightened by the funny clip (some people may have felt anxious or nervous for the main character while watching the funny film clip). This group will be referred to as the “Calm” group.

Finally, group 3 consisted of participants who watched the frightening film clip but did not find it to be scary (rated 6 or lower), as well as participants who watched the funny film clip and rated it 4 or higher in terms of how frightening it was. This group will be referred to as the “Limbo” group.

Therefore, data analysis for Study 1 (as well as subsequent studies) was conducted twice. For the first analyses, those participants who watched the frightening film clip were compared to those who watched the funny film clip. For the second set of analyses, participants in the Limbo group (described above) were removed and only participants in the Afraid and the Calm group were compared to one another. For this analysis, 42 participants were in the Afraid group, and 54 participants were in the Calm group. Of these participants, 50 were male and 46 were female. 45 of these participants were White, 7 Black, 27 Asian, 10 Latino, 1 Mixed Race, and 6 classified themselves as Other. This second analysis was performed in order to ensure that participants who watched the frightening film clip actually found the clip to be frightening, and to ensure that those who watched the funny film clip did not find the clip to be in any way frightening.



## Implicit Results

For the IAT, standard calculation procedures for computing participant's scores were used (Greenwald, Nosek, & Banaji, 2003; Nosek, Greenwald & Banaji, 2005). The IAT scores were then averaged in the Fear-Video condition and in the Funny-Video condition. These two average implicit scores were compared using an independent samples t test. For participants who watched the frightening video ( $n = 21$ ), the average IAT score ( $M = -.40$ ,  $SD = .29$ ) was compared to those who watched the funny video ( $n = 17$ ,  $M = -.36$ ,  $SD = .41$ ). This comparison was not significant ( $t(36) = -.30$ , ns), indicating that there was no difference in implicit fear, as measured by the IAT, between the fear and funny video condition. These results were similar when the Limbo group was removed from analysis.

For the LDT, participants were asked to recognize, as quickly as possible, whether a word that appeared on the screen was either a nonsense word or an actual word. The actual words were either words associated with fear or with calm. Therefore, three separate comparisons were made: the amount of time, in milliseconds, it took participants to recognize calm words compared to nonsense words, the amount of time to recognize fear words to nonsense words, and the amount of time to recognize calm words to fear words. For each of these comparisons, the mean amount of time for one category was subtracted from the other and the resulting number was compared to zero using a single sample t-test across both conditions. All three comparisons were significantly different, with participants taking significantly less time to recognize calm words as compared to nonsense words ( $M=31.23$ ,  $SD=55.05$ ,  $t(38)=3.542$ ,  $p<.01$ ), less time to recognize fear words as compared to nonsense words ( $M=61.48$ ,  $SD=69.94$ ,  $t(38)=5.49$ ,  $p<.001$ ), and

less time to recognize fear words compared to calm words ( $M=30.25$   $SD=54.60$ ,  $t(38)=3.46$ ,  $p<.01$ ).

These three difference scores and condition (funny or frightening film clip) were then compared using a 2 x 3 mixed model ANOVA. Each of the three difference scores described above was a within subject variable and the film clip the participants watched was a between subject variable. Although the three difference scores were significantly different than one another ( $F(2, 36) = 14.35$ ,  $p < .001$ ), there was no significant interaction between the difference scores and the film clip ( $F(2, 36) = .31$ , ns), nor did the LDT scores differ between film clips ( $F(1, 37) = .45$ , ns). These results indicate that the LDT did not assess implicit fear between conditions. These results were similar when the Limbo group was removed.

Finally, for the Implicit Mood Measure (Hass et al., 1992; Koole et al., 1999), the number of fear related words chosen in the critical trials were added up for each participant. The total number of fear related words chosen in the fear-video condition was then compared to the number of fear related words in the funny-video condition using an independent samples t test. Participants who watched the frightening video ( $n=22$ ) chose an average of  $M = 7.22$ ,  $SD = 2.58$  fear related words in the critical trials, as compared to  $M = 4.92$ ,  $SD = 2.45$  for those who watched the funny video ( $n=24$ ). An independent samples t test indicated that these means were indeed significantly different,  $t(44) = 3.058$ ,  $p < .01$  (as they were when the Limbo group was removed).

It was hypothesized that participants would show higher levels of implicit fear after watching a frightening film clip as compared to a funny film clip. This hypothesis was confirmed for those who took the implicit mood measure, but not for the IAT or the

LDT. Because of this, the implicit mood measure was utilized as the implicit fear measure for both Study 2 and Study 3.

### Explicit Results

Mean ratings of each explicit variable were compared across conditions using an Independent samples t test. It was hypothesized that those who watched the frightening video would rate various risks as more like to occur than those who watched the funny video. The results for these comparisons can be seen in Table 1.

When the second analysis was run with participants from the Limbo group excluded, additional comparisons became statistically significant. As can be seen from this table, the two compiled scales described above differed significantly across conditions (FSS II,  $t(94) = 2.27$ ,  $p = .03$ ; Concern for Death,  $t(94) = 1.98$ ,  $p = .05$ ). These results indicate that participants perceived greater explicit risk after watching a frightening film clip as compared to a funny clip.

### Implicit and Explicit Results

The implicit dependent variables were correlated with all explicit dependent variables and are presented in Table 2. As can be seen from this table, the only implicit measure that correlated significantly with an explicit measure was the Implicit Mood measure and the self-reported fear from the film ( $r = .35$ ,  $p < .05$ ). This correlation means that participants who rated the film as more frightening also chose more fear related words on the implicit mood measure. All other implicit measures did not correlate significantly with any of the explicit variables.

### Emotion Manipulation Check

All participants were asked to rate how much they were feeling a variety of emotions after completing the experiment (see Appendix F). This manipulation check was obtained from Lerner, Small, & Lowenstein (2004) and asks participants to rate on a Likert scale how much they are feeling a given emotion. Responses to these emotions were compared across the fear and funny video conditions. The results for this manipulation check can be seen in Table 3.

As can be seen from this table, there were multiple significant differences on a variety of reported emotions. As expected, participants in the fear video condition reported themselves as feeling significantly more afraid, anxious, fearful, nervous, scared, and tense than those in the funny video condition. Additionally, participants in the Funny video condition rated themselves as feeling significantly more of the emotions calm, gleeful, and warm heartedness.

There were also a few emotions that differed unexpectedly across conditions. Participants in the Fear video condition expressed feeling significantly more sadness and disgust, and when the Limbo group was removed, the emotions scornful, surprise, alert, angry, disdain, irritated, and mad become significantly more reported in the fear than the funny video condition. It is somewhat unclear why a frightening video may cause participants to report more sadness and anger than those who watched a funny video. Perhaps the funny video simply helped to reduce these emotions rather than the fear video increasing them.

Overall, the results from Study 1 confirmed the hypotheses. The totals of the FSS II scale and the Concern for Death scale differed across conditions, when the Limbo group

was removed from analysis, as predicted. Additionally, although the IAT and LDT did not differ significantly across the fear and funny video conditions, the Implicit Mood Measure did. For Study 2, the Implicit Mood Measure will once again be utilized, along with the FSS II and an altered version of the Concern for Death measure.

## STUDY TWO

Study 2 was an attempt to measure one of the unique proposals of the FBM - that feelings of dissonance between fear and cognition lead to an increase in risk perception. As has been noted, fear can be invoked automatically and may occur outside of conscious awareness (Bechara et al., 1997). It has also been argued that it is difficult to reduce feelings of fear using simply cognitive means (Fodor, 1983), and that emotion tends to override cognition (Lowenstein et al., 2001). Festinger (1957) also suggested that when two things are causing dissonance, people will likely make the easiest change in order to reduce that dissonance. One of the unique proposals of the FBM is that if there is dissonance between fear and cognition, cognition is easier to change than the emotion of fear, and cognition will shift toward fear, and not the other way around.

Study 2 sought to examine whether participants would show a decrease in risk perception, after having watched a frightening film clip, if they were able to reduce feelings of dissonance. It was additionally predicted that there would be no difference between a dissonance and a dissonance reduction condition in terms of implicit or explicit fear. This is because, it is hypothesized, dissonance reduction will only alter perceptions of risk (the cognition), and not feelings of fear (the emotion). As was previously mentioned, if participants are feeling dissonance between two things, the one that takes less effort to alter will likely be changed in order to reduce the dissonance – in this case, the cognition (Festinger, 1957). Participants should, therefore, show similar levels of implicit and explicit fear across conditions, given that fear is more difficult to alter after a reduction in dissonance.

## Hypotheses

It is hypothesized that people who experience dissonance reduction should subsequently show less concern for the items on the FSS-II (Geer, 1965; Bernstein & Allen, 1969) and the Risk Attitude scale (Weber, Blais, & Betz, 2002; discussed below), as well as estimate fewer people dying from the 18 causes of death as given by Johnson and Tversky (1983), as compared to those who are not given the opportunity to reduce their dissonance. All participants should, however, continue to show the same amount of implicit fear across conditions, as measured by the Implicit Mood Measure (Hass et al., 1992; Koole et al., 1999). This, it is hypothesized, is because when an opportunity to reduce dissonance arises, participants will adjust their cognitions to be more in line with their emotions, rather than the other way around. Therefore, participants in the dissonance reduction condition should show less reported worry and concern on the explicit measures, but the same amount of implicit fear as participants in the control condition. Participants should also report feeling a similar level of explicit fear across conditions as measured by the general emotion questionnaire manipulation check (Lerner, Small, & Lowenstein, 2004).

## Method

### Participants

Participants were 101 Rutgers University undergraduates enrolled in introductory psychology classes. They received credit in their class (RPU) for participating in the study. Of 101 participants, 59 were male and 42 were female. 50 participants were White, 6 were Black, 24 Asian, 15 Latino, 2 mixed race, and 4 classified themselves as other. 2 participants were under the age of 18, 38 participants were eighteen, 49 participants were

age 19, 7 participants were age 20, 2 participants were age 21, and 3 participants were older than 22 years old. Of the participants, 72 claimed to have seen the entire movie from which the clip was taken.

### Design

There were only two conditions for Study 2, so the design was a one-way design with two groups. All participants watched the frightening film clip. Participants were then either given the chance to reduce their feelings of dissonance, or were not given the chance to reduce dissonance. Other than this manipulation, all other aspects of the two conditions were identical.

### Measures

Fear Survey Schedule II. All participants completed the 10-item FSS-II (Geer, 1965; Bernstein & Allen, 1969; See Appendix D), as described in Study 1.

Concern for Death. All participants rated their level of worry over 18 different causes of death (e.g., terrorism, homicide, flood; Johnson & Tversky, 1983). The items for this measure were the same as for Study 1 (Appendix E). However, rather than having participants rate the likelihood of various events on a 9-point Likert scale as was done in Study 1, participants were asked to give open-ended answers to each item. In other words, participants were asked to estimate how many deaths occur each year in the United States due to each situation. This was changed from a Likert scale to an open-ended scale because, it was hypothesized, an open-ended scale would enable a greater sensitivity to any fluctuations due to fear. For Study 1, the Concern for Death scale wasn't significantly different across conditions until the Limbo group was removed. By having participants give open-ended numeric responses to estimates of the number of people who die each



year due to each event, it is thought that the scale is a more sensitive dependent measure for Study 2.

**Risk attitude scale.** An additional scale measuring risk perception was added to Study 2 (Appendix G). This scale, entitled the ‘Risk-Attitude Scale’ (Weber, Blais, & Betz, 2002), is a 21 item scale that asked participants to rate a series of mildly to moderately risky activities or events (i.e., exposing your self to the sun without sunscreen), and participants were asked to report their level of worry over each item on a 7-point Likert scale. This scale was added in order to determine whether the dissonance manipulation would have an impact on the perception of mild risks in addition to more severe risks. The scale was first administered to participants by asking them to rate how risky they found each item to be. The same items were then presented a second time, and participants were asked to rate how likely it is that they would engage in the given behaviors. The instructions for both scales are found in Appendix G.

**Emotion manipulation check.** All participants rated how much they felt a variety of emotions while watching the film clip (Lerner, Small, & Lowenstein, 2004; see description in Study 1 and Appendix F), as well as their perceptions of the quality of the film itself.

**Implicit mood measure.** Study 2 utilized the Implicit Mood Measure (Hass et al., 1992; Koole et al., 1999) as described in Study 1 (See Appendix C). This implicit measure was utilized in Study 2 because it was observed to be the most effective implicit measure from Study 1.

