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## **Are People Motivated to Experience Emotions for their Cognitive Impacts? The Motivational Implications of Cognitive Appraisal Theories of Emotion**

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Are People Motivated to Experience Emotions for their Cognitive Impacts?

The Motivational Implications of Cognitive Appraisal Theories of Emotion

A Dissertation Presented

By

DANIEL R. ROVENPOR

Submitted to the Graduate School of the  
University of Massachusetts Amherst in partial fulfillment  
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Department of Psychological and Brain Sciences



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The Motivational Implications of Cognitive Appraisal Theories of Emotion

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## ABSTRACT

# ARE PEOPLE MOTIVATED TO EXPERIENCE EMOTIONS FOR THEIR COGNITIVE IMPACTS? THE MOTIVATIONAL IMPLICATIONS OF COGNITIVE APPRAISAL THEORIES OF EMOTION

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I propose a novel framework for understanding why people want to feel different emotions. I argue that people may be motivated to experience emotions for the cognitive appraisals they are associated with. In an effort to lay the foundation for an appraisal-based model of emotional preferences, I drew upon research on cognitive appraisal theories of emotion, emotional preferences, and basic human motivation. I tested my proposed model by either measuring (Study 1) or manipulating (Studies 2-7) appraisals and measuring emotional preferences, using anger (Studies 1-6) and guilt (Study 7) as specific test cases. I predicted that uncertainty appraisals would lead participants to prefer to feel anger, an emotion associated with appraisals of certainty. I also predicted that low control appraisals would lead participants to prefer to feel guilt, an emotion associated with appraisals of personal control. First, using large surveys, I demonstrated that people who tend to be uncertain also tend to experience greater levels of anger (Study 1). I then found that experimental inductions of uncertainty led to stronger preferences for and experiences of anger (Study 4), particularly among those motivated to reduce uncertainty

(Study 2) and who are aware of the association between anger and certainty (Study 3). Inducing a mindset of uncertainty tolerance, on the other hand, reduced anger experience (Study 5). Finally, people lacking a sense of control expressed a stronger preference for guilt (Study 7). These findings suggest that people are motivated to experience negative emotions when they can provide for their appraisal needs. I discuss the implications of these findings for research on cognitive appraisal theories of emotion and emotional preferences. In doing so, I aim to more fully integrate the affect-cognition and emotion regulation literatures.

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# CHAPTER 1

## INTRODUCTION

Despite decades of research on what emotions are, how they interact with cognition, and how they influence motivational and behavioral *outcomes*, very little research has investigated the motivational *precursors* of emotions. Indeed, despite the nearly 12,000 articles published on “emotion regulation” in 2013 alone (Gross, 2015), very few of them have considered how people want to feel and why (Tamir, 2009). That is, very few have asked, what emotions are people motivated to experience and what are the properties of different emotions that make emotions desirable? It is possible that research on this topic has been impeded by the lay notion that people are simply motivated to feel positive emotions. Yet it should also be apparent to lay observers that negative emotions are experienced very frequently, and not always for reasons that are easily explained by situational or individual difference factors. This raises the question of whether *motivational* factors play a role in shaping the extent to which people experience negative emotions, and whether people tend to experience negative emotions because they *want* to experience them.

The field of emotion regulation has aimed to understand “how individuals influence which emotions they have, when they have them, and how they experience and express them” (Gross, 1998). Yet, most research on emotion regulation assumes that people have hedonic goals and considers different strategies people can use to achieve these goals (Gross, 2015). Emotion regulation theorists have repeatedly emphasized the need to better understand the psychological processes that precede the onset of emotion regulation – the processes that shape people’s emotional goals, or how people want to

feel to begin with (see Gross, 1998; 2013; 2015). Because emotional goals operate so early in the emotion generation process (and prior to any of the regulation strategies) they can have dramatic effects on the development and regulation of emotions. In other words, because of their primacy, even a small change in goals at the beginning of the emotion generation process has the potential to entirely transform the unfolding of the emotion regulation process and the resulting emotional experience. Thus, rather than only focusing on how people deal with emotions once they are experienced, understanding how people want to feel in the first place is critical for understanding both emotion generation and emotion regulation.

Despite the importance of this topic, research on the factors that shape emotional preferences has only emerged as a focused area of inquiry over the past seven years (for reviews see Tamir, 2009; 2016). Most researchers appear to have adopted the lay intuition that people want to feel positive emotions and avoid negative ones. Yet, once researchers began questioning this axiom, they found that there is substantial variability in the extent to which people want to feel positive and negative emotions (Tamir, 2009). A variety of factors that influence emotional preferences have been identified, and I will review these factors next. Afterward, I will argue that the present research introduces a major component to our understanding of emotional preferences that has been overlooked to date, and thereby advances a richer and more complete framework for understanding why people want to experience a variety of emotions.

### **The Emerging Science of Emotional Preferences**

A review of the literature reveals that several factors have been shown to influence how people want to feel. It also reveals that these factors are based in disparate

literatures (e.g., clinical, social, cross-cultural, developmental) and lack an overarching integrative framework. Much of this research was not intended to contribute to an understanding of emotional preferences, but rather to an understanding of other content areas, such as aging, culture, or individual differences. Below, I briefly review the variables known to influence how people want to feel.

**Utility.** Most notably, numerous studies have demonstrated that people prefer negative emotions when they are perceived to be useful in a given situation. For example, people prefer to feel angry when they need to engage in a confrontational negotiation or when they anticipate playing a violent video game, but prefer to feel afraid when they anticipate playing a video game involving avoiding deadly characters (Ford & Tamir, 2012; Tamir & Ford, 2012; Tamir, Ford, & Gillam, 2013; Tamir, Ford, & Ryan, 2013; for reviews, see Tamir, 2009, 2016). Thus, emotions can be instrumental in helping us navigate different situations, and people prefer emotions they believe will help them navigate situations most effectively. This research was among the first in psychology to argue and demonstrate that people do not want to feel emotions for hedonic reasons alone.

**Familiarity.** Research also demonstrates that people prefer emotions that are familiar to them (Ford & Tamir, 2014). That is, the more familiar people say they are with an emotion – whether positive or negative – the more they want to experience that emotion. Relatedly, research demonstrates that clinically depressed individuals tend to choose to maintain or increase levels of sadness (Millgram, Joorman, Huppert, & Tamir, 2015).

**Culture.** Clear cultural differences in emotional preferences have emerged: Americans tend to show a preference for more arousing positive emotions than people in East Asian cultures (e.g., Tsai, Knutson, & Fung, 2006). Thus, cultural values shape how people want to feel.

**Age.** It has also been suggested that older adults may have a stronger preference for positive emotional experiences compared to younger adults (Charles, 2010; Rovenpor, Skogsberg, & Isaacowitz, 2013; Urry & Gross, 2010). This is consistent with socioemotional selectivity theory, which argues that older adults are motivated to experience positive emotions because they have a sense of limited time and therefore reconsider their emotional priorities (Carstensen, Isaacowitz, & Charles, 1999).

**Stimulus factors.** Research has demonstrated that stimulus valence and arousal jointly predict emotional preferences (Suri, Sheppes, & Gross, 2012; Sheppes, Scheibe, Suri, Radu, Blechert, & Gross, 2012). Specifically, people seem to prefer emotional experiences (viewing IAPS images, in this research) that are positive in valence but only moderately arousing.

**Individual difference factors.** Researchers have studied emotional preferences as individual difference characteristics by developing self-report measures of explicit attitudes toward emotions, which have been shown to predict the types of emotional situations people seek out (Harmon-Jones, Harmon-Jones, Amodio, & Gable, 2011). Classic research on sensation seeking similarly demonstrated that people vary in the extent to which they seek out novel, complex, and intense emotional experiences (Zuckerman, 1979).

To summarize, research has demonstrated that utility, familiarity, culture, age, and attitudes influence how we want to feel. These findings have informed disparate literatures. Further, with the exception of the work on utility, researchers have generally not gone beyond individual characteristics (e.g., age, attitudes toward emotions, familiarity with emotions, cultural background) to consider what it is about an emotional state that might make it desirable. Given that emotions are associated with many other qualities that vary along many dimensions, as documented by cognitive appraisal theories of emotion (Smith & Ellsworth, 1985), it is likely that these dimensions play a role in why people want to feel different emotions. The current research investigates whether people seek out emotions to experience the appraisals they are associated with. In doing so, I search beyond valence, arousal, individual characteristics, and situational utility as factors influencing emotional preferences, and aim to develop a novel and systematic framework for investigating emotional preferences.

### **Cognitive Appraisal Theories of Emotion**

Appraisal theories of emotion (e.g., Lerner & Keltner, 2001; Smith & Ellsworth, 1985) have been highly generative for organizing research on the links between particular emotions and particular cognitive appraisals. Smith and Ellsworth (1985) demonstrated that discrete emotional experiences are associated with unique profiles of cognitive appraisals. They asked participants to recall past experiences in which they felt a variety of emotions and then asked participants to rate those experiences on a number of appraisal dimensions, including pleasantness, anticipated effort, certainty, attentional activity, self-other responsibility/control and situational control. They found that emotions systematically varied along these dimensions and that the dimensions



effectively differentiated between discrete emotions. Further illustrating the importance of cognitive appraisals, more recent research has shown that appraisals not only characterize emotional experience, but also shape how emotions impact decision-making and behavior. For example, research demonstrates that anger leads people to feel more confident in risk-taking tasks and thereby increases people's tendencies to take risks (Lerner & Keltner, 2001). Taken together, this work demonstrates not only that emotions are associated with different appraisals, but that these appraisals also determine the consequences that particular emotions have on subsequent, often seemingly unrelated, outcomes. What has not yet been considered is whether *preferences for emotions* are driven by the cognitive appraisals that characterize emotions and their consequences. In other words, appraisal theories of emotion have proven incredibly useful for understanding the cognitive, behavioral, and motivational consequences of discrete emotions based on their fundamental underlying dimensional qualities. However, to date, no work has extended this framework to better understand why people select different emotional experiences in the first place.

I argue that existing appraisal models offer a rich starting point for building a framework of emotional preferences. By documenting the cognitive appraisals associated with specific emotions, appraisal theories provide the clues about possible reasons people might want to experience different emotions. The present research aims to integrate what is known about emotional preferences and what is known about cognitive appraisals to bridge the two literatures.

Appraisal theories discuss the associations between emotions and appraisals in almost exclusively correlational terms. Smith and Ellsworth's (1985) analysis was purely

correlational, demonstrating associations between particular cognitive appraisals and particular emotions. There is no consensus on the causal direction between appraisals and emotions. Underscoring this point, in a recent review of appraisal theories of emotion, Phoebe Ellsworth (2013) wrote, “I am often asked whether I think that appraisals cause emotions: yes or no? My writings have been unclear on this point... The issue of causality in emotion is a vexing one for me, and one that I have generally tried to avoid” (Ellsworth, 2013, p. 125). The present research does not have any bearing on the topic of the causal relationship between appraisals and emotions. What the present work does suggest, however, is that appraisal theorists have not attended to a potential important implication of appraisal theories. That is, if emotions are associated with appraisals, being on the low end of an appraisal dimension may cause an emotion to arise for motivational reasons, because people will choose to feel an emotion that can boost the deficient appraisal. For example, appraisal research has demonstrated that anger tends to co-occur with appraisals of certainty. The literature remains agnostic as to whether anger causes the certainty appraisals or whether the certainty appraisals cause the anger. But the causal question that this debate has failed to ask is whether *uncertainty* can lead to anger, because individuals experiencing uncertainty may be motivated to feel angry to attain the certainty appraisals contained within it. Thus, in addition to applying appraisal theory to advance our understanding of emotional preferences, I attempt to incorporate a motivational component into appraisal theories of emotion, seeking causal evidence that appraisal deficits can lead to the generation of emotions that can mitigate those deficits.

In short, it is not relevant to my perspective whether certainty causes anger or anger causes certainty. Instead, I aim to provide evidence that *uncertainty* causes anger.

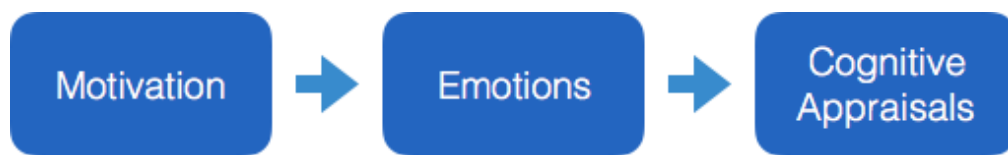
By incorporating a hydraulic/motivational component into what has been a debate about the causal relationship between emotion and cognition, I make novel causal predictions about the association between cognitive appraisals and emotions.

### **An Appraisal-Based Understanding of Emotional Preferences**

I propose an appraisal-based model of emotional preferences that integrates research on emotion regulation and emotional preferences with the cognitive appraisal tradition. Such integration will lay the groundwork for a broad framework that identifies reasons why many different emotions might be desired based on many different appraisal dimensions. Although most empirical evidence in the present research will consider the cognitive appraisal dimension of certainty and the emotion of anger as a starting point, this will lay the groundwork, in terms of both ideas and methods, for future work that can test other appraisal-emotion pairs. For example, appraisals of low interest and low arousal (e.g., common in boredom) may lead people to prefer emotions high in interest or arousal (e.g., excitement, anxiety). Of course, more surprising predictions would involve emotions that might be sought out despite having a negative valence. An example of this would be guilt, which is high on appraisals of control and self-responsibility. It follows that people who lack a sense of control in the world might want to feel guilt in order to alleviate their diminished sense of control. I will provide an initial test of this hypothesis in the final study in this dissertation.

Motivational direction (i.e., approach versus avoidance) has emerged as another key dimension along which emotions vary (e.g., Harmon-Jones & Allen, 1998). It may be that the hydraulic prediction applies here as well, and that being low in approach orientation leads one to prefer approach-oriented emotions. Indeed, cognitive appraisals

may only be a starting point for understanding why emotions are sought out for their dimensional qualities. By considering the fundamental qualities of emotions as motivating factors for pursuing different emotions, this work will represent a systematic, dimensional, theoretically-driven attempt to understand a wide range of emotional preferences. This work will integrate research on motivation, emotions, and cognitive appraisals in pursuit of a novel model of emotional preferences (see *Figure 1*).



*Figure 1.* Basic overview of proposed model.

### **Anger as an Initial Test Case**

I tested my predictions by using anger as an initial test case. Anger provides an ideal context for testing my research questions because, among other reasons, large literatures already exist on the cognitive concomitants of anger and on the motivation to regulate uncertainty, though no research to date has connected these literatures. This work on anger will not only serve as a context for testing an appraisal-based model of emotional preferences, but will serve as an opportunity to illustrate the importance and applicability of this model for answering important questions about the development and regulation of anger. As such, this work is expected to have theoretical as well as applied implications.

Anger frequently plagues everything from interpersonal relationships (Lemay et al., 2012), to intergroup relations (Iyer & Leach, 2008), to physical health (Smith et al., 2004). Yet, according to many estimates, anger is one of the most frequently experienced emotions (Lerner & Tiedens, 2006; Averill, 1986). Why, then, are people so prone to

feeling angry, even though there are many good reasons to avoid it? In contrast to the lay notion that anger is something people try to avoid but sometimes involuntarily get “caught up in,” I propose that people may be implicitly drawn toward anger because it promises to enhance one’s sense of certainty. If such an alluring quality draws people toward anger, it may contribute to a vicious cycle in which individuals lack certainty, turn to anger to boost it, and only create more problems (i.e., personal, interpersonal, intergroup), without ever addressing the core problem – a lack of certainty. Identifying the starting point of this cycle may help us to more effectively end it.

Anger is experienced as a high-arousal negative emotion (Russell & Barrett, 1999). People report that they dislike the experience of anger (Carver & Harmon-Jones, 2009). Although anger is similar to other negative emotions (i.e., fear) on levels of valence and arousal, a key distinguishing feature of anger relative to other negative emotions is that it is associated with a sense of certainty, confidence, and self-righteousness (e.g., Smith & Ellsworth, 1985). People get angry when they are sure about their stance on an issue, and feeling anger is an intense experience that in turn solidifies this sense of certainty. For these reasons, some researchers have even briefly discussed the possibility that anger might be more appropriately labeled as a “positive” emotion (Carver & Harmon-Jones, 2009; Lerner & Tiedens, 2006). Though these researchers conclude that anger is ultimately best classified as a negative emotion based on the lack of empirical data suggesting positivity per se, current theorizing about emotion strongly supports the idea that there is *something* appealing about anger, even if this appeal cannot be directly captured by measures of self-reported attitudes toward anger.

Converging evidence from research on the effect of anger on cognition reveals that anger influences cognitive outcomes in much the same way happiness does, and suggests that anger may be one of the few negative emotions to exhibit such effects. For example, an array of research demonstrates that, just like happiness, anger enhances judgments of certainty (Tiedens & Linton, 2001), promotes people's tendencies to use heuristics (Bodenhausen, Sheppard, & Kramer, 1994), and functions as a cognitive "go" signal that conveys positive value on accessible modes of thought (Isbell, Rovenpor, & Lair, 2016). Building on Smith and Ellsworth's initial evidence for an association between anger and certainty, these experimental findings have confirmed that certainty is a defining feature of anger that is responsible for many of its unique cognitive consequences. Could this core feature of how anger is experienced and how it influences our thoughts, then, also help us understand *why* anger is so commonly experienced?

A growing body of research demonstrates that people have a strong motivation to feel certain and mitigate uncertainty. People go to great lengths to manage and compensate for uncertainty (e.g., Grieve & Hogg, 1999; Hofstede, Hofstede, & Minkov, 1991; Kruglanski & Webster, 1996; McGregor, Nash, Mann, & Phillips, 2010; McGregor, Nash, & Prentice, 2010; Neuberg, Judice, & West, 1997; Van den Bos, 2001), even when it is experienced subtly (Heine, Proulx, & Vohs, 2006). Thus, good evidence exists that certainty represents a fundamental object of human motivation. If certainty is the distinguishing feature of anger, and the pursuit of certainty is a defining feature of the human experience, then anger may be the emotional experience that is uniquely able to satisfy a core psychological motive. It thus seems plausible that individuals may gravitate

toward anger-inducing situations in a motivated attempt to alleviate uncertainty. The current research directly tests this heretofore untested possibility.

### **Guilt as a Second Test Case**

The present research aims to build a strong foundation for a broad appraisal-based model of emotional preferences and thus uses anger as a starting point. However, a second, perhaps even more counterintuitive hypothesis generated by the model is that people who lack a sense of control may prefer to feel even negative emotions that contain responsibility and control appraisals, such as guilt. The notion that people have a strong desire for control is even more widely supported than the notion that people have a strong desire to attain certainty. Indeed, the importance of a sense of control in human functioning is a key cornerstone of the psychological literature, emerging as a central theme in the clinical (e.g., Abramson, Seligman, & Teasdale, 1978), health (e.g., Rodin, 1986; Taylor & Brown, 1988; Wrosch, Heckhausen, & Lachman, 2000), personality (e.g., Ryan & Deci; 2000), well-being (e.g., Ryff & Keyes, 1995), social (e.g., Bandura, 1977; Dweck & Legget, 1988; Whitson & Galinsky, 2008), organizational (e.g., Hofstede, Hofstede, & Minkov, 1991) and developmental (e.g., Baltes, 1997; Heckhausen, Wrosch, & Schulz, 2010) literatures. Given that guilt has been shown to be associated with appraisals of control and self-responsibility (Smith & Ellsworth, 1985), it is possible that guilt would be preferred to a greater extent by individuals who lack a strong sense of control or self-responsibility. This would illustrate that people are more receptive to feeling guilty when it serves their appraisal needs. Given the important implications of experiencing guilt for interpersonal relationships and intergroup relations, among other domains (e.g., Baumeister, Stillwell, & Heatherton, 1994; Lickel, Schmader,

Curtis, Scarnier, & Ames, 2005; Tangney, 1995), understanding the motivational factors that allow for heightened feelings of guilt could have important applied implications.

### **Methodological Considerations for Studying Emotional Preferences**

Several experimental paradigms have been used to study emotional preferences. Three such paradigms have been employed in Maya Tamir's work on the instrumental value of emotions (see Tamir, 2009 for a review). In one paradigm, Tamir and her colleagues ask participants to listen to 20-second snippets of music that evoke different emotions (e.g., happiness, sadness, anger, fear) and have participants rate the extent to which they would like to listen to similar music in an upcoming task. In another measure of emotional preferences, participants are told that they will engage in a recall task, and are asked to rate the extent to which they would like to recall several different types of emotional experiences. Finally, Tamir and her colleagues also assess emotional preferences via explicit self-report measures. In research that I have conducted previously on emotional preferences, I displayed media items to participants that evoked different emotions and asked participants to select the material they were most interested in engaging with (Rovenpor & Isbell, under review; Rovenpor, Skogsberg, & Isaacowitz, 2013).

I adapted several of these paradigms for the present research. Critical to my selection of methodological approaches was the notion that it should be at least *possible* for participants to realize that choosing to feel a particular emotion may have consequences for the cognitive appraisals they experience. This ruled out the use of the music paradigm. It is likely difficult for participants to discern that listening to upbeat heavy metal music has the potential to increase the specific cognitive appraisals they will



experience. My hypothesized effects are more likely to emerge when participants can experience a “taste” of the emotion they will express preferences for – and thus a sampling of the appraisals they could experience if they maintain or increase the extent to which they feel that emotion. Thus, rather than merely measure preferences for hypothetical anger-inducing experiences, I exposed participants to actual emotion-inducing experiences and assessed their willingness to prolong them.

It is also important to consider the social desirability concerns that can arise during the measurement of emotional preferences. For example, social desirability may inhibit people from fully expressing that they want to feel angry, especially when this desire arises out of a defensive desire to restore uncertainty and the action taken to reduce uncertainty is socially frowned upon. Thus, cover stories were used to describe the tasks that participants were completing (i.e., uncertainty manipulation and anger induction tasks) as being separate and unrelated.

Further, in addition to simple ratings of emotional preferences, I employed indirect measures of emotional preferences. The most straightforward index of how people want to feel after an anger-inducing experience may be how they actually feel after the experience. If they want to feel angry, they would feel angry. Where possible, I tested this logic explicitly by assessing whether emotional preferences mediated any effects on emotional experience. Other unobtrusive measures were collected, such as how many words people write during a task in which they are asked to write about an anger-inducing life experience. Measures of attempts to up-regulate the target emotion or tendencies to ruminate about the target emotion were also collected. To overcome concerns that participants may be reluctant to positively affirm that they want to feel a

negative emotion, I reversed the direction of the question and asked participants how likely they would be to *eliminate* the emotion if they could (e.g., via a hypothetical pill). In these ways, I developed and refined several paradigms for testing my theoretical perspective.

### **The Present Research**

In the present research, I aimed to establish initial evidence for the idea that people are motivated to seek out emotions for the appraisals they confer. I first tested this idea using anger and certainty (Studies 1-6), and later tested this using guilt and control (Study 7). Following a correlational study (Study 1), the basic experimental design of the remaining studies (Studies 2-7) involved experimentally manipulating an appraisal (e.g., certainty, control) and then measuring emotional preferences. I predicted, for example, that people experiencing appraisals of uncertainty would be more likely to prefer anger, to alleviate their uncertainty. Each study also sought evidence that such effects emerged for motivational reasons. Thus, each study measured or manipulated the desire to attain the target appraisal (i.e., certainty or control), as well as people's awareness that the target emotion contains the desired appraisal. These variables were hypothesized to moderate the effects of appraisal deficits on emotional preferences.