## Procedure

In Study 2, all participants were shown the frightening film clip from Study 1. This, it was predicted, should have caused an emotion (fear) that was not consonant with the participant's cognitions (perception of threat), thus producing dissonance. Participants were then randomly assigned the opportunity to either reduce their dissonance or not. This was operationalized by having the experimenter tell some participants that the researchers were working with the Rutgers engineering department to test a new lighting system. The researcher explained to the participants that the lights being used were supposed to have certain benefits, but they have also been noted to cause uneasiness and discomfort in people. Participants were then told that if they were feeling any discomfort, it is just the lights and that they shouldn't worry about it (for the exact script, see Appendix H).

The participants who were not given the option of reducing their dissonance were simply not told about the special lights, though the lights were of course still on in the room. This is based on a manipulation that has been utilized in past research (Cooper, 1998; Zanna & Cooper, 1974) and has been successful in reducing dissonance. This is because, it is believed, people who are able to attribute any feelings of cognitive dissonance to an external object such as a pill or a light will not feel a need to make their emotions (fear in this case) consonant with their cognitions.

Participants first came into the lab, filled out the consent form, and were told about the study. After the experimenter asked if they had any questions about the study, the experimenter (in the dissonance reduction condition only) told the participants about the lights in a casual, 'oh, I almost forgot' way. Next, all participants watched the frightening film clip, and completed the implicit and explicit measures.

## Results and Discussion

### Preliminary Analyses

Means and standard deviations for the FSS II scale, the Concern for Death measure, and the Implicit Mood Measure are presented in Table 4. Means and standard deviations for the Risk Attitude Scale are presented in Table 5. For Study 2, the ‘Limbo Group’ was removed in a slightly different way than in Study 1. Analysis was first conducted on all participants, and then once again on only those who rated the movie as being 5 or higher on a 7 point scale to the question “How frightening was the film?”. This was done to ensure that all participants being analyzed perceived the film clip as frightening.

Reliability analysis was calculated for four scales. For the FSS II scale (see Appendix D; Geer, 1965; Bernstein & Allen, 1969), Cronbach’s alpha was  $\alpha = .68$  (.70 for analysis without the Limbo group). The Concern for Death (Johnson & Tversky, 1983) measure was comprised of 18 various dangerous occurrences (flood, homicide, electrocution; see Appendix E), and participants were asked to provide an estimate of the number of Americans who die each year due to each, using an open ended response option. Because the responses to this scale had a large range, and therefore an increased variability, each item was tested using a Shapiro-Wilk test for normality. For the Shapiro-Wilk test, if the W statistic is significant, it indicates that the item being analyzed is not normally distributed. Before the log transformation, the Shapiro-Wilk test reported a significant W for each item in the scale ( $p < .05$ ), indicating non-normality. After log transformation, however, each item in the scale had a non-significant W ( $p > .05$ ), indicating that the log transformed items were normally distributed. Cronbach’s alpha for

these 18 log transformed items was  $\alpha = .76$  (it was also .76 for analysis without the Limbo group). For the Risk Attitude Scale, Cronbach's alpha was  $\alpha = .83$  (.86 With participants from the Limbo group removed). For the Risk Behavior Scale, Cronbach's alpha was also  $\alpha = .83$  (.83 with participants from the Limbo group removed).

### Explicit Results

For the FSS scale, the items were analyzed across conditions, both individually and after being totaled, using an independent samples t test (see Table 4). Before participants from the Limbo group were removed, all but two (illness of a loved one and death of a loved one) of the means were in the predicted direction. That is, the mean rating of the amount of worry for each item was lower in the dissonance reduction condition than in the control condition. When the Limbo group was removed, however, all means moved in the predicted direction (most, but not all, means were in the predicted direction before the Limbo group was removed), and the total of the FSS scale became statistically significant when compared across conditions ( $t(65) = 2.03, p = .05$ ). This indicates that a reduction in dissonance after watching a frightening movie did help to reduce the perceived risk of the items on the FSS II.

The open-ended questions in which participants estimated how many Americans die each year to various causes (titled the Concern For Death measure), as was noted above, was log transformed and the individual items were added together to form a scale. An independent samples t test was performed comparing the individual items on this scale, as well as the total of the items, between the dissonance reduction and the control conditions. Before participants from the Limbo group were removed, only one of the individual items was significant across conditions (lung cancer,  $t(96) = 2.57, p = .01$ ).

After participants from the Limbo group were removed, all means were in the predicted direction (participants in the dissonance reduction condition reported fewer deaths than those in the control condition). The total of these items, however, was only marginally significant across conditions ( $t(53) = 1.75, p = .09$ ).

Additionally, A one-way ANOVA was conducted comparing the funny, fear, and limbo group. A pairwise contrast was then used to compare the funny and fear group. The analysis was conducted this way, in addition to the independent samples t tests described above, because this analysis utilizes the degrees of freedom from the entire data set. The results from this analysis, however, did not alter the results and are therefore not described in further detail.

For the newly added questionnaires, the Risk Attitude and the Risk Behavior scale (see Table 5), there were no significant differences across conditions after the scales were totaled. As was noted above, the risks in these scales were fairly benign, which may explain why these scales did not significantly differ across conditions.

### Implicit Results

The number of fear related words chosen on the Implicit Mood Measure (Hass et al., 1992; Koole et al., 1999) was added up for each participant (see Study 1). The mean values for this variable were then compared across conditions using an independent samples t test. The results indicate that there was no difference in how many fear related words were chosen across conditions (Fear,  $n=53, M=5.74(2.86)$ ; Calm,  $n=48, M=5.56(2.47)$ ,  $t(99) = .33, ns$ ). These results were similar when participants from the Limbo group were removed (Fear,  $n=35, M=5.83(2.66)$ ; Calm,  $n=32, M=5.75(2.09)$ ,  $t(65) = .13, ns$ ). These results support the hypothesis that, although dissonance reduction

seemed to reduce perceived risk on some of the explicit variables, it had no impact on implicit fear.

### Implicit and Explicit Results

A correlation was run on the Implicit Mood Measure, the FSS II scale, the Concern for Death Measure, and the Risk Attitude/Behavior Scale (Table 6). As can be seen from this table, the Implicit Mood Measure did not correlate significantly with any of the explicit measures. These results are similar to those found in Study 1, with the exception that, in Study 1, the Implicit Mood Measure and participants' self reported fear after watching the movie were significantly correlated at  $r = .35$ . This finding indicates that the significant correlation from Study 1 may have been due to chance.

### Emotion Manipulation Check

All participants were asked to rate how much they were feeling a variety of emotions after completing the experiment (see Appendix F). Participant's responses on the emotion manipulation check were compared across the dissonance and dissonance reduction conditions. The results for this manipulation check can be seen in Table 7.

As can be seen from this table, only a handful of comparisons across conditions were significantly different from one another, and in no particular pattern. This finding confirms the hypothesis that, although the dissonance reduction may have reduced the explicit perception of certain risks, it did not seem to alter participants' explicit self-reported emotional states.

### STUDY THREE

Study 3 extended the results of the first 2 studies by testing whether incidental fear would influence implicit person perception. The video fear manipulation was used to determine whether those who were feeling fear would see outgroup members as more frightening and report more prejudice against them. Specifically, participants completed an anti-Muslim implicit measure, as well as several explicit measures. They did so after watching either a funny or fear inducing film clip. A third neutral clip condition was also added.

Past research suggests that negative emotions can exacerbate implicit outgroup prejudice (DeSteno et al., 2004; Schaller, Park, & Mueller, 2003). Additionally, Recent research has examined the role of threat and its impact on perceptions of gay males (Bromgard & Stephan, 2006), Affirmative Action (Renfro, Duran, Stephan, & Clason, 2006), immigrants (Stephan et al., 2005), and prejudice in general (Corenblum & Stephan, 2001), amongst others. These studies found that threat tended to exacerbate prejudice and bias.

#### Hypotheses

It was hypothesized that participants who had just watched a frightening video would express explicit bias against Muslims as measured by a Bias Against Muslims scale (Bushman & Bonacci, 2004), as well as implicit association of Muslims with fear as measured by an Anti-Muslim IAT (Greenwald, McGhee, & Schwartz, 1998), as compared to participants who watched the funny or neutral film clip. Additionally, it was hypothesized that participants who watched a frightening clip would score higher on the FSS II (Geer, 1965; Bernstein & Allen, 1969), higher on a Fear of Terrorism scale

(Oswald, 2005), choose more fear related words on the Implicit Mood Measure (Hass et al., 1992; Koole et al., 1999), and rate Muslims lower on a feeling thermometer, as compared to participants who watched the funny or neutral clip.

## Method

### Participants

Participants in this experiment were Rutgers University undergraduates enrolled in introductory psychology classes. They received credit in their class (RPU's) for participating in the study. Of 81 participants, 53 were male and 28 were female. 46 participants were White, 5 were Black, 13 Asian, 4 Latino, 6 mixed race, and 6 classified themselves as other. 46 participants classified themselves as Christians, 4 as Muslims, 4 as Hindus, 1 as Buddhist, 6 as Jews, 5 as Atheists, and 12 as other. 1 participant was under the age of 18, 28 participants were eighteen, 40 participants were age 19, 10 participants were age 20, 1 participants was age 21, 0 participants were age 22, and 1 participants was older than 22 years old. Of the participants, 46 claimed to have seen the entire movie from which the clip was taken.

### Design

This study was a 3 (Fear vs. Funny vs. Neutral video) group between-subject design.

### Stimuli and Measures

**Video Clips.** The video clips were identical to those described in Study 1, however, a third neutral clip was also added. This clip was a 10-minute clip taken from the movie, A Beautiful Mind, starring Russell Crowe and directed by Ron Howard. A clip was chosen that was deemed interesting yet was thought to be as emotionally neutral as



possible. So, for Study 3, a frightening clip, a funny clip, and an emotionally neutral clip were used.

**Anti-Muslim IAT.** The Muslim-Christian IAT (Appendix I; Greenwald, McGhee, & Schwartz, 1998) is a standard IAT in which participants assigned stereotypical Muslim sounding first names (Muhammad, Abdul, Fareed) and Christian first names (Matthew, James, Jonathan) to the categories of “Muslim” and “Christian”. Next, participants assigned fear related words (terror, horror) and calm words (relax, serene) to the categories of “Fear” and “Calm”. The IAT effect was computed by subtracting response latencies when participants associated words related to “Fear/Christian” and “Calm/Muslim” from the time it took to categorize “Fear/Muslim” and “Calm/Christian” (a positive score reflects greater implicit fear of Muslims).

**Implicit mood measure.** All participants were given the implicit Mood Measure (Appendix C; Hass et al., 1992; Koole et al., 1999) as described in Study 1.

**Fear survey schedule II.** All participants were given the FSS II (Bernstein & Allen, 1969; Geer, 1965; Suls & Wan, 1987) described in Study 1 (Appendix D).

**Fear of terrorism scale.** Participants were given a five-item scale (Appendix J; Oswald, 2005) that assessed their perceptions of the potential threat of terrorism in the United States. The scale included such statements as “I feel personally at risk for being the victim of a terrorist attack”. Participants were asked to indicate how much they agreed with the statements on a 7-point Likert scale.

**Bias against Muslims Scale.** An eleven-item scale was administered that attempted to assess participants’ explicit bias towards Muslims (Appendix K; Bushman & Bonacci, 2004). The original scale used the term ‘Arab-American’, which was replaced by the word

‘Muslim’ for the current research. This scale included such statements as “If there are too many Muslims in America, our country will be less safe”, and asked participants to rate how much they agree on a scale of 1-7.

Feeling thermometers. Feeling thermometers assessed participants’ explicit attitudes towards Christians and Muslims (Appendix L). Participants rated, from 0 – 100, how much they liked the group in question, with 0 being ‘completely dislike’ and 100 being ‘like as much as possible’.

Emotion manipulation check. All participants rated how much they felt a variety of emotions while watching the film clip (Lerner, Small, & Lowenstein, 2004; see description in Study 1 and Appendix F).

#### Procedure

Participants entered the lab where they were randomly assigned to one of three conditions, each of which showed one of the film clips described above. Participants were told that they were going to watch a 10-minute film clip and that they would be asked to imagine how they would feel if they were involved in the situation being portrayed in the clip. They were then randomly assigned to a computer and the film clip was played on the computer.

After watching the film clip, the instructions on the computer screen guided the participants to first take the Muslim/Christian IAT. Next, participants completed the FSS II, Fear of Terrorism scale, Bias Against Muslims scale, the feeling thermometers, and the Implicit Mood Measure (the order of these tasks was counterbalanced). They then completed the emotion manipulation check described above. When they were finished, they were fully debriefed and thanked for their participation.