Study	Design	Sample	Emotion Induction	Primary Findings
1 Correlational Evidence	Correlational	SONA online prescreen	N/A	Correlations between trait uncertainty / need for cognitive closure and anger rumination / revenge planning / trait anger
2 Experimental Manipulation of Uncertainty	3 conditions (uncertainty, certainty, neutral)	Students in the lab	Anger-inducing video	Need for closure by condition interactions on anger experience and ideal anger
3 Replication of Study 2	2 conditions (uncertainty, certainty)	Students in the lab	Anger-inducing video	Knowledge by condition interaction on anger-prolonging behaviors
4 Anger in Response to a Life Experience	3 conditions (uncertainty, certainty, neutral)	MTurk participants	Writing about an anger-inducing life experience	Main effects of manipulation on writing word count, anger experience, anger up-regulation, and anticipated rumination
5 Manipulating Uncertainty Intolerance	2 conditions (uncertainty intolerance vs. tolerance)	MTurk participants	Anger-inducing article	Main effect of manipulation on anger experience
6 Manipulating Anticipated Certainty from Anger	2x2 (uncertain vs certain experience x certain vs. uncertain headline choice)	MTurk participants	N/A	No effects of manipulations on preferences for reading an anger-inducing article
7 Extension to Control and Guilt	3 conditions (high control, low control, neutral)	MTurk participants	Writing about a guilt-inducing life experience	Main effect on preferences for writing about a guilt-inducing life experience; knowledge by condition interaction on desire to eliminate guilt

*Table 1.* Overview of studies.

I tested these predictions using correlational data as well as six experiments (see Table 1 for an overview of these studies). The correlational data (Study 1) used large samples of survey respondents to test the direction of the association between trait tendencies to experience uncertainty and trait tendencies to feel angry. Study 2 experimentally manipulated appraisals of uncertainty, exposed participants to an anger-inducing video, and assessed how angry participants felt and how angry they wanted to feel after watching the video. Study 3 attempted to replicate Study 2. Study 4 experimentally manipulated appraisals of uncertainty, asked participants to write about an anger-inducing life experience, and assessed how much participants wrote, whether they attempted to up-regulate their experience of anger during the writing task, how angry

they felt after the writing task, and whether they anticipated ruminating about their anger in the future. Study 5 experimentally manipulated the desire to reduce versus accept uncertainty, exposed participants to an anger-inducing article, and assessed the anger they felt in response to it. Study 6 experimentally manipulated appraisals of uncertainty as well as the extent to which participants anticipated feeling certain versus uncertain after reading an anger-inducing article, and measured their preferences for reading the article. Study 7 experimentally manipulated appraisals of control, asked participants to write about a guilt-inducing life experience, and assessed participants' preferences for writing about this experience as well as their desire to eliminate their guilt after writing about the experience.

Together, these studies tested whether people want to experience anger (or guilt) to a greater extent when they are experiencing appraisals of uncertainty (or lack of control), when they want to reduce that uncertainty (or increase control), and when they know that anger can provide certainty (or that guilt could provide a sense of responsibility). In doing so, these studies began to test the idea that people seek out emotions for the appraisals they confer.

## CHAPTER 2

### STUDY 1: CORRELATIONAL EVIDENCE

I first tested my ideas correlationally using large data sets obtained from the departmental prescreen across four different semesters. Across various semesters, I measured trait-level uncertainty, need for cognitive closure, anger rumination, and revenge planning and assessed correlations within each dataset. This correlational data tested a simple question: Do people who tend to be uncertain also tend to get more angry? Given that some students completed the prescreen two semesters in a row, I also combined datasets to test my hypotheses longitudinally. This allowed me to ask the question: As people become more uncertain or intolerant of uncertainty, do they tend to ruminate more about their anger?

These data are well-suited to test the direction of the relationship between uncertainty and anger, but are not intended to provide a sense of the *causal* direction or magnitude of the effect. Given that a sizeable literature demonstrates that anger is associated with a sense of certainty, I expected that it is plausible that anger would be negatively correlated with measures of trait uncertainty. Therefore, I reasoned that a *positive* correlation between anger and trait uncertainty would lend support for my model, providing evidence that uncertainty, and *not* certainty, is associated with anger on an individual difference level. In addition, I predicted that a measure of the desire to alleviate uncertainty (i.e., need for cognitive closure) should be positively associated with tendencies to get angry. Given the lack of a salient competing hypothesis for this inherently motivational variable, I expected that the correlations involving need for cognitive closure would be stronger than those involving trait uncertainty.

## Method

### Participants

I used data from four different surveys administered during four different semesters. Participants completed the online survey at the beginning of the semester in exchange for extra course credit. The surveys included many measures not relevant to the present hypotheses and took approximately 45 minutes to complete. A very small number of participants were excluded from each sample for taking an unreasonably short or long amount of time to complete the survey or not reporting having spoken English for at least 5 years. Between 1400-1500 participants completed each survey wave, and more than 400 participants completed two surveys in two successive semesters, allowing for four within-semester analyses and two between-semester analyses to be conducted. The precise number of participants in each sample is listed in Table 2.

### Measures

The following measures were included in a subset of the datasets, interspersed amongst other measures. Reliabilities of the measures are listed in Table 2.

**Trait uncertainty.** I assessed trait-level uncertainty using the 20-item Judgmental Self-Doubt Scale (e.g., “I am inclined to have trouble knowing where to stand on an issue”; Mirels, Greblo, & Dean, 2002), which assesses how uncertain participants tend to be when making judgments and decisions.

**Need for cognitive closure.** I assessed the motivation to *reduce* uncertainty using 4 items from the Need for Closure Scale (e.g., “I must get away from all uncertain situations,” “Unforeseen events upset me greatly”; Roets & Hiel, 2011; Webster & Kruglanski, 1994).

**Revenge planning.** I assessed participants’ tendency to desire and plan for revenge as an indirect measure of preferences for anger using an 11-item revenge planning scale (e.g., “When someone makes me angry I can’t stop thinking about how to get back at this person”; Denson, Pedersen, & Miller, 2006).

**Anger rumination.** I assessed participants’ habitual tendency to amplify and prolong anger using a 10-item anger rumination scale (e.g., “I keep thinking about events that angered me for a long time”; Denson, Pedersen, & Miller, 2006).

**Anxiety and depression.** I controlled for potential third variables that could inflate the relationship between uncertainty (and the desire to reduce uncertainty) and anger. I assessed anxiety using four items (assessing anxiety in general, anxiety in social situations, anxiety about public speaking, and anxiety about taking tests). I assessed depression using 20 items from the Beck Depression Inventory (Beck, Steer, & Brown, 1996).

## Results

Semester	Sample Size	Measure of Uncertainty	Measure of Anger	Covariates	Correlation
Fall 2012	1584	Trait uncertainty ( $\alpha = .95$ )	Revenge planning ( $\alpha = .92$ )	None Anxiety ( $\alpha = .72$ )	$r = .151, p < .001$ $r = .116, p < .001$
Spring 2013	1453	Trait uncertainty ( $\alpha = .95$ )	Revenge planning ( $\alpha = .94$ )	None Anxiety ( $\alpha = .71$ )	$r = .159, p < .001$ $r = .136, p < .001$
Fall 2015	1420	Need for closure ( $\alpha = .72$ )	Anger rumination ( $\alpha = .93$ )	None	$r = .330, p < .001$
Spring 2016	1427	Need for closure ( $\alpha = .74$ )	Anger rumination ( $\alpha = .93$ )	None Depression ( $\alpha = .92$ )	$r = .375, p < .001$ $r = .298, p < .001$
Fall 2012 to Spring 2013	448	Change in trait uncertainty	Change in revenge planning	None Change in anxiety	$r = .129, p = .006$ $r = .100, p = .035$
Fall 2015 to Spring 2016	412	Change in need for closure	Change in anger rumination	None Depression ( $\alpha = .92$ )	$r = .160, p < .001$ $r = .143, p = .004$

Table 2. Summary of correlational results.

Table 2 presents the results for all analyses. As shown in Table 2, trait uncertainty was positively associated with revenge planning. This association was weak yet consistent across two large surveys. Further, the association remained after controlling

for anxiety. The positive correlation suggests that uncertainty and preferences for anger tend to generally coincide. In addition, as predicted, the more people wanted to reduce their uncertainty, the more they tended to ruminate on their anger, and these correlations were consistently moderate in size. The association remained after controlling for depression. This provides more direct evidence for the idea that people who want to reduce their uncertainty tend to amplify or prolong their anger.

I assessed the test-retest reliability of each measure over time to gain a better understanding of the extent to which participants' scores on these trait measures changed over time. I tested this using correlations between Time 1 and Time 2 measurements. The results were as follows:  $r_{\text{trait uncertainty}} = .759$ ,  $r_{\text{revenge planning}} = .684$ ,  $r_{\text{need for closure}} = .520$ ,  $r_{\text{anger rumination}} = .673$ . Thus, despite high correlations, there was a degree of change over time in these measures. I thus considered whether people who become more uncertain over time also tend to seek more revenge. Indeed, a change in trait uncertainty was positively correlated with a change in revenge planning, and this association held after controlling for a change in anxiety from Time 1 to Time 2. Similarly, as participants developed a stronger desire to reduce uncertainty, they also developed a stronger tendency to ruminate about anger, and this association held after controlling for time 2 depression (the depression measure was not available at Time 1).

## **Discussion**

These analyses support my hypotheses that uncertainty – and the desire to reduce it – is associated with tendencies to prolong the experience of anger. Despite the possibility that *negative* correlations would emerge between uncertainty and revenge planning, reflecting the association identified by research on cognitive appraisals



whereby anger is associated with a sense of certainty, *positive* correlations instead emerged between uncertainty and revenge planning. This illustrates that in the real world, these variables are associated in ways consistent with a motivational/hydraulic relationship between uncertainty and anger.

These analyses used large samples, and even though the effects are significant, the effect sizes are small. However, this may not be surprising given the possibility that the cognitive impact of high certainty on greater anger may have suppressed the motivational effect. In addition, these results emerged in the absence of a salient induction of uncertainty or an acute opportunity to feel anger. In the real world, or in an experimental context in which uncertainty is made salient or participants are provided with a salient opportunity to feel anger, these effects should be stronger. Although Study 1 began to rule out third-variable explanations for the reported effects, future correlational research should aim to include more such variables as covariates. Most importantly, these correlational findings open the door for experimental research to test the causal relationship between uncertainty and anger.

## **CHAPTER 3**

### **STUDY 2: EXPERIMENTAL MANIPULATION OF UNCERTAINTY**

Study 2 sought experimental evidence for the idea that uncertainty should heighten preferences for anger. Participants were randomly assigned to complete a task in which they wrote about a time they experienced uncertainty, certainty, or neither (in a neutral/control condition). Next, all participants were exposed to the same anger-inducing video. Participants then rated how angry they felt and how angry they wanted to feel. This study thus tested my hypothesis that experiencing uncertainty (compared to certainty) leads people to want to experience more anger and, in turn, actually experience more anger. Importantly, I also tested whether this effect is stronger among people who are highly motivated to reduce uncertainty (i.e., high in need for cognitive closure), thereby directly testing the hypothesized motivational mechanism for the effect.

#### **Method**

##### **Participants**

Participants were recruited from a pool of approximately 1400 students who completed a large departmental prescreening at the beginning of the semester, which included a measure of need for cognitive closure (Roets & Hiel, 2011; Webster & Kruglanski, 1994). A subset of those who completed the prescreen were invited to complete a lab study, and 140 participants took part in exchange for extra course credit. I excluded one participant who did not follow instructions on the writing task constituting the manipulation, seven participants who did not watch the entire anger-inducing video, and four outliers on a measure of anger felt after the video (they were below the midpoint

of the scale and over 2 SDs below the mean), leaving 128 participants in the final sample (22 males, 105 females, 1 “other”).