## Results and Discussion

### Preliminary Analyses

The 10 items from the Fear Survey Schedule II (Bernstein & Allen, 1969; Geer, 1965; Suls & Wan, 1987) were analyzed to ensure reliability. Cronbach's alpha for these 10 items was  $\alpha = .77$ , and  $\alpha = .76$  when participants from the Limbo group were removed. Reliability for the 5-item Fear of Terrorism Scale (Oswald, 2005) was also calculated, and Cronbach's alpha was  $\alpha = .75$  ( $\alpha = .74$  when participants from the Limbo group were removed). Finally, reliability was calculated for the 11-item Muslim bias scale. Cronbach's alpha for the scale was  $\alpha = .94$ , and  $\alpha = .94$  when the Limbo group was removed.

Additionally, it should be noted that, because Muslims may bias the results, all analyses were run with and without Muslim participants. Because the results were not significantly affected after removing Muslim participants, all participants' data are presented below.

### Implicit Results

A one-way ANOVA was conducted to compare the IAT effect across the three conditions for the 'Muslim vs. Christian' IAT. Results of this analysis indicated a significant overall ANOVA ( $F(2, 78) = 6.04, p < .01$ ). A Tukey HSD post-hoc test indicated that the mean IAT effect in the 'Fear video' condition ( $M = .55, SD = .39$ ) was significantly higher (more bias towards Muslims) than both the IAT effects from 'Meet the Parents' ( $M = .25, SD = .30, p < .01$ ), and 'A Beautiful Mind' ( $M = .29, SD = .35, p = .03$ ). The two neutral clips were not significantly different from each other.

Removing the Limbo group further increased the difference between the Fear group and each of the Neutral groups. The one-way ANOVA ( $F(2, 64) = 7.04, p < .01$ ) was once again significant, as were the post-hocs between the Fear ( $M = .63 (.40), n = 19$ ) and the Funny ( $M = .26 (.31), n = 26, p < .01$ ), as well as Fear and the Neutral ( $M = .30 (.22), n = 22, p < .01$ ) conditions.

For the Implicit Mood Measure (Hass et al., 1992; Koole et al., 1999), the total number of fear related words chosen by each participant were added together. The mean totals were compared across the three conditions. Although participants in the Fear condition ( $M = 5.14 (2.31), n = 29$ ) chose a slightly higher number of fear related words than the Funny ( $M = 4.75 (2.49), n = 28$ ) and Neutral ( $M = 4.67 (2.22), n = 24$ ) conditions, the overall ANOVA was not significant, even when the Limbo group was removed. Because this measure failed to replicate from Study 1, it makes it difficult to reach clear conclusions about the Implicit Mood Measure. This will be discussed in further detail in the limitations section.

### Explicit Results

The means and standard deviations for the totals of the explicit questionnaires, as well as the two feeling thermometers are presented in Table 8. Each scale was totaled and compared across the three conditions using a one-way ANOVA. As can be seen from Table 8, none of these comparisons were statistically significant. It should be noted, however, that the Muslim feeling thermometer approached marginal significance ( $p = .11$ ) when the fear condition was compared to the other 2 conditions using a pair-wise contrast.

These results mean that the FSS II, as well as the Implicit Mood Measure, failed to replicate from Study 1. Additional replications of the current study need to be conducted

to determine whether the significant results from Study 1 were due to chance, or whether the fear manipulation actually does have an effect on the Implicit Mood Measure and the FSS II. Additionally, the Fear of Terrorism and Bias Against Muslims Scale, as well as the Feeling Thermometers, were not significantly different across conditions. These findings warrant further studies to determine why the fear manipulation failed to alter explicit variables in Study 3.

#### Implicit and Explicit Analysis

Table 9 reports the correlations between the IAT, Implicit Mood Measure, FSS II scale, Muslim Bias scale, Fear of Terrorism scale, and the two feeling thermometers. As can be seen from this table, the IAT was positively correlated with the Fear of Terrorism scale ( $r = .34, p < .01$ ) and with how frightening participants thought the movie was ( $r = .37, p < .01$ ). Because these are both positive correlations, it indicates that participants with more implicit fear of Muslims also had a higher fear of terrorism and perceived the movie to be more frightening. It is interesting to note that this second correlation indicates that perhaps those with a fear of or bias towards a group (in this case Muslims), might also be particularly sensitive to frightening things in general (in this case, the film clip).

#### Manipulation Check

All participants were asked to rate how much they were feeling a variety of emotions at the end of the study. The overall ANOVA indicated significant differences for the emotions afraid, calm, sad, alert, amazed, angry, disdain, disgust, downhearted, fearful, gleeful, mad, nervous, repulsed, scared, tense, turned-off, and warm hearted. When the Limbo group was removed, surprise and concentrate also became significant. A Tukey HSD post-hoc revealed that these significant differences were due to the

comparisons between the Fear and the Funny group, as well as between the Fear and Neutral group – there were no significant differences between the Neutral and Funny condition on any of the reported emotions. This indicates that participants had similar emotional reactions when watching the Funny and Neutral clips.

## General Discussion

The three studies described in this thesis were designed to empirically examine specific components of the newly proposed Fear Bias Model. The model first predicts that those who are experiencing incidental fear (which may be experienced non-consciously) will perceive risks and threats as being more likely to occur than those who are not afraid (Study 1). The FBM further predicts that individuals may experience dissonance if they aren't able to synch their high feelings of fear with their cognitive appraisal of a situation. If these individuals aren't able to reduce this feeling of dissonance, they will show increased risk perception (Study 2). Finally, the model suggests that incidental fear may cause people to become more fearful of an outgroup, specifically Muslims, and to show more bias towards that outgroup (Study 3).

In Study 1, the results indicated that participants showed a significant increase in explicit risk perception after having watched a frightening film clip as opposed to a funny film clip. Additionally, although there was no significant difference between conditions on an IAT or LDT, participants chose more fear related words on an Implicit Mood Measure after having watched the frightening clip.

The results from Study 1 were mainly a replication of previous findings indicating that risk perception becomes exaggerated when people are feeling incidental fear (see Lerner & Keltner, 2000; 2001). The unique contributions of Study 1 were to establish a measure of implicit fear, as well as to establish that the frightening video would serve as a sufficient fear manipulation. Study 1 didn't directly test an aspect of the FBM, but Study 1 did provide a foundation for Study 2, which did directly test the model. The implications of the results from Study 1 confirm previous findings suggesting that incidental fear can

lead to an increase in the perception of all risk – that is to say, when people are afraid, they may see everything in their environment as more frightening. This broad increase in risk perception may then be affecting everything from a person's perception of the safety of food, cars, or airline travel, to the perceived probability of a natural disaster or a nuclear meltdown.

In Study 2, participants in a dissonance reduction condition showed significantly less explicit perception of risk, as measured by the Fear Survey Schedule II (Bernstein & Allen, 1969; Geer, 1965; Suls & Wan, 1987), and showed a marginally significant reduction in the perceived number of people who die from various incidents, as measured by the Concern For Death measure (Johnson & Tversky, 1983). Additionally, as predicted, there was no significant difference between conditions on the Implicit Mood Measure or on participants' self reported explicit fear. This indicates that, although risk perception was reduced after a dissonance reduction, implicit and explicit fear was not affected. These findings confirm the hypothesis that dissonance reduction will alter explicit risk assessments, and yet not affect participants' emotional states. Study 2 directly tested a component of the FBM: motivation to reduce dissonance between emotion and cognition accounts for an increase in risk perception when people are afraid. The model predicts that people will alter their cognition to be more in line with their emotion, and that emotion is not expected to be affected by a reduction in dissonance. This is what Study 2 attempted to test, and the results from Study 2 partially confirmed this hypothesis. Alternative explanations to dissonance, however, must be considered as well and are discussed below.



Although some of the explicit measures from Study 2 were not affected by a reduction in dissonance, several measures were, indicating that dissonance may be at least partially responsible for an increase in risk perception. Lowering feelings of dissonance may help to reduce this increase in risk perception. Because inflated risk perception may be influencing, presumably in negative ways, a variety of thoughts and behaviors, reducing levels of dissonance and discomfort may have an impact on how people think and behave on a daily basis.

Finally, in Study 3, an additional Neutral video condition was added to the Fear and Funny video conditions. Participants who watched the frightening video showed a significant increase in implicit fear against Muslims, as measured by an IAT (Greenwald, McGhee, & Schwartz, 1998), as compared to the Funny and Neutral video clip condition. The results for the Implicit Mood Measure as well as the explicit measures did not confirm the hypotheses, however, as there was no difference on these measures across conditions. Study 3 did not specifically test an aspect of the FBM. The FBM does predict, however, that a dissonance between cognition and emotion will lead to an increase in risk perception. Study 3, therefore, was an attempt to determine whether this increase in risk perception applied to perceptions of a feared outgroup.

The results from Study 3, though decidedly mixed, may begin to shed some light on how prejudice and bias towards others arise from fear. The results on the IAT suggest that incidental fear has an impact on implicit perceptions of others. It is not yet clear, however, why the explicit measures, as well as the Implicit Mood Measure, did not follow the pattern from Study 1. This will be discussed further in the Limitations section.

Overall, although there were mixed results, some of the results provide initial support for the Fear Bias Model. This model and its associated predictions are critically important for understanding the processes responsible for people's tendency to inflate their perceived risk of various events, as well as other individuals, when they are afraid. Although this phenomenon has been demonstrated in previous research, the current research attempted to further develop a theoretical framework specifying the ways in which this process takes place. Specifically, the current research was the first to provide some support to the proposal that risk assessment is inflated due to a dissonance between fear and cognitive appraisal. When people are feeling fear, and yet their cognitive appraisal of a situation tells them that there is nothing to fear, they feel dissonance. As a way to reduce this dissonance, people's cognitive appraisal of potential risks become increased in order to be more in synch with their feelings of fear. In the current research, this was operationalized by having participants watch a frightening film clip and then giving them a chance to reduce their dissonance by telling them that new florescent lights have been installed that have been reported to cause people uneasiness. Because feelings of dissonance may have arisen between fear and cognitive appraisal, and because those who were told about the lights were given a means to explain away this feeling of discomfort, those who were told about the lights reported less explicit perception of risk.

Additionally, the current research was the first to support the proposal that incidental fear can affect implicit perceptions of Muslims. Those who watched a 10-minute clip from a horror movie were more likely to associate Muslim sounding first names with words related to fear. This occurred even though there was absolutely no

reference to Muslims in the film clip. It seems then that being in a general state of fear triggered implicit prejudice against an outgroup.

#### Theoretical and Real World Implications of the FBM

Empirical support for the FBM may provide a deeper understanding of why fear can sometimes lead to bias, including negative perceptions and behaviors toward outgroup members. This dual process model is the first to propose that dissonance between thoughts and emotions may cause exaggerated risk perceptions, and potentially lead to negative perceptions and behavior toward feared or disliked outgroup members. If a reduction in dissonance can lead to a reduction in inflated risk assessment, and reduction in bias towards an outgroup, the theoretical and applied implications are certainly notable. Being able to reduce feelings of dissonance when a person is afraid may indeed be a stepping stone to reducing intergroup violence and hatred. Specifically, if people feel a dissonance between fear and cognition, they may be inflating their perceived risk of outgroup members as a way to synch their emotional state and cognitions, and ultimately reduce the unpleasant feeling of dissonance that they are experiencing. This increased risk assessment of outgroup members may then lead to prejudice, discrimination, and potential violence against that outgroup. If it were possible to reduce this dissonance, prejudice and discrimination could potentially be reduced.

Another interesting implication of the FBM is the proposal that incidental fear, and not only fear related to the outgroup, may influence perceptions of an outgroup and its members. The current research suggests that it is not only fear related to terrorism that may make a person more likely to be biased towards Muslims, but rather anything that causes fear, including a horror movie, may increase this bias. Although it may be

commonly thought that prejudice and bias stem from specific information about an outgroup member, the current research suggests that a heightened state of general fear, derived from any source, may also contribute to bias. This suggests that intergroup prejudice and bias may not only be exacerbated by an individual's specific cognitive appraisal of an outgroup member, but their general level of fear as well. The implications that incidental fear may trigger fear and bias towards outgroup members certainly warrants further examination.