## **Procedure**

Participants were told that the study would consist of several separate and unrelated tasks. To manipulate uncertainty, participants were first randomly assigned to write about a time they felt uncertain, certain, or, in a control condition, about a typical life event, similar to a procedure used by DeMarree et al. (2012). All participants read the following:

We are collecting a sample of people’s personal experiences to use in constructing stimulus materials for a future study. In the first task, we would like you to help us develop these materials by writing about a personal life experience.

Next, participants were randomly assigned to either the certainty, uncertainty, or control conditions:

[Certainty / Uncertainty conditions]:

We are interested in the types of experiences people associate with [a sense of certainty and confidence / uncertainty and doubt]. To help us address this question, we would like you to write about something you currently feel [certain or confident / uncertain or doubtful] about. Please take a few moments to think about something you really feel [certain / uncertain] about - it can be an event or a belief you really feel [certain / uncertain] about. Then, please write about the experience. Be sure to include what you are [certain / uncertain] about, why you are [certain / uncertain] about it, and how it makes you feel. Please describe this as vividly and in as much detail as possible. You have 5 minutes to complete this task.

[Control condition]:

We are interested in the types of experiences people have in everyday life. To help us address this question, we would like you to write about a typical experience in your life. Please take a few moments to think about an ordinary and

typical life experience. Then, please write about the experience. Please describe this as vividly and in as much detail as possible. You have 5 minutes to complete this task.

After the manipulation, all participants watched an anger-inducing film clip that has been used to reliably induce anger in previous research (Rottenberg, Ray, & Gross, 2007). The 3-minute clip depicts the South African military killing young schoolchildren and teachers during a nonviolent protest. Immediately after viewing the video, participants were asked to rate their current emotions and their emotional preferences using the measures listed below.

Participants then completed manipulation checks in which they rated how they felt during the certainty/uncertainty/control writing task. They first reported how certain/uncertain they felt, which was expected to differ by condition. They then also reported the extent to which they felt a variety of emotions – ratings which might also differ by condition, and which could be used as covariates in the analyses. In all studies reported in this dissertation, these ratings came at the end of the study so as not to influence participants' responses to the other measures. By drawing explicit attention to participants' inner states, emotion ratings have been known to eliminate effects of manipulations by leading participants to attempt to correct or adjust for the effects of the manipulation (e.g., Schwarz & Clore, 1985). Given that I used well-established manipulations, that I was more interested in emotional experience after the anger induction rather than after the manipulation of certainty/uncertainty, and that I did not want to run the risk of weakening the manipulation's effects, positioning these ratings at

the end of the study seemed to be the best option. Finally, as in all studies, participants responded to demographic questions and were debriefed.

## **Measures**

**Need for cognitive closure.** Need for cognitive closure was measured weeks before the study, on the departmental prescreen, using 14 items (e.g., *I don't like situations that are uncertain*; Roets & Hiel, 2011; Webster & Kruglanski, 1994; see appendix). Participants responded on a 6-point scale (1 = *Strongly Disagree*, 6 = *Strongly Agree*;  $\alpha = .85$ ).

**Emotions after the video.** Immediately after viewing the video, participants were asked to indicate the extent to which they currently feel the following emotions using a 9-point scale (1 = *Not at all*, 9 = *Extremely*): *sad, angry, afraid, disgusted, upset, anxious, happy, excited, irritated, agitated, frustrated*.

**Anger at the perpetrators.** Participants were also asked to indicate how angry they feel specifically toward the military members who shot at the protestors in the video, using a 9-point scale (1 = *Not at all*, 9 = *Extremely*).

**Intentions to engage in anger-prolonging behaviors.** Participants responded to three questions assessing the extent to which they anticipated behaving in ways that would keep anger on their minds for a longer period of time. This measure of behavioral intentions served as an indirect measure of emotional preferences. We asked participants, "If you had 15 minutes of free time, how likely would you be to..." "...search the internet for more information about this event?" "...voice your anger about this event via social media?" "...discuss your anger over this event with a friend?" Participants responded on 9-point scales (1 = *Not at all likely*, 9 = *Extremely likely*;  $\alpha = .74$ ).

**Ideal affect.** To directly assess emotional preferences, participants were asked to rate the extent to which they would IDEALLY like to feel the following emotions right now using a 9-point scale (1 = *Not at all*, 9 = *Extremely*): happy, sad, angry, fearful. This measure was adapted from a measure used in past research (Tsai, 2007).

**Beliefs about the link between anger and certainty.** To measure the extent to which participants knew that anger could lead to a sense of certainty, I asked: “In general, to what extent do you think people feel confident when they are angry?” Participants responded on a 9-point scale (1 = *Not at all*, 9 = *Extremely*).

**Manipulation Check.** To assess the validity of the manipulation, I asked participants to rate the extent to which they felt the following emotions during the writing task: *Certain, Confident, Doubtful, Sad, Fearful, Angry, Anxious*. Participants responded on a 7-point scale (1 = *Not at all*, 7 = *A great deal*).

The first three items were averaged to form a composite measure of uncertainty (*Certain* and *Confident* were reversed;  $\alpha = .85$ ). The latter four items were averaged to form a composite measure of negative affect experienced during the manipulation ( $\alpha = .79$ ).

## Results

### Descriptive Statistics

Table 3, below, displays the means and standard deviations for all measures across conditions.

Measure	M	SD
Need for cognitive closure	4.07	0.68
<i>Emotions after the video</i>		
Disgusted	8.53	0.86
Sad	8.07	1.27
Upset	8.06	1.27

Angry	7.81	1.36
Frustrated	6.72	2.14
Irritated	6.14	2.26
Agitated	6.12	2.24
Anxious	5.52	2.63
Afraid	4.66	2.55
Excited	1.38	0.94
Happy	1.31	0.89
Anger at the perpetrators	8.03	1.29
2-item anger composite	7.92	1.17
Intentions to engage in anger-prolonging behaviors	6.33	1.30
<i>Ideal affect</i>		
Happy	7.14	2.55
Sad	2.25	2.38
Angry	2.28	2.44
Fearful	1.66	1.59
Beliefs about the link between anger and certainty	5.20	1.26
<i>Manipulation Checks</i>		
Uncertainty composite	3.19	1.60
Certain	4.84	1.83
Confident	4.80	1.74
Doubtful	3.20	1.89
Negative affect composite	2.44	1.33
Sad	2.34	1.59
Fearful	2.35	1.68
Angry	1.60	1.08
Anxious	3.40	2.08

Table 3. Means and standard deviations for main measures in Study 2.

### Manipulation Checks

The manipulation had the anticipated effects on the uncertainty manipulation check composite variable,  $F(2,125) = 51.63$ ,  $p < .001$ ,  $\eta_p^2 = .452$ . Participants reported feeling more uncertain in the uncertainty ( $M = 4.60$ ,  $SD = 0.99$ ) condition compared to both the control condition ( $M = 2.72$ ,  $SD = 1.41$ ),  $p < .001$ , and in the certainty condition ( $M = 2.10$ ,  $SD = 1.14$ ),  $p < .001$ . The difference between the control condition and the high certainty condition was also significant,  $p = .019$ , but difference in the means was

smaller, suggesting that participants in the control condition resembled people who were high in certainty more than they resembled people who were uncertain.

The manipulation also influenced negative affect,  $F(2,125) = 15.79, p < .001, \eta_p^2 = .202$ . Upon reflecting back on the writing task, participants' reported having experienced more negative affect in the uncertainty condition ( $M = 3.25, SD = 1.35$ ) compared to both the certainty condition ( $M = 1.93, SD = 0.94$ ) and the control condition ( $M = 2.07, SD = 1.25$ ), both  $p$ 's  $< .001$ . The certainty and control conditions did not differ,  $p = .600$ .

I also analyzed anger as a single item. Participants' ratings of anger felt during the task did not differ across conditions,  $F(2,123) = .958, p = .386, \eta_p^2 = .015$ , and the contrast between the certainty ( $M = 1.40, SD = 0.74$ ) and uncertainty ( $M = 1.70, SD = 1.26$ ) conditions was not significant,  $p = .213$ .

### **Main Effects of Certainty Manipulation on Key Dependent Variables**

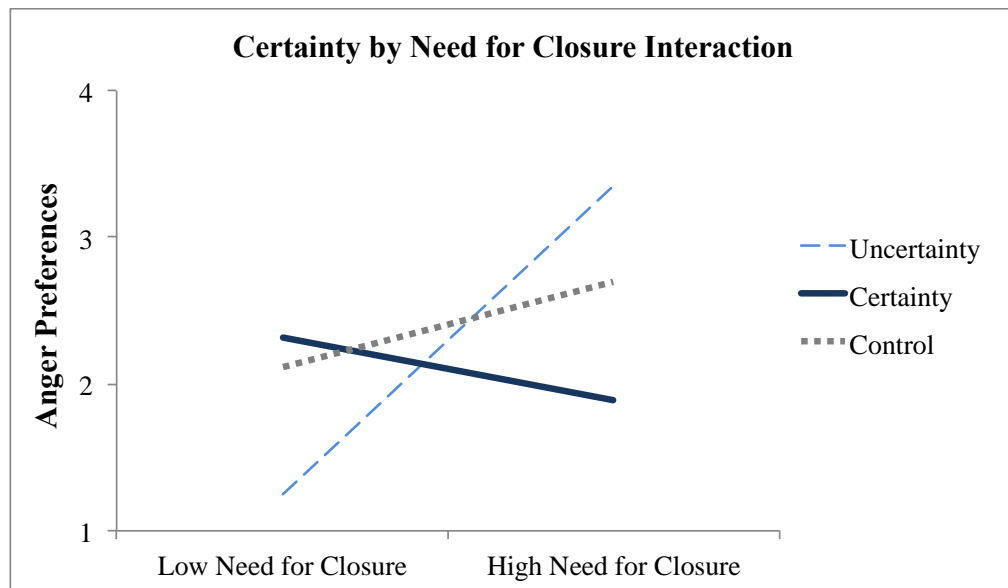
No main effects of the certainty manipulation emerged on any of the dependent variables,  $p$ 's  $> .15$ .

### **Moderation by Individual Differences in Motivation and Knowledge**

**Preferences for anger.** I reasoned that people high in the desire to reduce uncertainty should want to feel (and actually feel) the most angry when they are uncertain. I thus tested whether need for cognitive closure moderated the effect of the manipulation on anger preferences and experience. Need for cognitive closure was measured as a moderator before the study session, and thus scores in the different conditions did not differ,  $F(2,125) = .052, p = .950$ , allowing it to be treated as a moderator. I used a moderated regression analysis to assess the effects of the



manipulation at 1 SD above and below the mean of need for cognitive closure. I used the procedures for testing moderation between a multicategorical and a continuous IV outlined by Hayes (2013). This analysis revealed an interaction between the manipulation and need for cognitive closure on ideal anger (i.e., explicit preferences for anger),  $\Delta R^2 = .047$ ,  $F(2, 122) = 3.13$ ,  $p = .047$  (see *Figure 2*). The impact of need for cognitive closure significantly differed in the uncertainty and certainty conditions,  $b = 1.85$ ,  $SE = .747$ ,  $p = .015$ . Most importantly, among participants high in need for cognitive closure, those in the uncertainty condition had a stronger preference for anger than those in the certainty condition,  $b = 1.47$ ,  $SE = .723$ ,  $p = .045$ . This suggests that when people feel uncertain and they want to reduce this feeling, they adopt a stronger preference for anger.



*Figure 2.* The effects of uncertainty and need for cognitive closure on preferences for anger.

**Anger experience.** Next, I created a composite score reflecting anger experience by averaging the rating of general anger after the video with the rating of anger toward the perpetrators in the video ( $\alpha = .72$ ). I predicted that if people high in need for cognitive

closure who experience uncertainty *want* to feel more anger, they should also *actually* feel more anger when given the opportunity. As expected, a similar moderated regression analysis revealed that the manipulation also interacted with need for cognitive closure to influence anger experience,  $\Delta R^2 = .053$ ,  $F(2, 122) = 3.48$ ,  $p = .034$  (see Figure 3). Need for cognitive closure was positively related to anger experience only in the uncertainty condition,  $b = .613$ ,  $SE = .249$ ,  $p = .015$ , and not in the other conditions,  $p$ 's  $> .25$ . Thus, when people are uncertain, the more they generally want to reduce uncertainty, the more angry they end up feeling. This suggests that preferences for and experiences of anger result from attempts to manage uncertainty.