Real world implications of the current research. The potential real world implications of the findings from Study 1 are rather immense. People make countless decisions on a daily basis that potentially have some sort of risk associated with them: what to eat, drink, where to live, what street to walk or drive down, whom to date or marry, where to work, where and how to invest money, etc. The results of this and past research suggest that any and all of these decisions are potentially affected by whether or not, and to what degree, the person making them is feeling fear. Although it may commonly be believed that people make decisions in a mostly rational and reasonable manor, fear may in fact be biasing those decisions, and ultimately affecting people's lives in ways that they might not be aware of. It could be concluded that, if people wish to make decisions that are as rational and reasonable as possible, they should do so in a complete state of calm. Something as simple as watching a frightening story on the evening news may potentially impact how a person chooses to invest their money or where they decide to drive that evening.

The implications of Study 2, while helping to shed light on why the process of increased risk perception stems from feelings of fear, may also help provide insight into

how we can eliminate this bias. Further empirical evidence is certainly required to support the proposal that risk perception is increased due to a process related to cognitive dissonance. However, this finding suggests that if a person is able to reduce feelings of dissonance, they may also be able to at least partially eliminate this bias and make decisions from a more rational standpoint. Simply being aware that this process occurs may be enough to help people reduce feelings of dissonance and discomfort on a daily basis, and to ultimately reduce the negative effects of fear on thought, perception, and behavior.

Finally, for Study 3, the implications of the current findings suggest that incidental fear may be partially responsible for increasing bias against a feared outgroup, at least on an implicit level. The real world implications of this finding for interpersonal relations and person perception are particularly interesting. Although there are likely numerous factors that contribute to prejudice and bias, fear being but only one, the discovery that incidental fear may be a contributing factor is certainly noteworthy. The historical events mentioned in the introduction, such as the Holocaust and other mass murders, may have had fear at their root. And, although the current research did not directly test whether people would be more likely to harm others when they are afraid, the current research does suggest that fear may be a contributing factor to negative perceptions of outgroups. Knowing that fear may be contributing to bias against an outgroup suggests that, if we can eliminate or reduce a person's fear, we may be able to reduce outgroup bias, and potentially, intergroup conflict and violence.

The current research and its relationship to past research. As was mentioned in the introduction, the tendency to exaggerate the likelihood of various risky events has been

attributed in the past to the availability heuristic (Tversky & Kahneman, 1973). The results presented in this paper, however, suggest that there is more going on than just an exaggeration in risk perception based on information that comes most readily to mind. Using incidental fear as a manipulation ensures that it is fear, and fear only, that is increasing risk perception. Although it may certainly be the case that what comes most readily to mind influences risk perception, it is certainly not the sole factor.

The appraisal-tendency hypothesis (Lerner & Keltner, 2000), which states that fear and anger elicit contrasting appraisals of a situation, with fear eliciting greater uncertainty and perceived environmental control, was neither confirmed or disconfirmed in the current research. Although the FBM also supports the notion that fear leads to an increase in risk perception, the FBM does not propose, nor was it tested, whether this increase occurs due to processes related to perceived uncertainty and environmental control. One of the unique contributions of the FBM, however, was that this increase in risk perception occurs through a process related to cognitive dissonance, which garnered some support in Study 2. There is no reason to suspect that proposals made in the FBM and the appraisal-tendency hypothesis are mutually exclusive; it is possible that exaggeration in risk perception can be due to both an increase in uncertainty and situational control, as well as feelings of dissonance between fear and cognition.

The probability neglect hypothesis (Sunstein, 2003), which states that people will ignore the likelihood of an event occurring when they are afraid, did not get much support from the current research. In the current research, people tended to systematically increase their risk perception, when afraid, as compared to a control group. If people were truly neglecting the likelihood of various risks occurring, it would be expected that people who

watched a frightening video would underestimate as well as overestimate the likelihood of various risks.

The Risk as Feelings model (Lowenstein et al., 2001) is a dual process model that suggests that emotions and cognition diverge when people encounter an emotion inducing stimulus, and that our emotional reaction will tend to override our cognitive reaction. The FBM is influenced by this dual process model, but takes it a step further by explaining that emotions and cognitions diverge, but may also influence one another through a process related to cognitive dissonance.

Finally, the current research has some implications for cognitive dissonance theory (Festinger, 1957). Cognitive dissonance theory proposes that if two things, whether they be thoughts or emotions, are conflicting, people will adjust the easier of the two in order to reduce this dissonance. The results of Study 2 imply that people may be doing this in respect to emotions and cognitions, and that this process may be at least partially responsible for why risk estimates increase when we are afraid.

#### Limitations and Future Directions

A major limitation of this research is that the fear manipulation is relatively weak. Although participants may feel a certain amount of fear after watching a frightening film clip, there is likely no point at which they feel that they are truly in any danger. In a real world situation, people who are afraid very likely feel that they are actually in some sort of danger. In a laboratory setting, it would obviously be entirely unethical to have a participant believe that they were in any sort of actual danger. Because of this limitation, it is impossible to determine the true extent that people may be biased by fear in a laboratory setting.

Additionally, even though participants might experience implicit fear after watching a frightening film clip, it is not known how, or even whether, this implicit fear may impact their behavior. Indeed, future research should incorporate a behavioral component in order to determine whether those who are afraid are likely to act on their fears.

Another limitation to this research is that several of the measures used were relatively untested. Although the Fear Survey Schedule II (Bernstein & Allen, 1969; Geer, 1965; Suls & Wan, 1987) has been used in past research and is fairly established, the Concern for Death measure was combined into a measure for this research alone, as it was only used once in the past (Johnson & Tversky, 1983), though not as a compiled scale. Additionally, the fear film clip has not been used in previous research as a fear manipulation.

Some of the measures also failed to replicate. Most notably, the Implicit Mood Measure and the FSS II failed to replicate from Study 1 in Study 3. Further replications of these studies is needed to determine whether the results from Study 1 or Study 3 may have simply been due to chance.

Another limitation is that some of the choice points were changed from study to study, specifically on the Concern for Death measure. For Study 1, the choice points were on a Likert scale, while for Study 2 this was switched to an open-ended response option. This was done because it was thought that an open-ended response might be more sensitive to fluctuations due to the independent variable. Changing the response options from study to study, however, makes it difficult to compare some results across studies.



Additionally, for the FSS II scale, Cronbach's alpha was relatively low for some of the studies, particularly in Study 2. The FSS scale, when compiled, was the only scale to significantly differ between the dissonance reduction and control conditions. Although the low alpha for this scale should not bring that significant difference into question, it should be noted that the low alpha for the compiled scale is not ideal.

Implicit affect. One question that was not explicitly asked in the current research is whether there is such a thing as implicit affect and, if so, can implicit affect be measured? It is a reasonable assumption that people may occasionally feel certain emotions that they are not able to consciously identify. The question, however, then becomes whether psychologists have developed measures that are able to access and measure these subconscious emotions. Of the three measures used in these studies to measure implicit emotion, two of the measures (the IAT and LDT) failed to produce significant results. The third measure, the Implicit Mood Measure, which was seemingly effective in Study 1, failed to replicate in Study 3. All three measures utilize fear or calm related words, which poses the question as to whether the ability to recognize or choose words related to an emotion is the same thing as having that emotion implicitly. To give this argument the attention it deserves, however, is beyond the scope of this paper. Suffice to say, establishing a valid and reliable measure of implicit emotion would be a valuable contribution to the field.

Alternative explanations of results from Study 2. The results from Study 2 led to the potential conclusion that dissonance between cognition and emotion causes an increase in risk perception. There are, however, alternative explanations to dissonance that warrant further discussion.

The first potential alternative explanation to dissonance being responsible for an exaggerated risk perception in Study 2 is misattribution of arousal (Dutton & Aron, 1974), which is also similar to Schachter and Singer's (1962) two-factor theory of emotion. It is possible that participants are misattributing their fear from the film clip to a feeling they are getting from the lights. Although this is a reasonable explanation, it does not account for why explicit risk assessment is then lowered. Simply misattributing emotional arousal should not account for, and does not explain, why explicit risk assessment was reduced in the dissonance reduction condition as compared to a control condition.

The Affect-as-Information hypothesis (Schwarz & Clore, 1983) states that people consult their emotional state when making a decision, using their emotion as a piece of information that gets weighed into the decision making process. It is certainly possible that participants in the control condition in Study 2 consulted their feeling of fear when they were later asked to estimate various risk assessments. Theoretically, then, it is possible that participants in the dissonance reduction condition misattributed the fear they felt after watching the film to the light, and then dismissed that feeling as not providing a valuable source of information about risk assessment. Although this is a plausible alternative explanation to dissonance, the dissonance explanation seems more parsimonious. Further study is certainly required in order to test which of these theories may be responsible for a reduction in explicit risk assessment.

It is also possible that participants were simply distracted by the story about the lights. This may have moved their full attention away from the questions they were being asked, causing them to give different answers than those who were not told about the lights. This does not explain, however, why risk assessment would be systematically

reduced in the dissonance reduction condition. If participants were simply distracted, it stands to reason that their responses would vary above, as well as below, those in the control condition, thus providing a mean assessment that is statistically equivalent to the control condition. Because explicit risk assessment was found to be significantly lower (as measured by the FSS) in the dissonance reduction condition, it appears that something more than distraction is affecting participants' responses.

Finally, it is possible that excitation transfer played a role in the results found in Study 2. Excitation transfer theory (Zillman, 1971, 1996), which is similar to and influenced by Schacter and Singers' (1962) two-factor theory of emotion, states that one emotion (anger for example), may transfer over and affect later experiences and emotions. For example, if someone first feels angry, and then feels surprised, the anger may transfer over and influence the feeling of surprise (the feeling of surprise may be felt more strongly or at least differently than it would have been had anger not preceded it). It is similar to the two-factor theory of emotion in that the previously felt emotion (anger in the above case) may be perceived differently by the brain depending on the current context (previously felt anger may be interpreted as additional surprise later on).

Once again, however, excitation transfer theory doesn't fully account for why explicit risk perception was reduced for participants who were told about the lights. A possible explanation is that participants felt fear from the film, which was then dispersed after they were able to attribute some of the tension they felt to the lights. The tension/fear that then transferred over to their explicit perception of risk was less than the tension that was transferred over from those who weren't told about the lights. Although certainly a

possibility, further research is required to determine how much of a role any of the above-described theories played in the results obtained in Study 2.

Failure to include a video control condition in Study 2. Another limitation from Study 2, and one that would have addressed some of the previously mentioned limitations such as the proposition that participants were simply distracted, is the fact that there was no control video. For Study 2, there were only two conditions: fear video with no dissonance reduction, and fear video with dissonance reduction. However, had there been two additional conditions, one in which participants watched a funny video with no dissonance reduction, and a funny video with dissonance reduction (making the study a 2 x 2 design), some alternative explanations would have been addressed.

Specifically, if participants showed a reduction in risk perception in the dissonance reduction funny video condition, as compared to the funny video with no dissonance reduction, it then would become more plausible that the story about the lights simply distracted participants. It was presumed that the fear felt after watching a frightening film clip created tension, and the story about the lights enabled participants to locate a source for that tension and dismiss it. If there was a condition in which participants watched a funny video, it could have been more easily concluded that it was the unique combination of frightening video and light story, rather than simply an artifact of the light story, that caused a reduction in explicit risk perception.

Additionally, having a funny video may have helped address whether misattribution was responsible for the results. If participants in the funny video dissonance reduction condition showed a decrease in risk perception as compared to those in the funny video control condition, it is highly unlikely that they were misattributing the

feelings that the film clip produced to the lights. In other words, misattribution might predict that the film clip caused an emotion (fear), and when participants were told about the lights, they misattributed their feeling from the film to the feeling they were told they would experience from the special lights. If the results had shown a decrease in risk perception after watching a funny video, it can be safely assumed that no misattributions were made from the video to the lights. Of course, misattribution could have been eliminated as a possible cause if participants showed a decrease in risk perception after watching a funny film clip. If, however, there was no reduction in risk perception after watching the funny film clip, misattribution would have still been a possible explanation if a reduction occurred after watching the frightening film clip.

Order effect from Study 3. It should be acknowledged that, in Study 3, the anti-Muslim IAT was always presented before any of the other dependent measures. This was done because the results on the anti-Muslim IAT were of most interest in Study 3, and there was a concern that those results could be tainted if other measures were presented first. Because of this, however, it is possible that the IAT affected subsequent dependent measures. This could have occurred because people became aware, while taking the IAT, that the study was measuring prejudice. Participants may have therefore been overly cautious as to not appear prejudiced when completing the subsequent measures. It is also possible, given that the IAT requires the participants' full energy and attention for an extended period of time, that the IAT was mentally exhausting and this had an impact on the dependent measures that followed. Regardless of the cause, future research may wish to counterbalance the IAT with other measures.

Future directions. Future research may certainly wish to examine whether the findings from Study 2 and 3 can be incorporated into a study in which a dissonance reduction manipulation is combined with a measure of person perception. In other words, will a reduction in dissonance after watching a frightening movie clip also lead to a reduction in implicit bias against Muslims?

Additionally, future research may wish to examine whether this bias from fear may lead to negative behavior towards other individuals. Past research, such as the police officer's dilemma research conducted by Corell, et al. (2002), indicate that people are more likely to 'shoot' a Black, as compared to a White, individual on a computer simulation program. Although fear was not directly measured in this research, it would be interesting to determine whether having people watch a frightening film clip tend to show this bias against African Americans more quickly.

Further research may also wish to examine whether fear leads to bias against all outgroups, or only select outgroups. Stereotypes of Muslims as terrorists may certainly be triggered when people are afraid, but future research should examine whether fear leads to bias against any group, or whether there must be fear related stereotypes of that group before fear exacerbates bias against them.

Additionally, if it is indeed dissonance that is leading to exaggerated perceptions of risk, future research should address additional ways of reducing that dissonance. The light manipulation used in the current research, though seemingly effective at reducing dissonance, is only one of numerous possible ways that dissonance, and potentially bias, can be reduced.

## Conclusion

The three studies in this thesis are the first to test the unique assertions of the Fear Bias Model. Overall, the findings from the current research suggest that incidental fear exaggerates risk perception, that this exaggeration can be reduced if cognitive dissonance is reduced, and that incidental fear may lead to bias against an outgroup. Identifying the role that fear has in biasing our perceptions and behaviors may be the first, albeit small, step in eliminating those biases and improving intergroup relations.

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Table 1  
Means (and standard deviations) for explicit and implicit variables (Study 1)  
Higher means represent greater reported fear

Dependent Variable	Fear Video (n = 63)	Funny Video (n = 60)	Fear Video (Limbo Group removed; n = 33)	Funny Video (Limbo Group removed; n = 50)
Being Criticized^^	4.03 (1.18)	3.68 (1.50)	4.42 (1.06)	3.56 (1.57)
Snakes	3.90 (1.73)	3.62 (1.84)	4.42 (1.54)	3.68 (1.94)
Speaking in public	4.11 (1.62)	3.93 (1.59)	4.30 (1.57)	3.98 (1.70)
Not being a success	5.13 (1.50)	5.42 (1.27)	5.52 (1.23)	5.32 (1.30)
Members of opposite sex	2.59 (1.35)	2.55 (1.58)	2.45 (1.15)	2.40 (1.43)
Spiders	3.75 (1.72)	3.47 (1.90)	4.18 (1.72)	3.42 (2.00)
Self conscious^	4.08 (1.18)	3.72 (1.37)	4.27 (1.26)	3.62 (1.43)
Mistakes	4.11 (1.30)	4.15 (1.20)	4.39 (1.06)	4.18 (1.27)
Illness of loved one^	5.94 (.78)	5.63 (1.47)	6.12 (.74)	5.50 (1.54)
Death of loved one	6.37 (.83)	6.18 (1.21)	6.55 (.67)	6.18 (1.21)
Tornado	3.84 (2.58)	3.12 (2.38)	4.03 (2.58)	3.04 (2.48)
Flood	3.80 (2.33)	3.58 (2.49)	3.88 (2.27)	3.68 (2.55)
Lightning	3.56 (2.28)	3.13 (2.38)	3.91 (2.32)	3.02 (2.43)
Fire^	5.60 (2.28)	4.90 (2.61)	6.00 (2.28)	4.78 (2.64)
Electrocution	4.65 (2.64)	3.98 (2.71)	4.79 (2.76)	3.86 (2.85)
Accidental fall^	5.02 (2.26)	4.48 (2.53)	5.42 (2.07)	4.26 (2.53)
Traffic accident*^^	6.84 (1.93)	5.97 (2.31)	7.33 (1.65)	5.80 (2.41)
Airplane accident	5.14 (2.93)	4.65 (2.97)	5.76 (2.75)	4.62 (2.92)
Homicide*^^	5.62 (2.35)	4.68 (2.83)	6.06 (2.29)	4.56 (2.77)
Terrorism^	5.49 (2.63)	4.88 (2.73)	6.15 (2.56)	4.74 (2.77)
War	5.22 (2.57)	4.85 (2.72)	5.82 (2.65)	4.84 (2.82)
Nuclear accident^	4.44 (2.73)	3.85 (2.69)	4.88 (2.67)	3.70 (2.67)
Toxic chemical spill	3.40 (2.57)	3.48 (2.44)	3.70 (2.78)	3.34 (2.50)
Stroke	5.41 (2.46)	5.23 (2.47)	5.30 (2.52)	5.12 (2.45)
Heart disease	6.21 (2.26)	5.95 (2.47)	6.15 (2.37)	5.74 (2.48)
Leukemia	5.25 (2.61)	5.13 (2.61)	5.72 (2.65)	5.10 (2.71)
Stomach cancer	5.10 (2.58)	5.09 (2.91)	5.06 (2.61)	5.20 (2.96)
Lung cancer	5.63 (2.85)	5.10 (2.93)	5.94 (2.91)	5.06 (2.98)
FSS scale total^^	44.00 (7.58)	42.35 (8.33)	46.64 (6.35)	41.84 (8.88)
Concern for Death scale total^	90.24 (32.90)	82.07 (34.80)	95.91 (33.98)	80.46 (35.69)
IAT	-.40 (.30)	-.36 (.41)	-.36 (.30)	-.42 (.43)
LDT	-68.85 (77.32)	-53.71 (62.38)	-81.93 (99.59)	-57.55 (66.42)
Mood measure^^	7.18 (2.58)	4.92 (2.45)	7.38 (2.55)	4.91 (2.02)

\*=  $p < .05$ ; ^ =  $p < .05$  Limbo removed; ^^ =  $p < .01$  Limbo removed

Table 2  
Correlations of Implicit and Explicit Variables (Study 1)

Correlation of IAT and explicit variables

<i>n</i> = 38	FSS Scale Total	Danger Scale Total	IAT score	“How frightening was the film”
FSS Scale Total	-	.58**	.19	.24
Danger Scale Total	.58**	-	.23	-.03
IAT score	.19	.23	-	.06
“How frightening was the film”	.24	-.03	.06	-

Correlation of LDT and explicit variables

<i>n</i> = 39	FSS Scale Total	Danger Scale Total	LDT score	“How frightening was the film”
FSS Scale Total	-	.25	-.15	.09
Danger Scale Total	.25	-	-.07	.17
LDT score	-.15	-.07	-	-.07
“How frightening was the film”	.09	.17	-.07	-

Correlation of Implicit Mood Measure and explicit variables

<i>n</i> = 46	FSS Scale Total	Danger Scale Total	Mood Measure	“How frightening was the film”
FSS Scale Total	-	.42**	.13	.29
Danger Scale Total	.42**	-	.08	.31*
Mood Measure	.13	.08	-	.35*
“How frightening was the film”	.29	.31*	.35*	-

\* =  $p < .05$ ; \*\* =  $p < .01$

Table 3  
Emotion manipulation check (Study 1; higher numbers represent greater reported feeling of emotion)

All Participants	Fear ( <i>n</i> = 63)	Calm ( <i>n</i> = 60)	Limbo Removed	Fear ( <i>n</i> = 33)	Calm ( <i>n</i> = 50)
Afraid***	6.33 (2.02)	3.27 (2.62)	Afraid***	7.33 (1.58)	2.54 (2.06)
Calm***	3.21 (2.22)	4.75 (2.09)	Calm***	2.33 (1.74)	4.86 (2.10)
Sad**	3.86 (2.33)	2.78 (1.98)	Sad***	4.39 (2.40)	2.42 (1.90)
Scornful	3.65 (1.94)	3.08 (1.91)	Scornful*	3.94 (2.09)	2.88 (1.92)
Surprise	5.27 (2.21)	4.82 (2.44)	Surprise*	6.06 (2.08)	4.70 (2.49)
Alert	6.33 (1.62)	5.85 (2.15)	Alert*	6.73 (1.70)	5.66 (2.16)
Amazed**	3.32 (2.11)	4.63 (2.39)	Amazed**	3.18 (2.13)	4.68 (2.45)
Angry	3.81 (2.29)	3.07 (2.19)	Angry**	4.21 (2.26)	2.76 (2.10)
Anxious**	5.94 (2.08)	4.95 (2.18)	Anxious***	6.61 (2.12)	4.60 (2.13)
Astonished	3.89 (2.18)	4.18 (2.25)	Astonished	3.97 (2.26)	4.06 (2.36)
Blue	3.18 (2.32)	3.08 (2.23)	Blue	3.15 (2.08)	2.64 (2.08)
Concentrate	5.22 (2.33)	5.03 (2.36)	Concentrate	5.12 (2.53)	4.78 (2.32)
Contempt	3.46 (2.00)	3.87 (2.25)	Contempt	3.67 (1.81)	3.64 (2.30)
Disdain	3.67 (2.04)	3.33 (1.95)	Disdain*	4.18 (1.96)	3.08 (1.97)
Disgust***	4.59 (2.56)	3.17 (1.98)	Disgust***	5.79 (2.27)	2.92 (2.03)
Downhearted	3.67 (2.21)	3.15 (2.20)	Downhearted**	3.97 (2.28)	2.62 (1.93)
Elated	3.06 (2.12)	3.68 (2.14)	Elated	3.06 (2.25)	3.64 (2.17)
Fearful***	6.14 (2.01)	3.52 (2.67)	Fearful***	6.97 (1.51)	2.94 (2.43)
Gleeful***	2.22 (1.69)	4.20 (2.02)	Gleeful***	1.94 (1.48)	4.08 (2.06)
Interest*	5.00 (2.44)	5.98 (2.08)	Interest**	4.64 (2.73)	6.14 (1.98)
Irritated	4.25 (2.38)	4.03 (2.58)	Irritated*	4.79 (2.36)	3.60 (2.48)
Mad	3.75 (2.12)	3.07 (2.13)	Mad*	3.82 (2.10)	2.76 (2.06)
Nervous***	5.89 (2.23)	4.33 (2.81)	Nervous***	6.91 (1.94)	3.72 (2.57)
Repulsed***	4.79 (2.35)	3.45 (2.13)	Repulsed***	5.49 (2.15)	3.20 (2.14)
Scared***	5.91 (2.45)	3.17 (2.44)	Scared***	7.33 (1.74)	2.82 (2.37)
Tense***	6.33 (1.88)	4.32 (2.55)	Tense***	7.46 (1.18)	3.76 (2.30)
Turned Off***	4.97 (2.47)	3.35 (2.42)	Turned Off***	5.55 (2.41)	3.20 (2.49)
Warm Hearted***	2.13 (1.74)	4.20 (2.11)	Warm Hearted***	2.06 (1.66)	4.16 (2.22)

\* =  $p < .05$ ; \*\* =  $p < .01$ ; \*\*\* =  $p < .001$

Table 4  
Means (and standard deviations) for explicit scores (Study 2)