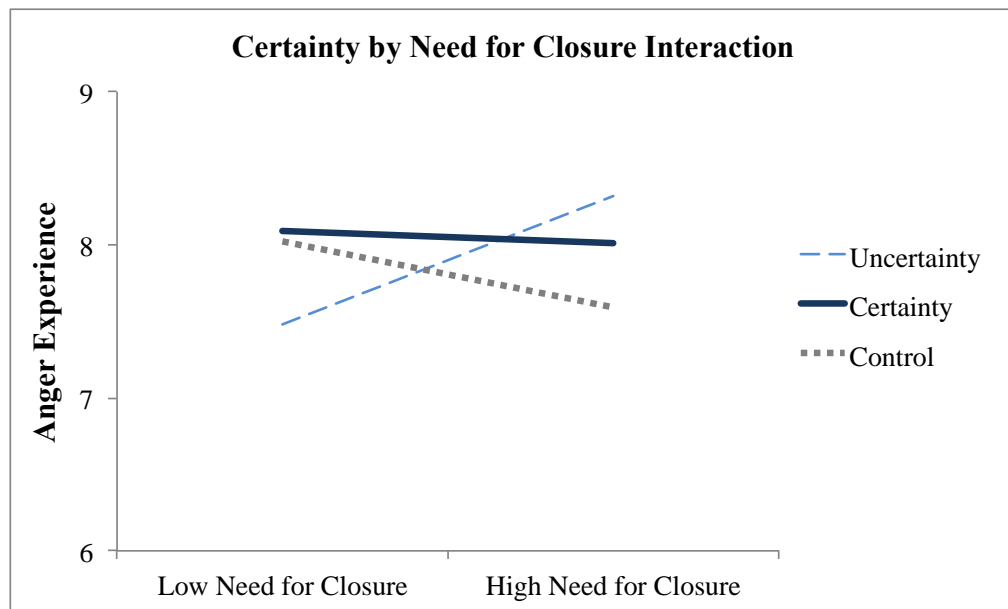


Figure 3. The effects of uncertainty and need for cognitive closure on anger experience.

**Moderated mediation.** Considering these findings in conjunction, I formally tested whether the reason people high in need for closure *experienced* more anger in the low certainty condition was because they *preferred* to feel anger (using PROCESS with 10,000 bias corrected bootstrap resamples; Hayes, 2013; Model 7). As predicted, the effect of need for closure on anger experience was mediated by anger preferences in the

uncertainty condition,  $b = .5254$ ,  $SE = .1929$ , 95%  $CI [.1607, .9232]$ , but not in the other conditions, constituting moderated mediation,  $b = .5107$ ,  $SE = .2238$ , 95%  $CI [.0902, .9707]$ .

**Sadness and preferences for sadness.** Although my primary hypotheses were supported, a prediction that would follow from my framework was not supported. That is, interactions with similar patterns also emerged between the manipulation and need for cognitive closure on sadness after the video,  $\Delta R^2 = .052$ ,  $F(2, 122) = 3.45$ ,  $p = .035$ , and preferences for sadness,  $b = 1.49$ ,  $SE = .73$ ,  $p = .044$ . (Knowledge of the association between anger and certainty did not moderate any effects.) I discuss these unanticipated findings in the Discussion section.

### **Covariates**

Given that negative affect experienced during the certainty manipulation differed across conditions, I reran the analyses controlling for negative affect. The results remained unchanged. Following guidelines regarding controlling for covariates that are themselves influenced by an experimental manipulation (Yzerbyt, Muller, & Judd, 2004), I reran the analyses controlling for both negative affect and its interaction with the manipulation, and again the results were unchanged.

### **Discussion**

This research provides initial experimental evidence for the novel proposition that people are motivated to experience emotions for their appraisals. When faced with uncertainty, participants preferred to feel angry, and felt more angry, under some conditions. Consistent with a motivational interpretation, such effects emerged primarily among people who wanted to reduce uncertainty. The fact that the effects were sensitive

to the motivation to reduce uncertainty suggests that people who are uncertain may be seeking out anger particularly for the sense of certainty it conveys (rather than some other component).

Although unexpected, I found that similar interactions emerged on sadness and preferences for sadness. This could have occurred because anger and sadness have a lot in common (i.e., negativity). It therefore may have been hard for participants to dissociate anger and sadness and only pursue anger but not the sadness elicited by the video. Thus, participants may have been willing to accept the sadness in order to experience the anger. The effects of sadness therefore are perhaps not too surprising. Still, this potential empirical artifact clouds the argument that uncertainty leads people pursue specific emotions. Given the strong feelings of both anger and sadness, this study was not able to demonstrate a distinction between the two, and this represents a limitation. It is noteworthy that although anger was elicited very strongly ( $M = 7.81$ ), three other emotions (disgusted, sad, upset) were rated even higher; thus even this classic anger induction video has trouble eliciting high levels of anger without also eliciting other strong emotions. Following a replication attempt in Study 3, Study 4 will attempt to address this limitation using a paradigm in which participants select their own anger-inducing experience (in an autobiographical writing paradigm).

One alternative explanation for the finding that uncertain people tend to get more angry (now demonstrated with correlational and experimental evidence) may be that uncertain individuals, given their negative outlook, are more vulnerable to anger and less capable of coping with it. This “vulnerability” explanation cannot account for why uncertain people *want* to experience anger. It also cannot account for why only uncertain

people who want to reduce their uncertainty would show these effects (i.e., why would only people high on need for closure not be able to cope effectively with anger?).

Given that these results provided the first experimental evidence for my model, I sought to replicate them in Study 3. I was interested in whether the interaction effects on the anger DVs would replicate, and also whether the effects on the sadness DVs would replicate. Before investing in trying to further tease apart anger and sadness with a new experimental paradigm, I wanted to determine what effects are reliable and replicable.

## CHAPTER 4

### STUDY 3: REPLICATION OF STUDY 2

Study 3 aimed to replicate Study 2, using the exact same manipulations, measures and procedures, with a few minor changes. Given that in Study 2 I learned that participants in the control condition responded similarly to participants in the high certainty condition, and given resource constraints, we did not run a control condition in Study 3. In addition, I was unable to recruit participants from the prescreen for Study 3 due to a shortage of students willing to participate in the study, so I did not obtain a measure of need for cognitive closure before the study. Instead, I measured need for cognitive closure at the end of the study, immediately after the measure of ideal affect and before the measure of knowledge about the link between anger and certainty. Thus, the placement of both need for cognitive closure and knowledge about the cognitive consequences of anger was altered: need for cognitive closure was measured after the uncertainty manipulation, anger induction, and key dependent variables; the knowledge item now came after (and could have been influenced by) need for cognitive closure.

#### **Participants**

A total of 149 student participants took part in the lab study in exchange for extra course credit. I excluded six participants who did not follow instructions on the writing task constituting the manipulation, five participants who did not watch the entire anger-inducing video, and five outliers on the measure of anger felt after the video (they were below the midpoint of the scale and over 2 SDs below the mean), leaving 133 participants in the final sample (25 males, 105 females, 1 unreported). These were the same exclusion criteria used in Study 2. Importantly for the purposes of replication, Study 3 included a

greater number of participants in the uncertainty and certainty conditions than Study 2 did.

## Measures

The measures were the same as those in Study 2, with the exception of need for cognitive closure, which was measured after the ideal affect items and before the knowledge item.

## Results

### Descriptive Statistics

Table 4, below, displays the means and standard deviations for all measures across conditions, as well as reliability estimates for the composite scores.

Measure	M	SD	$\alpha$
<i>Emotions after the video</i>			
Disgusted	8.53	1.03	
Sad	7.96	1.50	
Angry	7.92	1.29	
Upset	7.87	1.60	
Frustrated	6.86	2.02	
Irritated	6.36	2.26	
Agitated	6.31	2.31	
Anxious	5.49	2.51	
Afraid	4.99	2.57	
Happy	1.20	0.61	
Excited	1.19	0.70	
Anger at the perpetrators	8.10	1.24	
2-item anger composite	8.01	1.15	.79
Intentions to engage in anger-prolonging behaviors	5.18	1.85	.72
<i>Ideal affect</i>			
Happy	6.98	2.68	
Sad	2.24	2.22	
Angry	2.55	2.57	
Fearful	1.95	1.93	
Need for cognitive closure	4.29	0.96	.74
Beliefs about the link between anger and certainty	4.59	1.45	
<i>Manipulation Checks</i>			

Uncertainty composite	3.23	1.74	.90
Certain	4.73	1.96	
Confident	4.79	1.88	
Doubtful	3.21	1.88	
Negative affect composite	2.76	1.39	.81
Sad	2.77	1.82	
Fearful	2.74	1.76	
Angry	2.06	1.43	
Anxious	3.45	1.99	

Table 4. Means, standard deviations, and reliability estimates for main measures in Study 3.

### Manipulation Checks

The manipulation had the anticipated effects on the uncertainty manipulation check composite variable,  $F(2,132) = 199.33, p < .001, \eta_p^2 = .603$ . Participants reported feeling more uncertain in the uncertainty condition ( $M = 4.57, SD = 1.33$ ) than in the certainty condition ( $M = 1.88, SD = 0.80$ ).

The manipulation also influenced negative affect,  $F(2,131) = 59.06, p < .001, \eta_p^2 = .311$ . Upon reflecting back on the writing task, participants' reported having experienced more negative affect in the uncertainty condition ( $M = 3.53, SD = 1.33$ ) compared to the certainty condition ( $M = 1.98, SD = 0.95$ ).

I also analyzed anger as a single item. In contrast to Study 2, where no difference emerged between conditions on anger participants reported feeling during the manipulation, participants reported more anger in the uncertainty condition ( $M = 2.43, SD = 1.49$ ) compared to the certainty condition ( $M = 1.68, SD = 1.27$ ),  $F(2,131) = 9.80, p = .002, \eta_p^2 = .070$ .

### Main Effects of Certainty Manipulation on Key Dependent Variables



No main effects of the certainty manipulation emerged on any of the dependent variables,  $p$ 's > .22.

### **Moderation by Individual Differences in Motivation and Knowledge**

Again, I tested for moderation by need for cognitive closure. No interactions consistent with my hypotheses emerged, either on the anger or the sadness variables,  $p$ 's > .09.

I also tested for moderation by the item assessing knowledge of the association between anger and certainty, which itself was unaffected by the manipulation,  $F(2,131) = 1.84$ ,  $p = .177$ . I reasoned that people who are aware of the potential for anger to elicit a sense of certainty should demonstrate especially strong preferences for anger when they are under a state of uncertainty. Supporting this idea, a significant interaction emerged between this knowledge and the effect of the manipulation on intentions to engage in anger-prolonging behaviors given 15 minutes of free time (i.e., searching the internet for more information about the event, voicing one's anger on social media, talking to friends about the event),  $F(3,129) = 3.48$ ,  $b = -.53$ ,  $SE = .22$ ,  $p = .017$ ,  $\eta_p^2 = .043$  (see *Figure 4*). Participants in the uncertainty condition intended to engage in more anger-prolonging behaviors than participants in the certainty condition, but only when they were aware that anger is associated with a sense of certainty,  $b = -.93$ ,  $SE = .44$ ,  $p = .039$ , and not when they were unaware that anger is associated with certainty,  $b = .59$ ,  $SE = .44$ ,  $p = .183$ . Knowledge had no relationship with anger-prolonging behaviors when certainty was high,  $b = -.03$ ,  $SE = .15$ ,  $p = .854$ , but it was positively associated with anger-prolonging behaviors when certainty was low,  $b = -.50$ ,  $SE = .16$ ,  $p = .002$ . This suggests that people intend to engage in anger-prolonging behaviors when 1) they lack certainty and 2) know

that anger can provide it, providing support for the proposed motivational mechanism through which people seek out anger to restore feelings of certainty.