Dependent Variable	Control ( <i>n</i> = 53)	Dissonance Reduction ( <i>n</i> = 48)	Dependent Variable (only participants who rated fear of film as 5 or higher)	Control ( <i>n</i> = 35)	Dissonance Reduction ( <i>n</i> = 32)
Being Criticized	4.02 (1.39)	3.77 (1.40)	Being Criticized	4.26 (1.36)	3.94 (1.48)
Snakes	4.17 (2.04)	3.63 (1.83)	Snakes	4.37 (1.91)	3.78 (1.70)
Speaking in public	3.94 (1.76)	3.90 (1.63)	Speaking in public	4.37 (1.59)	4.13 (1.62)
Not being a success	5.34 (1.22)	5.19 (1.23)	Not being a success	5.37 (1.14)	5.03 (1.33)
Members of opposite sex	2.40 (1.41)	2.25 (1.50)	Members of opposite sex	2.51 (1.50)	2.09 (1.25)
Spiders*	4.45 (1.92)	3.65 (1.90)	Spiders	4.51 (1.72)	3.94 (1.81)
Self conscious	3.92 (1.50)	3.77 (1.65)	Self conscious	3.94 (1.41)	3.81 (1.55)
Mistakes	4.38 (1.35)	4.15 (1.27)	Mistakes*	4.54 (1.15)	3.91 (1.23)
Illness of loved one	5.81 (1.21)	5.96 (.85)	Illness of loved one	6.03 (.95)	5.94 (.76)
Death of loved one	6.30 (1.07)	6.40 (.87)	Death of loved one	6.54 (.82)	6.34 (.83)
#Tornado	2.53 (.94)	2.49 (1.06)	Tornado	2.67 (.86)	2.49 (1.09)
Flood	2.84 (1.08)	2.71 (1.10)	Flood	2.97 (1.08)	2.60 (1.10)
Lightning	1.78 (.80)	1.73 (.90)	Lightning	1.83 (.78)	1.70 (.97)
Fire	3.49 (.90)	3.54 (.99)	Fire	3.62 (.93)	3.42 (1.04)
Electrocution	2.83 (.84)	2.68 (1.04)	Electrocution	2.88 (.80)	2.63 (1.17)
Accidental fall	3.09 (1.07)	3.11 (.80)	Accidental fall	3.30 (1.09)	3.11 (.80)
Airplane accident	2.50 (.69)	2.56 (.75)	Airplane accident	2.56 (.74)	2.47 (.78)
Homicide	4.21 (.96)	4.03 (1.03)	Homicide	4.20 (.97)	4.03 (.98)
Terrorism	2.52 (1.16)	2.71 (.93)	Terrorism	2.75 (1.12)	2.58 (.89)
War	3.61 (.65)	3.57 (.59)	War	3.67 (.63)	3.56 (.58)
Nuclear accident	2.21 (1.08)	2.07 (.91)	Nuclear accident	2.28 (1.15)	2.01 (1.15)
Toxic chemical spill	2.49 (.93)	2.44 (1.13)	Toxic chemical spill	2.67 (.85)	2.29 (1.06)
Stroke	4.13 (1.20)	4.00 (1.03)	Stroke	4.28 (1.24)	3.90 (.85)
Heart disease	4.57 (1.08)	4.35 (1.05)	Heart disease	4.64 (1.01)	4.25 (.95)
Leukemia	4.07 (.99)	3.71 (1.16)	Leukemia*	4.12 (.92)	3.64 (1.00)
Stomach cancer	3.58 (.97)	3.43 (1.05)	Stomach cancer	3.64 (1.02)	3.42 (1.04)
Lung cancer*	4.64 (.92)	4.16 (.93)	Lung cancer*	4.59 (.89)	4.07 (.95)
FSS scale total	44.74 (7.89)	42.65 (7.20)	FSS scale total*	46.46 (7.47)	42.91 (6.77)
Concern for Death total	55.55 (10.10)	54.94 (11.53)	Concern for Death total	57.11 (8.31)	53.68 (12.84)
Mood measure	5.74 (2.86)	5.56 (2.47)	Mood measure	5.83 (2.66)	5.75 (2.09)

\* =  $p < .05$ ; \*\* =  $p < .01$ ; \*\*\* =  $p < .001$

# = Items were log transformed from open-ended responses



Table 5  
Risk Attitude and Risk Behavior Scale (Study 2; behaviors are indicated with capital B)

\* =  $p < .05$

All participants	Control ( $n = 53$ )	Dissonance Reduction ( $n = 48$ )	Limbo Removed	Control ( $n = 35$ )	Dissonance Reduction ( $n = 32$ )
Bet Sport	4.53 (1.80)	5.04 (1.60)	Bet Sport	4.51 (1.79)	5.16 (1.57)
Bet Horse*	4.57 (1.68)	5.29 (1.35)	Bet Horse	4.63 (1.54)	5.31 (1.38)
Bet Poker	4.87 (1.72)	5.42 (1.44)	Bet Poker	4.86 (1.72)	5.44 (1.41)
Casino	5.87 (1.18)	6.15 (1.03)	Casino	5.89 (1.08)	6.28 (.92)
Walk Home Alone	5.15 (1.56)	5.48 (1.26)	Walk Home Alone	5.34 (1.61)	5.81 (.86)
Seatbelt	4.93 (1.76)	4.67 (1.71)	Seatbelt	4.86 (1.88)	5.06 (1.63)
Helmet	5.49 (1.71)	5.73 (1.54)	Helmet	5.60 (1.79)	5.66 (1.52)
Sunscreen	3.62 (1.40)	3.42 (1.62)	Sunscreen	3.77 (1.40)	3.41 (1.50)
Whitewater Rafting	4.70 (1.58)	4.90 (1.45)	Whitewater Rafting	4.77 (1.56)	4.81 (1.45)
Dangerous Sport	4.68 (1.64)	4.65 (1.31)	Dangerous Sport	4.51 (1.72)	4.72 (1.20)
Pilot Plane	4.68 (1.86)	4.31 (1.68)	Pilot Plane	4.91 (1.69)	4.44 (1.56)
Chase Tornado	6.09 (1.18)	5.83 (1.08)	Chase Tornado	6.17 (.95)	5.88 (1.16)
Taste Different Than Friends	1.60 (.88)	1.79 (1.18)	Taste Different Than Friends	1.57 (.78)	1.75 (1.05)
Disagree Father	2.74 (1.53)	2.85 (1.62)	Disagree Father	2.71 (1.49)	2.50 (1.50)
Defend Issue	3.30 (1.42)	2.79 (1.57)	Defend Issue	3.34 (1.33)	2.81 (1.60)
Argue Friend	2.25 (1.30)	2.19 (1.44)	Argue Friend	2.23 (1.17)	2.03 (1.43)
Asking Date	3.83 (1.67)	4.37 (1.85)	Asking Date	3.74 (1.60)	4.16 (1.83)
Raising Hand	2.09 (1.36)	1.98 (1.35)	Raising Hand	2.11 (1.32)	1.97 (1.23)
Hold Snake	5.53 (1.48)	5.67 (1.26)	Hold Snake	5.69 (1.41)	5.84 (.95)
Hold Spider	5.09 (1.60)	5.31 (1.32)	Hold Spider	5.14 (1.56)	5.50 (1.11)
Swimming Sharks	5.79 (1.39)	5.81 (1.25)	Swimming Sharks	5.89 (1.30)	5.91 (1.03)
Scale Total	91.40 (15.41)	93.65 (14.32)	Scale Total	92.26 (15.87)	94.44 (14.89)
Bet SportB	2.96 (1.69)	2.81 (1.95)	Bet SportB	3.11 (1.64)	3.00 (2.06)
Bet HorseB	2.40 (1.39)	2.33 (1.62)	Bet HorseB	2.57 (1.38)	2.72 (1.78)
Bet PokerB	2.59 (1.69)	2.48 (1.62)	Bet PokerB	2.94 (1.71)	2.66 (1.70)
CasinoB	2.19 (1.47)	1.98 (1.26)	CasinoB	2.40 (1.56)	2.19 (1.38)
Walk Home AloneB	3.68 (1.70)	3.85 (1.54)	Walk Home AloneB	3.31 (1.66)	3.66 (1.64)
SeatbeltB	3.13 (2.03)	3.17 (1.69)	SeatbeltB	3.09 (2.15)	3.28 (1.59)
HelmetB	2.42 (1.79)	2.38 (1.73)	HelmetB	2.43 (1.84)	2.59 (1.64)
SunscreenB	4.77 (1.54)	5.02 (1.59)	SunscreenB	4.60 (1.59)	5.28 (1.37)
Whitewater RaftingB	4.09 (1.95)	3.63 (1.83)	Whitewater RaftingB	4.11 (2.01)	3.91 (1.86)
Dangerous SportB	4.40 (1.96)	3.96 (1.87)	Dangerous SportB	4.37 (1.85)	4.06 (1.81)
Pilot PlaneB	3.62 (2.11)	3.75 (1.87)	Pilot PlaneB	3.46 (1.92)	3.75 (1.76)
Chase TornadoB	2.57 (1.98)	2.69 (1.99)	Chase TornadoB	2.60 (1.93)	2.72 (2.04)
Taste Different Than FriendsB	5.85 (1.17)	5.98 (.93)	Taste Different Than FriendsB	5.89 (1.13)	6.00 (.88)
Disagree FatherB	5.45 (1.30)	5.04 (1.44)	Disagree FatherB	5.31 (1.28)	5.34 (1.13)
Defend IssueB	4.89 (1.49)	4.90 (1.29)	Defend IssueB	4.71 (1.36)	4.88 (1.39)
Argue FriendB	5.55 (1.29)	5.29 (1.15)	Argue FriendB	5.51 (1.27)	5.41 (1.19)
Asking DateB	4.42 (1.34)	4.29 (1.46)	Asking DateB	4.54 (1.36)	4.47 (1.46)
Raising HandB	5.30 (1.51)	5.58 (1.35)	Raising HandB	5.14 (1.65)	5.59 (1.41)
Hold SnakeB	2.59 (1.80)	2.56 (1.64)	Hold SnakeB	2.51 (1.79)	2.59 (1.46)
Hold SpiderB	2.21 (1.45)	2.46 (1.49)	Hold SpiderB	2.11 (1.39)	2.34 (1.26)
Swimming SharksB	2.21 (1.57)	2.04 (1.34)	Swimming SharksB	2.26 (1.56)	2.00 (1.30)
Scale Total B	77.26 (17.22)	76.19 (14.65)	Scale Total B	77.00 (17.20)	78.44 (14.60)

Table 6  
Correlations of Implicit and Explicit Variables (Study 2; the first table is with all participants, the second has the Limbo Group removed)

N = 101	FSS Scale Total	Danger Scale Total	Implicit Mood Measure	Risk Scale	Risk Scale Behavior	“How frightening was the film”
FSS Scale Total	-	.10	.19	.54***	-.50***	.27**
Danger Scale Total	.00	-	.12	.01	.18	.00
Implicit Mood Measure	.19	.15	-	.13	-.06	.04
Risk Scale	.54***	.10	.13	-	-.55***	.20*
Risk Scale Behavior	-.50***	.09	-.06	-.55***	-	-.01
“How frightening was the film”	.27**	.01	.04	.20*	-.01	-

N = 67 Limbo Removed	FSS Scale Total	Danger Scale Total	Implicit Mood Measure	Risk Scale	Risk Scale Behavior	“How frightening was the film”
FSS Scale Total	-	.13	.07	.47***	-.49***	.25*
Danger Scale Total	.07	-	.18	.15	.06	-.04
Implicit Mood Measure	.07	.18	-	.04	.11	.13
Risk Scale	.47***	.22	.04	-	-.54***	.30*
Risk Scale Behavior	-.49***	.02	.11	-.54***	-	-.26*
“How frightening was the film”	.25*	-.07	.13	.30*	-.26*	-

Table 7  
Emotion manipulation check (Study 2; higher numbers represent greater reported feeling of emotion)

All participants	Control ( <i>n</i> = 53)	Dissonance Reduction ( <i>n</i> = 48)	Limbo removed	Control ( <i>n</i> = 35)	Dissonance Reduction ( <i>n</i> = 32)
Afraid	4.40 (1.98)	4.52 (1.87)	Afraid	5.31 (1.64)	5.44 (1.27)
Calm	3.15 (1.96)	2.83 (1.56)	Calm	2.71 (1.84)	2.41 (1.52)
Sad	3.25 (1.91)	3.54 (1.89)	Sad	3.69 (2.04)	3.63 (2.03)
Scornful	2.83 (1.59)	2.52 (1.44)	Scornful	3.17 (1.72)	2.75 (1.44)
Surprise	3.53 (1.76)	3.42 (1.78)	Surprise	3.86 (1.68)	3.97 (1.69)
Alert	4.87 (1.62)	5.27 (.96)	Alert	5.34 (1.35)	5.41 (.98)
Amazed	2.47 (1.59)	3.06 (1.83)	Amazed	2.54 (1.65)	3.13 (1.90)
Angry	3.04 (1.87)	2.88 (1.62)	Angry	3.20 (1.86)	3.00 (1.59)
Anxious*	4.32 (1.80)	5.08 (1.30)	Anxious	4.94 (1.59)	5.56 (.98)
Astonished	2.89 (1.67)	3.46 (1.70)	Astonished	3.14 (1.74)	3.75 (1.72)
Blue	2.59 (1.78)	2.29 (1.57)	Blue	2.89 (1.95)	2.59 (1.70)
Concentrate*	3.93 (1.86)	4.60 (1.32)	Concentrate	4.31 (1.80)	4.66 (1.18)
Contempt*	2.38 (1.53)	3.02 (1.55)	Contempt	2.31 (1.53)	3.00 (1.55)
Disdain	3.28 (1.47)	3.38 (1.68)	Disdain	3.57 (1.48)	3.56 (1.76)
Disgust	3.66 (1.83)	3.96 (1.73)	Disgust	4.06 (1.85)	4.56 (1.44)
Downhearted	3.02 (1.83)	3.08 (1.61)	Downhearted	3.49 (1.85)	3.50 (1.63)
Elated	2.40 (1.67)	2.33 (1.40)	Elated	2.43 (1.65)	2.19 (1.38)
Fearful	4.53 (1.86)	4.43 (1.80)	Fearful	5.34 (1.43)	5.41 (1.13)
Gleeful	1.94 (1.47)	1.90 (1.34)	Gleeful	1.97 (1.49)	1.66 (1.21)
Interest	4.38 (1.57)	4.46 (1.62)	Interest	4.57 (1.42)	4.53 (1.69)
Irritated	3.53 (1.87)	3.19 (1.66)	Irritated	3.40 (1.88)	3.22 (1.62)
Mad	2.85 (1.80)	2.77 (1.59)	Mad	3.09 (1.96)	2.88 (1.54)
Nervous	4.43 (1.88)	4.63 (1.67)	Nervous	5.34 (1.35)	5.22 (1.31)
Repulsed	3.79 (1.86)	4.13 (1.71)	Repulsed	4.29 (1.86)	4.75 (1.22)
Scared	4.45 (1.88)	4.38 (2.07)	Scared	5.40 (1.44)	5.47 (1.32)
Tense	4.57 (1.94)	4.88 (1.54)	Tense	5.43 (1.50)	5.44 (1.16)
Turned Off	3.42 (1.95)	3.46 (1.90)	Turned Off	3.37 (1.86)	3.72 (1.90)
Warm Hearted	2.17 (1.82)	2.10 (1.68)	Warm Hearted	2.03 (1.81)	1.91 (1.65)

\* =  $p < .05$ ; \*\* =  $p < .01$ ; \*\*\* =  $p < .001$

Table 8  
Explicit totals and Implicit scores for Study 3

Dependent Variable	Fear Video ( <i>n</i> = 29)	Meet the Parents ( <i>n</i> = 28)	A Beautiful Mind ( <i>n</i> = 24)	Fear Video – Limbo Removed ( <i>n</i> = 19)	Meet Parents – Limbo Removed ( <i>n</i> = 26)	Neutral Video - Limbo Removed ( <i>n</i> = 22)
FSS Total	42.21 (9.47)	42.18 (7.87)	45.04 (8.47)	44.74 (8.85)	41.81 (8.04)	44.82 (8.81)
Muslim Bias Total	29.30 (15.56)	25.71 (15.75)	26.13 (13.63)	28.06 (15.56)	25.42 (15.88)	23.29 (10.21)
Fear of Terrorist Total	23.41 (4.83)	21.82 (5.55)	24.26 (6.04)	23.59 (5.06)	21.77 (5.75)	23.43 (5.60)
Muslim Feeling Thermometer	54.07 (25.68)	64.21 (25.91)	63.63 (27.33)	56.47 (28.59)	63.77 (25.50)	65.55 (25.91)
Christian Feeling Thermometer	75.45 (19.89)	78.29 (21.19)	78.42 (29.76)	80.95 (17.88)	77.00 (21.42)	77.14 (30.81)
IAT**^^	.55 (.39)	.25 (.30)	.29 (.35)	.63 (.40)	.26 (.31)	.30 (.35)
Mood measure	5.14 (2.31)	4.75 (2.49)	4.67 (2.22)	5.26 (2.58)	4.77 (2.49)	4.50 (2.24)

\*\* =  $p < .01$ ; ^^ =  $p < .01$  (Limbo removed)

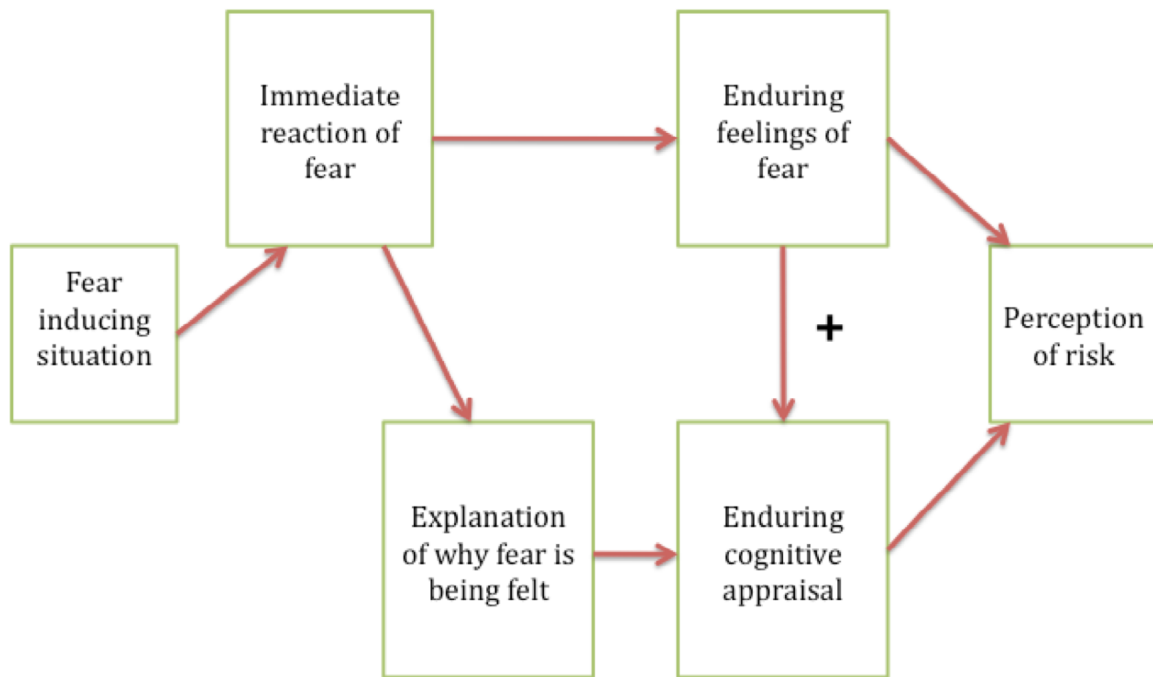
Table 9  
Correlations of implicit and explicit variables (Study 3)

N = 81	FSS Scale	Terror Fear	Muslim Bias	Muslim Feel Th	Christian Feel Th	Implicit Mood	IAT	Fear of Movie
FSS Scale	-	.28*	.18	.03	.21	-.06	-.02	.08
Terror Fear	.28*	-	.47***	-.25*	.19	.00	.32**	.10
Muslim Bias	.18	.47***	-	-.60***	.12	.11	.13	.15
Muslim Feel Th	.03	-.25*	-.60***	-	.32**	.09	-.16	-.15
Christian Feel Th	.21	.19	.12	.32**	-	.17	.08	.01
Implicit Mood	-.06	.00	.11	.09	.17	-	-.19	.14
IAT	-.02	.32**	.13	-.16	.08	-.19	-	.31**
Fear of Movie	.08	.10	.15	-.15	.01	.14	.31**	-

N = 64 Limbo Removed	FSS Scale	Terror Fear	Muslim Bias	Muslim Feel Th	Christian Feel Th	Implicit Mood	IAT	Fear of Movie
FSS Scale	-	.36**	.21	.03	.10	-.08	.00	.08
Terror Fear	.36**	-	.47***	-.24	.24	-.04	.34**	.09
Muslim Bias	.21	.47***	-	-.58***	.09	.10	.17	.15
Muslim Feel Th	.03	-.24	-.58***	-	.36**	.14	-.21	-.14
Christian Feel Th	.10	.24	.09	.36**	-	.18	.12	.02
Implicit Mood	-.08	-.04	.10	.14	.18	-	-.18	.13
IAT	.00	.34**	.17	-.21	.12	-.18	-	.37**
Fear of Movie	.08	.09	.15	-.14	.02	.13	.37**	-

\* =  $p < .05$ ; \*\* =  $p < .01$ ; \*\*\* =  $p < .001$

Figure 1. The Fear Bias Model (FBM)



+ refers to fear increasing risk assessment due to dissonance

## Appendix A

### IAT for Study 1

#### IAT Calm words

/1 =" CALM "

/2 =" PEACE "

/3 =" RELAX "

/4 =" REST "

#### IAT fear words

/1 =" TERROR "

/2 =" HORROR "

/3 =" FEAR "

/4 =" AFRAID "

#### IAT self words

/ 1 = " I "

/ 2 = " ME "

/ 3 = " MINE "

/ 4 = " SELF "

#### IAT other words

/ 1 = " THEY "

/ 2 = " THEM "

/ 3 = " THEIRS "

/ 4 = " OTHER "

Appendix B  
LDT words for Study 1

Fear words

- / 1 = " TERROR "
- / 2 = " HORROR "
- / 3 = " FEAR "
- / 4 = " PANIC "
- / 5 = " DANGER "
- / 6 = " AFRAID "
- / 7 = " ALERT "
- / 8 = " FRIGHT "

Calm words

- / 1 = " TRANQUIL "
- / 2 = " PEACE "
- / 3 = " RELAX "
- / 4 = " SERENE "
- / 5 = " CALM "
- / 6 = " SOOTHING "
- / 7 = " QUIET "
- / 8 = " REST "

Neutral words

- / 1 = " DESK "
- / 2 = " PAPER "
- / 3 = " CHAIR "
- / 4 = " TABLE "
- / 5 = " BENCH "
- / 6 = " WINDOW "
- / 7 = " FLOOR "
- / 8 = " WALL "
- / 9 = " DOOR "
- /10 = " CEILING "

Nonsense words

- / 1 = " GLYXW "
- / 2 = " BLGTIP "
- / 3 = " SBVUWXX "
- / 4 = " PLYTREG "
- / 5 = " BPLOMD "
- / 6 = " NUVTPL "
- / 7 = " TIVSXCR "



/ 8 = " KWOPCRE "  
/ 9 = " QUTZLE "  
/10 = " ZHITBMN "

/ 1 = " CYZLTE "  
/ 2 = " EWPOLI "  
/ 3 = " ZASDFG "  
/ 4 = " MLPIOK "  
/ 5 = " RUTYWM "  
/ 6 = " NALOPC "  
/ 7 = " XUTGHJK "  
/ 8 = " PLMINOB "  
/ 9 = " AJKTUN "  
/10 = " VOIXKL "

/ 1 = " NASFTGET "  
/ 2 = " POLMNIB "  
/ 3 = " ZSITUY "  
/ 4 = " NYTRGHJ "  
/ 5 = " IKVSWEN "  
/ 6 = " LAERTYB "  
/ 7 = " TIVSXCR "  
/ 8 = " CVBKWYM "  
/ 9 = " VITZRE "  
/10 = " HYTPLN "

# Appendix C

## Implicit Mood Measure for Studies 1 – 3

### Nonsense Primes

/ 1 = " KLEET "  
 / 2 = " ORST "  
 / 3 = " PLUDN "  
 / 4 = " HBUUED "  
 / 5 = " DBOURL "  
 / 6 = " HBTROSS "  
 / 7 = " ALBDO "  
 / 8 = " RDOT "  
 / 9 = " DRBOL "  
 /10 = " ALDBO "  
 /11 = " SDPBOLD "  
 /12 = " CHUUBP "  
 /13 = " SHURBH "  
 /14 = " ODGPOER "  
 /15 = " FUPD "  
 /16 = " PRBODNOM "  
 /17 = " PDEET "  
 /18 = " DPOBY "  
 /19 = " TOBPDLO "  
 /20 = " WPDBNOL "  
 /21 = " NEDBPOL "  
 /22 = " PEDBDO "  
 /23 = " FRUPDB "  
 /24 = " CUBPDO "  
 /25 = " ABDOPD "  
 /26 = " DOPD "  
 /27 = " BDOUT "

/ 1 = "Which of the following was the word just presented?"