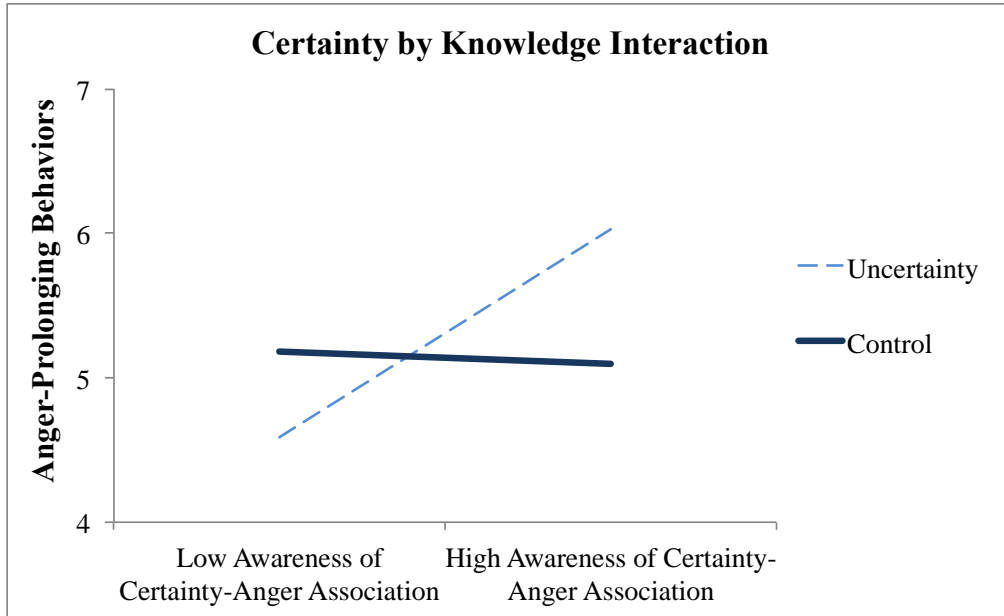


Figure 4. The effects of uncertainty and beliefs about the association between anger and certainty on anger-prolonging behaviors.

### Covariates

Given that negative affect and anger experienced during the manipulation differed across conditions, I controlled for these variables in the test of the knowledge by condition interaction on anger-prolonging behaviors, and the results remained essentially unchanged.

### Discussion

Study 3 failed to replicate the primary findings of Study 2 (namely the need for cognitive closure by condition interactions on anger preferences and experience). Yet it provided a partial conceptual replication in revealing a knowledge by condition interaction on intentions to engage in anger-prolonging behaviors.

Several factors could have contributed to the discrepancies in results. Study 3 did not employ a pre-study measure of need for cognitive closure as Study 2 had. Thus, participants' completion of the uncertainty manipulation, anger writing task, and dependent measures, could have influenced their need for closure responses in intricate ways (perhaps leading them to overthink their responses given the thematically similar tasks they just completed) that would change the meaning of the measure. Importantly, this would not change the mean level of need for cognitive closure (which did not differ across conditions,  $F[1,131] = 1.26, p = .26, \eta_p^2 = .010$ ), as participants could shift in both directions. One plausible hypothesis for how this could occur is that participants who had just sought out anger in order to resolve their uncertainty may not want to admit that they dislike and cannot tolerate uncertainty (admitting this could make them uncomfortable) and thus they might lower their need for cognitive closure reports. I tested this hypothesis by testing the interaction between the manipulation and intentions to prolong anger on need for cognitive closure. Though the interaction did not reach significance,  $F(2,129) = 2.74, p = .100, \eta_p^2 = .021$ , among participants in the low certainty condition, those who intended to engage in anger-prolonging behaviors also tended to have lower need for cognitive closure,  $b = -.21, SE = .12, p = .073$ . This relationship did not exist in the high certainty condition,  $b = .07, SE = .12, p = .578$ . Thus, it is possible that this social desirability concern altered the validity of the need for cognitive closure measure when assessed at the end of the study. One other potential difference between this replication study and the original study is that the replication study was run entirely during the last two weeks of the semester (with the majority of participants run during the last week of

the semester), whereas no participants in the original study were run within the last 6 weeks of the semester.

In sum, although the need for cognitive closure interactions may have failed to replicate for methodological reasons, Study 3 nonetheless provided conceptual support for my hypotheses by demonstrating that when people are aware of the link between anger and certainty, they intend to prolong anger when coping with uncertainty. The notion that people who are motivated to reduce uncertainty should also show strong preferences for anger should not be ruled out based on this study alone, and will be tested again in the subsequent studies.

## CHAPTER 5

### STUDY 4: ANGER IN RESPONSE TO A LIFE EXPERIENCE

Study 4 sought to conceptually replicate the earlier findings using a similar manipulation of uncertainty but a different anger-evoking paradigm, in order to begin to generalize these effects to a variety of different anger-eliciting contexts. In fact, in Study 4, I allowed participants to select an anger-eliciting experience to write about from their own lives. This served as both an anger induction and a dependent variable (as I could measure how much participants wrote about the experience). This paradigm also ensures that all participants think about an event that they believe is primarily anger-evoking. This ameliorates the limitation of Study 2, whereby people who were motivated to reduce uncertainty expressed a stronger preference for anger, but also a stronger preference for sadness, likely because the anger-inducing video they saw also contained high levels of sadness, which, given the content of the video, was hard to separate from anger (i.e., participants would accept the sadness to experience the anger). Study 4's paradigm allows for a clearer distinction between anger and other negative emotions to be made and reduces the conflation of anger with other emotions.

Study 4 also introduced a new methodological feature that has the potential to strengthen the ability of the study to test my theoretical perspective. That is, Study 4 introduces a time delay between the manipulation of uncertainty and the anger induction. Although, in some research areas, a greater time interval between the independent variable and the dependent variable can weaken experimental effects, research and theorizing about non-emotional forms of compensatory reactions to uncertainty suggests that delay between the IV and DV can strengthen motivated reactions to uncertainty.

Such findings are thought to emerge because individuals' immediate reaction is to try to inhibit their motivated reactions to the threat of uncertainty (Burke, Martens, & Faucher, 2010; Nash, McGregor, & Prentice, 2011; Wichman, Brunner, & Weary, 2008). Thus, I expected that the delay should actually make it more likely to find effects to the extent that they emerge for motivational reasons.

### **Participants**

A total of 366 participants participated in the study via Amazon Mechanical Turk in exchange for \$0.75. I obtained a large sample because I anticipated that a number of participants would not fully comply with the numerous writing tasks they that would be asked to complete, and because I anticipated a good deal of non-systematic variance stemming from the open-ended nature of many of the tasks. I excluded 50 participants who did not follow instructions on the uncertainty manipulation, the distraction task, the brief listing of anger/fear/sadness life events, or the anger induction writing task (see below for details about these tasks), one participant who experienced technical difficulties while completing the study, 15 participants who took a substantially shorter or longer time to complete the study than the remainder of the sample (i.e., less than 10 minutes or greater than 60 minutes, with the mean time to complete the study, without excluding these participants, being 20.19 minutes;  $SD = 15.58$ ), and five participants who reported not taking the study seriously, leaving 295 participants in the final sample (116 males, 174 females, 3 "other," 2 did not report gender). The number of exclusions was comparable to other MTurk studies (Chandler, Mueller, & Paolacci, 2014) and was reasonable given the several demanding writing tasks.

### **Procedure**

Participants were recruited to participate in a study on “autobiographical memory and information processing” in which they would “write about several life experiences” to help us better understand “how people process information about their lives.” Participants were randomly assigned to write about an experience in which they felt uncertain, certain, or neither (in a control condition).

The manipulations were very similar to the ones used in Study 2, but both the instructions and the time limit were shortened to be better suited for an online format, as online participants tend to expect brief, simple tasks. The instructions for the uncertainty/certainty conditions were as follows:

In this first task, we are interested in the types of experiences people associate with [uncertainty and doubt / certainty and confidence]. To help us address this question, we would like you to write about something (such as an event or a belief) you currently feel [uncertain or doubtful / certain or confident] about. Please write, in as much detail as possible, what it is that you feel [uncertain / certain] about, why you are [uncertain / certain] about it, and how you feel as a result of this experience. Please describe this experience in as much detail as possible. Please write for at least 3 minutes. The continue button will appear below after 3 minutes have elapsed.

In the control condition, participants were asked to write about a typical experience in their lives:

In this first task, we are interested in the types of experiences people have in everyday life. To help us address this question, we would like you to write about a typical experience in your life. Please take a few moments to think about an ordinary and typical life experience. Please describe this experience in as much detail as possible. Please write for at least 3 minutes. The continue button will appear after 3 minutes have elapsed.

Next, participants completed a distractor task for about 2 minutes, in which they were asked to list as many states and cities as they could. This allowed for a stricter test of my ideas while also providing additional support my theoretical rationale. On average, incorporating the time spent on all instructions and questions, 4.69 minutes (SD = 2.22) elapsed between the end of the uncertainty manipulation and the beginning of the anger writing task. This is consistent with past research, which has successfully observed compensatory reactions to uncertainty with time delays ranging from 3-10 minutes (e.g., Nash, McGregor, & Prentice, 2011). The death anxiety literature similarly finds strong effects of mortality salience after delays lasting as long as 20 minutes (Burke, Martens, & Faucher, 2010).

Next, I assessed participants' preferences for experiencing a variety of negative emotions (i.e., anger, fear, and sadness). To ensure that participants thought concretely and vividly about an emotionally evocative experience (which they would later express their preferences for writing more about), I asked participants to briefly generate possible topics to write about for the writing task to follow. Specifically, they were told:

In the next task, we are interested in how people describe life experiences in which they have felt specific emotions, such as sadness, anger, or fear.

Before you complete this writing task, you will be given the opportunity to indicate the type of emotional experience you would like to write about. Click continue to proceed.

In the upcoming writing task, you will be asked to write for several minutes about a personal life experience in which you felt a specific emotion.

First, however, we would like you to generate a possible life experience that you might write about for each of the emotions listed below.



Please think about experiences you had recently (within the past year or so) that made you feel each of the following emotions. Then, in a brief sentence, please describe an experience for each emotion type.

Participants listed experiences in which they felt anger, fear, and sadness. Then, on the following page, their responses reappeared, and they were asked to rate the extent to which they wanted to write about each of the three experiences to a greater extent using 9-point scales (*Not at all interested – Very interested*). Specifically, they were told:

Next, you will see the experiences you generated on the previous page. Please indicate the extent to which are you interested in writing about each of the following experiences for the upcoming full-length writing task:

Next, to ensure that all participants experienced anger, I told participants, as a cover story, that while their ratings will be taken into account, the emotion they write about during the full length writing task will also be determined by an element of chance. Then, all participants were asked to write about an experience in which they felt angry, and were told to write as much as they wanted:

On the next page, you will receive your writing prompt. Please note that because we are looking to obtain a sampling of experiences from each type of emotion, you might not be asked to write about the emotion you indicated the strongest preference for. Because we want a somewhat even sampling of each emotion type, an algorithm will generate an emotion for you to write about based on the preferences you expressed as well as an element of chance.

Click continue to receive your writing prompt and begin the writing task.

Based on your responses, as well as an element of chance, you were assigned to write about a life experience in which you felt **angry**.

In the space below, please write about a recent personal life experience in which you felt angry. You can write about the same experience you briefly described earlier, or you can write about a different experience.

**Be sure to describe what you were/are angry about, why you were/are angry about it, and how it made/makes you feel. Please describe this in as much detail as possible.**

There is no timer for this task. Write as much as you feel is necessary to fully describe the experience. Click the continue button below when you are done writing.

## Measures

After the anger induction, the following measures were obtained.