(please use the mouse to respond)"

/ anchors = [1="GREET"; 2="SHEET"; 3="SLEET" ]

/anchors = [1="LOST"; 2="LIST"; 3="FAST" ]

/anchors = [1="PAPER"; 2="PANIC"; 3="PEACE" ]

/anchors = [1="HORROR"; 2="HONOR"; 3="HAPPY" ]

/anchors = [1="DODGER"; 2="DANGER"; 3="DOORWAY" ]

/anchors = [1="SUCCESS"; 2="GUEST"; 3="EXCESS" ]

/anchors = [1="ALIVE"; 2="ALLEY"; 3="ALERT" ]

/anchors = [1="CLOT"; 2="SHORT"; 3="HOT" ]

/anchors = [1="DREAM"; 2="DRAPES"; 3="DREAD" ]

/anchors = [1="ALBUM"; 2="ALARM"; 3="ALIVE" ]

/anchors = [1="SCARED"; 2="SCORED"; 3="SOURED" ]

/anchors = [1="CHAIR"; 2="CHEESE"; 3="CHEEK"]

/anchors = [1="SHRINK"; 2="SHOCK"; 3="SHIPPED" ]

/anchors = [1="LINGER"; 2="ANGER"; 3="RANGER" ]

/anchors = [1="FEAR"; 2="FIRE"; 3="FLOOR" ]

/anchors = [1="PATTERN"; 2="PAWNED"; 3="PETRIFIED" ]

/anchors = [1="GREET"; 2="SHEET"; 3="SLEET" ]

/anchors = [1="SHAPE"; 2="GABBY"; 3="HAPPY" ]

/anchors = [1="TRANQUIL"; 2="TABLE"; 3="TERROR" ]

/anchors = [1="WINDOW"; 2="WINDY"; 3="WONDER" ]

/anchors = [1="NERVOUS"; 2="NEEDLESS"; 3="NEEDLE" ]

/anchors = [1="PENCIL"; 2="PENSIVE"; 3="PENNY" ]

/anchors = [1="FRIDGE"; 2="FRIGHT"; 3="FRINGE" ]

/anchors = [1="CURTAIN"; 2="CURIOUS"; 3="CURRY" ]

/anchors = [1="APPLE"; 2="AFFECT"; 3="AFRAID" ]

/anchors = [1="GLAD"; 2="SHED"; 3="WELD" ]

/anchors = [1="QUIET"; 2="CLOUD"; 3="RIOT" ]

## Appendix D

### Fear Survey Schedule II

Next you will find a list of situations or objects that may cause anxiety, uneasiness, or other unpleasant feelings.

You are being asked to indicate the degree of fear, anxiety, or uneasiness that each of the objects or situations creates for you.

For each item, click on the choice that best describes your feeling of anxiety (none, very little, a little, some, much, very much, terror).

Please respond to all items as honestly as you can.

[1="None"; 2="Very Little"; 3="A Little"; 4="Some"; 5="Much"; 6="Very Much"; 7="Terror"]

/ 1 = "Being Criticized"

/ 2 = "Snakes"

/ 3 = "Speaking in front of a group"

/ 4 = "Not being a success"

/ 5 = "Being with a member of the opposite sex"

/ 6 = "Spiders"

/ 7 = "Being self conscious"

/ 8 = "Making mistakes"

/ 9 = "Illness or injury to loved ones"

/ 10 = "Death of a loved one"

Appendix E  
Concern for Death measure

Please rate your level of worry and concern for the following causes of death.

Anchors = [1="Not at all Worried"; 9="Very Worried"]

/ 1 = "TORNADO"

/ 2 = "FLOOD"

/ 3 = "LIGHTNING"

/ 4 = "FIRE"

/ 5 = "ELECTROCUTION"

/ 6 = "ACCIDENTAL FALL"

/ 7 = "TRAFFIC ACCIDENT"

/ 8 = "AIRPLANE ACCIDENT"

/ 9 = "HOMICIDE"

/ 10 = "TERRORISM"

/ 11 = "WAR"

/ 12 = "NUCLEAR ACCIDENT"

/ 13 = "TOXIC CHEMICAL SPILL"

/ 14 = "STROKE"

/ 15 = "HEART DISEASE"

/ 16 = "LEUKEMIA"

/ 17 = "STOMACH CANCER"

/ 18 = "LUNG CANCER"

## Appendix F

### Emotion Manipulation Check

Please think back to the film clip that you watched earlier.

Please indicate the greatest amount, if at all, you experienced the following emotions. A "1" on this scale means that you did not experience the emotion at all. A "9" means that you experienced the emotion more strongly than ever before.

/ anchors = [1="Not at all"; 9="More strongly than ever"]

/1 ="AFRAID"

/2 ="CALM"

/3 ="SAD"

/4 ="SCORNFUL"

/5 ="SURPRISE"

/6 ="ALERT"

/7 ="AMAZED"

/8 ="ANGRY"

/9 ="ANXIOUS"

/10 ="ASTONISHED"

/11 ="BLUE"

/12 ="CONCENTRATE"

/13 ="CONTEMPT"

/14 ="DISDAIN"

/15 ="DISGUST"

/16 ="DOWNHEARTED"

/17 ="ELATED"

/18 ="FEARFUL"

/19 ="GLEEFUL"

/20 ="INTEREST"

/21 ="IRRITATED"

/22 ="MAD"

/23 ="NERVOUS"

/24 ="REPULSED"

/25 ="SCARED"

/26 ="TENSE"

/27 ="TURNED OFF"

/38 ="WARMHEARTED"

## Appendix G

### Risk Attitude Scale

People often see some risk in situations that contain uncertainty about what the outcome or consequences will be and for which there is the possibility of 'bad' consequences.

However, riskiness is a very personal and intuitive notion, and we are interested in your gut level assessment of how risky each situation is.

For each of the following statements, please indicate how risky you perceive each situation.

Provide a rating from 1 to 7, with 1 being 'Not at all risky', and 7 being 'Extremely risky'.

Please answer quickly; your first response is as good as any.

Please be honest. Remember that your answers are completely anonymous.

Proceed by pressing the '5' key.

/ 1 = "Betting a day's income on the outcome of a sporting event (e.g. baseball, soccer, or football)."

/ 2 = "Betting a day's income at the horse races."

/ 3 = "Betting a day's income at a high stake poker game."

/ 4 = "Gambling a week's income at a casino."

/ 5 = "Walking home alone at night in a somewhat unsafe area of town."

/ 6 = "Not wearing a seatbelt when being a passenger in the front seat."

/ 7 = "Not wearing a helmet when riding a motorcycle. "

/ 8 = "Exposing yourself to the sun without using sunscreen. "

/ 9 = "Going whitewater rafting during rapid water flows in the spring."

/ 10 = "Periodically engaging in a dangerous sport (e.g., mountain climbing or sky diving).  
"

/ 11 = "Piloting your own small plane, if you could. "

/ 12 = "Chasing a tornado or hurricane by car to take dramatic photos."



/ 13 = "Admitting that your tastes are different from those of your friends."

/ 14 = "Disagreeing with your father on a major issue. "

/ 15 = "Defending an unpopular issue that you believe in at a social occasion."

/ 16 = "Arguing with a friend about an issue on which he or she has a different opinion. "

/ 17 = "Asking someone you like out on a date, whose feelings about you are unknown."

/ 18 = "Raising your hand to answer a question that a teacher has asked in class."

/ 19 = "Holding a snake that may bite you."

/ 20 = "Holding a spider that may bite you."

/ 21 = "Swimming in an area in the ocean where sharks have been spotted."

----

We would now like to present the statements that you just rated to you again.

For each of the following statements, please indicate your likelihood of engaging in each activity or behavior.

Provide a rating from 1 to 7, with 1 being 'Extremely unlikely' that you would engage in the behavior, and 7 being 'Extremely likely' that you would engage in the behavior.

Please answer quickly; your first response is as good as any.

Please be honest. Remember that your answers are completely anonymous.

Proceed by pressing the '5' key.

## Appendix H

### Dissonance reduction script for Study 2

#### Dissonance Reduction Condition

Hi, and thank you for participating. In this study, you are going to be first watching a ten-minute film clip. After the film is done, we have several small studies we would like you to complete, including a computer task, some general surveys, and some other questions. We ask that you watch the film clip closely and imagine that you are involved in the events occurring in the film. As you are imagining this, think about how it would make you feel to be involved in the events being portrayed in the film.

(said very casually) Oh, and by the way, the engineering department has been installing a new type of efficient light bulb in these rooms, but they are concerned with reports that they sometimes makes people feel uncomfortable, you know, like tense. I don't know if they do or not, but engineering has asked us to give anyone who is in these rooms a survey about the lights at the end of the session. They tell us that this discomfort is in no way harmful, but if you are to feel any sort of discomfort while participating in the study, it is probably just these special lights.

In a moment you will be seated at separate computers and I will start the film clip. When the film clip is done, please let me know and I will start you on the several short tasks that follow. The directions on the screen should guide you through all of the tasks, so please read them closely. Are there any questions before we begin?

(If no questions, set up participants at computers and begin film. When film is over, give them implicit and explicit measures. When they are done, debrief and thank).

#### Control Condition

Hi, and thank you for participating. In this study, you are going to be first watching a ten-minute film clip. After the film is done, we have several small studies we would like you to complete, including a computer task, some general surveys, and some other questions. We ask that you watch the film clip closely and imagine that you are involved in the events occurring in the film. As you are imagining this, think about how it would make you feel to be involved in the events being portrayed in the film.

In a moment you will be seated at separate computers and I will start the film clip. When the film clip is done, please let me know and I will start you on the several short tasks that follow. The directions on the screen should guide you through all of the tasks, so please read them closely. Are there any questions before we begin?

(If no questions, set up participants at computers and begin film. When film is over, give them implicit and explicit measures. When they are done, debrief and thank).

## Appendix I

### Muslim-Christian IAT

#### IAT Calm words

/1 =" RELAX "

/2 =" PEACE "

/3 =" QUIET "

/4 =" SOOTHING "

/5 =" TRANQUIL "

#### IAT fear words

/1 =" HORROR "

/2 =" AFRAID "

/3 =" PANIC "

/4 =" DANGER "

/5 =" ALERT "

#### IAT Muslim first names

/ 1 = " HABIB "

/ 2 = " MUHAMMAD "

/ 3 = " ABDULLAH "

/ 4 = " FAREED "

/ 5 = " AHMED "

#### IAT Christian first names

/ 1 = " MATTHEW "

/ 2 = " JOSEPH "

/ 3 = " WILLIAM "

/ 4 = " DANIEL "

/ 5 = " DAVID "

Appendix J  
Fear of Terrorism Scale

Please indicate how much you agree with the following statements about terrorism.

Answer on a 7 point scale with 1 being 'Strongly Disagree', and 7 being 'Strongly Agree'.

Please answer quickly; your first response is as good as any.

Please be honest. Remember that your answers are completely anonymous.

/ 1 = "The United States is vulnerable to future terrorist attacks."

/ 2 = "It is likely that terrorists will attempt future attacks against the United States."

/ 3 = "The September 11th terrorist attacks have changed how Americans live their lives."

/ 4 = "The United States' economy will suffer long-term consequences due to the terrorist attacks."

/ 5 = "I feel personally at risk for being the victim of a terrorist attack."

## Appendix K

### Bias Against Muslims Scale

Please indicate how much you agree with the following statements about Muslims.

Answer on a 7 point scale with 1 being 'Strongly Disagree', and 7 being 'Strongly Agree'.

Please be honest; Remember that your answers are completely anonymous.

Proceed by pressing the '5' key.

/ 1 = "Muslims have moral standards that they apply in their dealing with each other, but with non-Muslims, they are unscrupulous, ruthless, and undependable."

/ 2 = "There is something different and strange about Muslims; one never knows what they are thinking or planning, or what makes them tick."

/ 3 = "A major fault of Muslims is their conceit, overbearing pride, and their idea that they are a chosen group."

/ 4 = "It is wrong for Muslims and non-Muslims to intermarry."

/ 5 = "Even for Muslims who live in America, their first loyalty is to their home country rather than to America."

/ 6 = "If there are too many Muslims in America, our country will be less safe."

/ 7 = "I can hardly imagine myself voting for a Muslim who is running for an important political office."

/ 8 = "One general fault of Muslims is their over-aggressiveness, a strong tendency always to display their own looks, manners, and customs."

/ 9 = "You just can't trust a group of young Muslim men together because they are probably up to criminal or delinquent activity."

/ 10 = "In order to maintain a nice residential neighborhood, it is best to prevent Muslims from living in it."

/ 11 = "If I knew I had been assigned to live in a dorm room with a Muslim, I would ask to change rooms."

## Appendix L

### Feeling Thermometers

For the next part, we would like for you to rate your feelings towards two groups. Please use the box provided to enter in any number on a scale from 0 - 100. 0 means that you have extreme negative feelings toward the group, and 100 means that you have extreme positive feelings toward the group.

Please answer quickly; your first response is as good as any.

Please be honest. Remember that your answers are completely anonymous.

/1 = "Please rate your feelings toward MUSLIMS on a scale from 0 - 100, with 0 being the most negative feeling, and 100 being the most positive feeling."

/2 = "Please rate your feelings toward CHRISTIANS on a scale from 0 - 100, with 0 being the most negative feeling, and 100 being the most positive feeling."