**Anger writing task word count.** As an indirect and unobtrusive index of engaging in behaviors that prolong the experience of anger, I computed the length of each participant's written response (using a word count function).

**Emotions.** Immediately after the anger induction, participants were asked to indicate the extent to which they “currently feel” the following emotions a 9-point scale (1 = *Not at all*, 9 = *Very much*): *Angry, Sad, Afraid, Happy, Upset, Anxious, Furious, Excited, Confident, Disgusted, Hostile, Frustrated.*

**Anger up-regulation.** After rating their emotions, participants rated the extent to which they attempted to up-regulate their anger during the anger writing induction on a 9-point scale (1 = *Not at all*, 9 = *A great deal*): “As you were writing about an experience that made you angry, to what extent did you think about the experience in a way that *increased* the anger you were feeling?”

**Anticipated rumination.** As a measure of anticipated rumination, participants were asked, “If you had 15 minutes of free time, how likely would you be to keep

thinking about the event that made you angry?” on a 9-point scale (1 = *Not at all likely*, 9 = *Extremely likely*).

**Beliefs about the link between anger and certainty.** Participants responded to the same question assessing their awareness of the association between anger and certainty as in Studies 2 and 3.

**Need for cognitive closure.** Need for cognitive closure was measured at the end of the study using the 14-item measure used in Study 2 ( $\alpha = .91$ ). In this study, a 6-point scale was used (1 = *Strongly disagree*, 6 = *Strongly agree*)

**Manipulation check.** Participants indicated the extent to which they felt the following emotions during the first writing task, in which they wrote about a life experience in which they felt certain and confident / uncertain and doubtful using a 9-point scale (*Not at all – Very much*): *certain, confident, uncertain, doubtful, sad, fearful, angry, anxious*. Because there were several writing tasks in this study, I displayed participants’ actual responses back to them at the top of the screen, to remind them which task I was referring to.

The first four items were averaged to form a composite measure of uncertainty ( $\alpha = .95$ ). The latter four items were averaged to form a composite measure of negative affect ( $\alpha = .90$ ).

## Results

### Descriptives

Table 5, below, displays the means and standard deviations for all measures across conditions.

Measure	M	SD
<i>Preference for writing task</i>		

Anger	4.83	2.73
Sadness	4.76	2.76
Fear	4.63	2.64
Anger writing task word count	103.64	60.09
<i>Emotions after the anger writing task</i>		
Angry	5.36	2.69
Frustrated	5.35	2.93
Confident	4.70	2.42
Disgusted	4.48	2.83
Furious	4.26	2.84
Happy	4.24	2.45
Sad	4.11	2.63
Upset	4.90	2.66
Anxious	4.08	2.57
Hostile	3.87	2.64
Excited	3.34	2.25
Afraid	2.63	2.15
Anger up-regulation	5.44	2.38
Rumination	3.80	2.42
Need for cognitive closure	4.13	0.83
Beliefs about the link between anger and certainty	5.20	2.34
<i>Manipulation Checks</i>		
Uncertainty composite	3.73	2.59
Certain	6.03	2.80
Confident	6.16	2.67
Doubtful	3.40	2.76
Uncertain	3.70	2.92
Negative affect composite	3.16	2.25
Sad	3.16	2.55
Fearful	3.10	2.58
Angry	2.64	2.31
Anxious	3.72	2.80

Table 5. Means and standard deviations for main measures in Study 4.

### Manipulation Check

The manipulation had the anticipated effect on ratings on the composite measure of uncertainty,  $F(2,289) = 197.08$ ,  $p < .001$ ,  $\eta_p^2 = .577$ . Participants reported feeling more uncertain in the uncertainty condition ( $M = 6.37$ ,  $SD = 2.16$ ) compared to participants in

the control condition ( $M = 2.57, SD = 1.57$ ),  $p < .001$ , who felt more uncertain than participants in the certainty condition ( $M = 1.98, SD = 1.10$ ),  $p = .018$ .

The manipulation also influenced negative affect,  $F(2,289) = 69.70, p < .001, \eta_p^2 = .325$ . Upon reflecting back on the writing task, participants' reported having experienced more negative affect in the uncertainty condition ( $M = 4.90, SD = 2.09$ ) compared to both the certainty condition ( $M = 2.21, SD = 1.70$ ) and the control condition ( $M = 2.21, SD = 1.73$ ). The certainty and control conditions did not differ,  $p = .983$ .

A significant effect of the manipulation emerged on the single item assessing anger experienced during the manipulation,  $F(2,288) = 15.56, p < .001, \eta_p^2 = .098$ . Participants reported more anger in the uncertainty condition ( $M = 3.60, SD = 2.64$ ) compared to both the certainty condition ( $M = 2.00, SD = 1.68$ ),  $p < .001$ , and the control condition ( $M = 2.20, SD = 2.10$ ),  $p < .001$ , with no difference emerging between the certainty and control conditions,  $p = .526$ .

### **Main Effects of Certainty Manipulation on Key Dependent Variables**

Using one-way ANOVAs, I tested for main effects of the manipulation on the extent to which they wanted to write about anger/fear/sadness during the writing task, how much participants wrote on the anger writing task, the extent to which they reported feeling angry after the anger writing task, the extent to which they attempted to up-regulate their anger, and the extent to which they believed they would ruminate about their anger given 15 minutes of free time.

**Anger writing task word count.** There was a significant effect of the manipulation on the number of words participants wrote during the anger writing task,  $F(2,292) = 3.51, p = .031, \eta_p^2 = .024$ . Participants in the uncertainty condition ( $M =$

115.87,  $SD = 70.77$ ) wrote more words during the anger writing task than participants in the control condition ( $M = 94.64$ ,  $SD = 52.11$ ),  $p = .012$ , and marginally more words than participants in the certainty condition ( $M = 99.78$ ,  $SD = 53.16$ ),  $p = .061$ <sup>1</sup>. The certainty and control conditions did not differ,  $p = .551$ . This provided evidence that participants exposed to uncertainty behaved in ways that prolonged their experience of anger.

**Anger.** I next tested the effect of the manipulation on anger reported after the induction. A trend emerged,  $F(2,291) = 1.89$ ,  $p = .152$ ,  $\eta_p^2 = .013$ . Participants in the uncertainty condition ( $M = 5.76$ ,  $SD = 2.64$ ) reported feeling marginally more anger than participants in the control condition ( $M = 5.06$ ,  $SD = 2.83$ ),  $p = .061$ , and nonsignificantly more anger than participants in the certainty condition ( $M = 5.25$ ,  $SD = 2.56$ ),  $p = .181$ . The certainty and control conditions did not differ,  $p = .622$ . Although not significant, the direction of these effects are consistent with my hypotheses, and suggest that people exposed to uncertainty may feel more angry compared to people not exposed to uncertainty.

**Anger up-regulation.** There was a significant effect of the certainty/uncertainty manipulation on anger up-regulation,  $F(2,291) = 4.71$ ,  $p = .001$ ,  $\eta_p^2 = .032$ . Participants in the uncertainty condition ( $M = 5.97$ ,  $SD = 2.14$ ) reported attempting to up-regulate their anger to a greater extent than participants in the certainty condition ( $M = 5.34$ ,  $SD = 2.23$ ),  $p = .003$ , and to a marginally greater extent than participants in the control

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<sup>1</sup> Given that a marginal effect of the manipulation emerged on the number of words written during the manipulation writing task,  $F(2,292) = 2.36$ ,  $p = .096$ ,  $\eta_p^2 = .016$ , I controlled for number of words written during the manipulation, and the interaction between this variable and condition (this could be interpreted as controlling for individual differences in writing length). When controlling for these variables, the effect of the manipulation on words written during the anger induction became nonsignificant,  $F(2,289) = 1.96$ ,  $p = .143$ ,  $\eta_p^2 = .013$ . Uncertain participants still wrote marginally more words than certain participants,  $p = .096$ .

condition ( $M = 4.96$ ,  $SD = 2.65$ ),  $p = .065$ . The certainty and control conditions did not differ,  $p = .271$ . These findings illustrate that participants exposed to uncertainty reported using cognitive emotion regulation strategies in an effort to increase the level of anger they felt during the writing task.

**Anticipated rumination.** Finally, the manipulation influenced the extent to which participants anticipated ruminating about their anger during 15 minutes of free time,  $F(2,289) = 2.99$ ,  $p = .052$ ,  $\eta_p^2 = .020$ . Participants in the uncertainty condition ( $M = 4.27$ ,  $SD = 2.40$ ) anticipated spending their time thinking about the anger-inducing event to a significantly greater extent than participants in both the certainty ( $M = 3.49$ ,  $SD = 2.41$ ),  $p = .027$ , and control conditions ( $M = 3.60$ ,  $SD = 2.40$ ),  $p = .050$ . The certainty and control conditions did not differ,  $p = .769$ . This suggests that people who are uncertain believe they will spend more time thinking about their anger than people who are not uncertain.

**Mediation.** I tested whether people in the uncertainty condition experienced more anger because they up-regulated their anger (Hayes, 2013; model 4). As predicted, the difference in anger in the uncertainty and certainty conditions was mediated by reported cognitive up-regulation of anger during the anger writing task,  $b = -.3386$ ,  $SE = .1735$ , 95%  $CI [-.6885, -.0068]$ . The difference in anger in the uncertainty and control conditions was similarly mediated by anger up-regulation,  $b = -.5613$ ,  $SE = .1892$ , 95%  $CI [-.9537, -.0399]$ . This provides evidence that participants in the uncertainty condition not only reported up-regulating their anger to a greater extent than participants in the other two conditions, but they also actually felt more angry as a result of this up-regulation.

**Moderation by Individual Differences in Motivation and Knowledge**

No effects of the manipulation emerged on either need for closure,  $p = .247$ , or knowledge of the link between anger and certainty,  $p = .466$ , allowing me to treat these variables as moderators of the effects of the manipulation on the dependent measures. However, no interaction effects emerged. This suggests that, in this study, uncertainty led to greater preferences for and experiences of anger irrespective of motivation to reduce uncertainty or awareness of the notion that anger can provide certainty. Thus, perhaps this phenomenon is more general and occurs even among participants who do not explicitly report wanting certainty or knowing that anger can provide it.

### **Covariates**

Once again, given that negative affect experienced during the certainty manipulation differed across conditions, I reran the analyses controlling for negative affect. Controlling for negative affect and its interaction with condition led the effects described above on the amount written during the anger task, anger experience, anger up-regulation, and anticipated rumination to become nonsignificant. These analyses should be interpreted with caution, as it is possible that if the experimental conditions differed so systematically on negative affect, controlling for it could have essentially partialled out the very effects of the conditions themselves. See General Discussion for a full discussion of this issue.

### **Discussion**

Study 4 demonstrated that participants who are uncertain (compared to those who are not uncertain) spend more time writing about an anger-inducing experience, report attempting to amplify the anger they felt during this experience, anticipate ruminating



more about this experience, and actually feel more angry as a result of their amplification efforts.

Despite this support for my hypothesis that people who are uncertain are motivated to feel anger, the results of Study 4 differed from those in Studies 2 and 3. Methodological differences may help to begin to explain the discrepancies. Study 4 used a different experimental paradigm from the one used in Studies 2 and 3. Although participants in all studies wrote about either an uncertain or certain life experience, participants in Study 4 generated their own anger experience to think about, whereas participants in Studies 2 and 3 were all exposed to the same anger-inducing video. Study 4 also introduced a time delay to the paradigm. Of course, using the existing data, it is not possible to pinpoint the reason for the discrepancy in effects. In Study 4, the effects were constant across individual difference variables, yet in Studies 2 and 3 the effects were contingent on these moderating variables. However, it is plausible that the anger task, which was tailored to each individual and thus likely stronger for each participant, as well as the time delay, which prior theorizing suggests could allow time for stronger compensatory reactions to uncertainty to emerge, enhanced the ability of this paradigm to detect effects across all participants. Future research on this topic should use the anger writing paradigm and a time delay to confirm this speculation.

It is also possible that certain methodological factors attenuated the ability of this study to detect the moderation effects. Like Study 3 (and unlike Study 2), need for cognitive closure was measured at the end of the study. Thus, as in Study 3, it is possible that the content of the study (which includes thinking about uncertainty/certainty and anger) could have influenced responses on the need for cognitive closure measure. Future

research should measure need for cognitive closure prior to the study, as was done in Study 2. As we await additional research, Study 5 offers another solution to the need for cognitive closure measurement problem: manipulating need for cognitive closure.

## CHAPTER 6

### STUDY 5: MANIPULATING UNCERTAINTY INTOLERANCE

Study 1 found correlational evidence of an association between wanting to reduce uncertainty and tendencies to experience anger. Studies 2-4 manipulated uncertainty and found initial evidence suggesting that people who are uncertain are more likely than people who are not uncertain to prefer and feel angry. However, in Study 2, this effect only emerged among people who were motivated to reduce uncertainty. In Study 4, the effect emerged across all participants, but the assumption was still that participants became angry in an effort to reduce uncertainty. Therefore, in Study 5, I decided to directly manipulate the desire to reduce uncertainty. By directly manipulating the theorized motivational mechanism, this experimental paradigm is uniquely and parsimoniously able to test the core theoretical components of my perspective: that *wanting to reduce uncertainty* drives preferences for anger.

In Study 5, I asked participants in two experimental conditions to think about something that currently makes them feel uncertain, and manipulated whether participants believed that *reducing and getting rid of* uncertainty or *embracing and tolerating* uncertainty is healthy and adaptive. Participants were provided with ostensible scientific evidence on the matter and were asked to write about ways they could either reduce or tolerate a significant source of uncertainty in their lives. I was interested in whether a subtle difference in how people think about managing uncertainty would influence preferences for anger. I predicted that participants who adopted a mindset of uncertainty intolerance would seek out anger to compensate for uncertainty whereas those who see the benefits of uncertainty tolerance would not.

Study 5's paradigm provides a true experimental test of the notion that uncertainty-driven anger preferences stem from a desire to reduce uncertainty, without needing to rely on individual difference measures. Even if measured prior to the study, treating need for cognitive closure as an individual difference moderator allows for the possibility that some third variable that is related to need for cognitive closure (e.g., a general orientation toward negativity) is responsible for why uncertainty increases anger when need for cognitive closure was high. The freedom from individual difference measures also overcomes the problem identified in Studies 2-4, whereby measured need for cognitive closure moderated condition effects only when assessed weeks before the study (as in Study 2) and not when assessed at the end of the study (as in Studies 3 and 4). One additional benefit of this paradigm is that it helps rule out a possible alternative explanation for the effects observed in the earlier studies. As discussed earlier, uncertainty is often associated with a sense of negativity, which may make individuals vulnerable to, or less capable of coping with, anger. All of the evidence for a motivational mechanism accumulated in the earlier studies (e.g., effects on preferences for anger, not just experience of anger, and moderation by need for cognitive closure and knowledge of the potential for anger to restore certainty) speaks against alternative explanation. However, Study 5 allowed for the accumulation of further evidence against vulnerability as a possible mechanism by holding negative affect constant, by asking participants in *both* experimental conditions to think about uncertainty, and simply manipulating how they believed they should deal with it.

Study 5 also used yet another type of anger induction – reading an anger-inducing article about ISIS. This paradigm allows for a standardized anger induction across

participants and allows converging evidence to be obtained for my model using different methodologies. Further, the content of the article (i.e., intergroup conflict) lent itself to exploring the potential downstream implications of compensatory anger preferences. That is, it allowed me to test whether people who become angry while attempting to eliminate uncertainty in turn display more bias toward outgroup members. Prior work has shown that both anger (Sadler, Lineberger, Correll, & Park, 2005; Skitka, Bauman, Aramovich, Morgan, 2006) and uncertainty (Hogg, Meehan, & Farquharson, 2010; Hogg & Adelman, 2013; Orehek et al., 2010) are independently associated with outgroup hostility. The present work therefore tested whether it might be possible to integrate these independent strands of research and demonstrate that anger mediates the effects of uncertainty on outgroup bias.

### **Participants**

A total of 292 participants participated in the study via Amazon Mechanical Turk in exchange for \$0.75. I excluded 23 participants who did not follow instructions on the uncertainty intolerance manipulation (they either did not provide a reasonable response to the prompt or wrote less than 15 words, despite being asked to write for 2 minutes; see full task instructions below), 17 participants who spent less than 15 seconds reading the anger induction article or could not adequately summarize the main theme of the article, 24 who got fewer than three out of four attention check questions correct, one who took substantially shorter to complete the study than the rest of the sample (this participant took 5.22 minutes while the mean duration was 15.16 minutes;  $SD = 11.53$ ), five who reported not taking the study seriously, and three who completed the study on a mobile

phone, leaving 219 participants in the final sample (94 males, 118 females, 3 “other,” 4 unreported).

## **Procedure**

Participants were recruited to participate in a study on “autobiographical memory and information processing” to help us better understand “how people process information about their lives and the world around them.” Participants were randomly assigned to one of three experimental conditions (uncertainty intolerance, uncertainty tolerance, and control). Participants in the control condition were asked to write for 2 minutes about a typical life experience:

In the first task, we are interested in people's autobiographical memories, and would like you to write about an ongoing life experience. In particular, we are interested in the types of experiences people have in everyday life. Please take a few moments to think about an ordinary and typical life experience. Then, please write about the experience. Please write for at least 2 minutes. The continue button will appear after 2 minutes have elapsed.

Participants in *both* the uncertainty intolerance and uncertainty tolerance conditions were all asked to first briefly describe a current significant source of uncertainty in their lives:

In the first task, we are interested in people's autobiographical memories, and would like you to write about an ongoing life experience. In particular, we are interested in an experience that you currently feel uncertain or doubtful about. Please take a few moments to think about something that **is currently a significant source of uncertainty in your life**. Then, in a few sentences, please describe the experience.

Next, participants in the uncertainty intolerance/tolerance conditions were informed about ostensible research demonstrating the value of reducing/accepting

uncertainty and were asked to write about ways they could reduce/accept their uncertainty in connection to the experience they just wrote about for at least one minute:

Research demonstrates that it is very important to try to [reduce and get rid of / accept and come to terms with] uncertainty in one's life. Decades of psychological research demonstrates that [feeling uncertain is detrimental to psychological functioning / being able to embrace uncertainty is key for adaptive psychological functioning]. Meanwhile, [reducing levels of uncertainty / accepting or embracing uncertainty] to the point where people feel [certain / at ease with their uncertainty] has been shown to lead to increased life satisfaction and greater productivity.

Please think about the experience that is making you feel uncertain. Then think about ways you can [reduce / be more at ease with] your uncertainty about the experience. Please write about what you can do to try to [reduce / accept] the feelings of uncertainty that you feel in connection to the experience you described earlier. Please write for at least 1 minute. The continue button will appear below after 1 minute has elapsed.

Thus, all participants wrote about a significant source of uncertainty except for those in the control condition. Although participants in the control condition only completed one writing task and participants in the uncertainty intolerance/tolerance conditions completed two writing tasks, the time I asked participants to spend writing was roughly the same (two minutes in the control condition, briefly describing a source of uncertainty plus one minute managing it in the other two conditions).

Participants were told that “in the next task, we are interested in how people process information while reading,” and that they would be asked to read a brief article excerpt and answer questions about it. The article (see *Figure 5*), entitled “Despite Losses, ISIS Continues to Target Civilians in the Middle East and Around the World,” was formatted to look like a “New York Times” article. It described that despite

territorial losses in Iraq and Syria, ISIS has carried out or inspired attacks that have killed hundreds of civilians in the Middle East, Europe, and the United States. It also described the brutal tactics that ISIS has employed against civilians living under its rule, such as using human shields and mutilating dead bodies. The content of the article was selected based on the goal of maximizing its potential to elicit anger. The article discussed immoral actions (using human shields, mutilating dead bodies) rather than death tolls or stories about the lives of those affected by ISIS to mitigate sadness, and emphasized territorial losses to mitigate fear.



## MIDDLE EAST

## ***Despite Losses, ISIS Continues to Target Civilians in the Middle East and Around the World***

By CHARLES FLETCHER JULY 23, 2016



Islamic State fighters in Syria. Getty Images

Since the start of the American-led air campaign against the Islamic State (ISIS), which began two years ago, ISIS has lost about 50 percent of its territory in Iraq and 20 percent in Syria. Yet despite these losses, ISIS has demonstrated that it continues to have the ability to attack civilians around the world.

In recent weeks, hundreds of civilians were killed in a spate of suicide attacks attributed to the Islamic State in Turkey, Iraq, Bangladesh, Afghanistan and Saudi Arabia. Saturday's attack in Kabul, which killed 80 peaceful demonstrators, was the deadliest attack in months. The Islamic State has also demonstrated its ability to strike at the heart of the Western world over the past year, carrying out terrorist attacks in Paris and Brussels, and inspiring attacks in Orlando, Florida, and San Bernardino, California.

Just as it seeks to terrorize civilians around the world, ISIS continues to terrorize the people who live under its rule in Iraq and Syria. According to the United Nations, men and boys who refuse to fight for ISIS are being killed. Aid groups have reported that ISIS has been putting thousands of civilians into the line of fire as human shields. Dead bodies are abused and mutilated.

The Islamic State's brutality has escalated as it continues to claim leadership of global jihadism. Last month in Fallujah, ISIS demanded

***You have reached the end of the article excerpt. Click continue to proceed.***

Figure 5. Anger induction article used in Study 5.

## Measures

After reading the anger-inducing article, participants completed the following measures.

**Emotions.** Participants were asked to indicate the extent to which they “currently feel” the following emotions a 9-point scale (1 = *Not at all*, 9 = *Very much*): *Angry, Afraid, Sad, Disgusted, Upset, Furious, Anxious, Happy, Excited, Irritated, Agitated, Frustrated*. In addition to considering anger as a single item, I created a composite score averaging anger-related emotions that emerged as related in a factor analysis: *Furious, Frustrated, and Upset* ( $\alpha = .89$ ).

**Anti-Muslim bias.** To assess the downstream consequences of anger resulting from uncertainty intolerance and reading about ISIS, we assessed bias toward Muslims using four items. One item assessed collective blame (“All Muslims are responsible for the recent terrorist attacks”), two items were taken from Pratto & Glasford’s (2008) Anti-Arab scale (“People of Middle Eastern descent should have to carry special identification,” “People of the Muslim religion tend to be fanatical”) and one item was developed for this study (“Refugees from Arab countries should not be allowed to enter the United States”;  $\alpha = .89$ ).

**Beliefs about the link between anger and certainty.** Knowledge of the link between anger and certainty was measured the same way as in Studies 2-4.

**Need for cognitive closure.** Need for cognitive closure was measured at the end of the study using the 14-item measure used in Studies 2, 4, and 5 ( $\alpha = .92$ ).

**Manipulation checks.** To assess differences between conditions on uncertainty and negative affect, participants indicated the extent to which they felt the following

emotions during the manipulation: *certain, confident, uncertain, doubtful, sad, fearful, angry, anxious*. Again, participants' writing task responses were displayed to them at the top of the screen as a reminder.

The first four items were averaged to form a composite measure of uncertainty ( $\alpha = .94$ ). The latter four items were averaged to form a composite measure of negative affect ( $\alpha = .84$ ).

**Attention checks.** Four true/false questions assessed the extent to which participants paid sufficient attention to the anger induction article: "The article discussed Iran's nuclear weapon's program," "The article discussed recent terrorist attacks around the world," "The article mentioned a speech given by President Obama," "The article mentioned that ISIS was using human shields."

## Results

### Descriptives

Table 6, below, displays the means and standard deviations for all measures across conditions.

<b>Measure</b>	<b>M</b>	<b>SD</b>
<i>Emotions after the anger article</i>		
Disgusted	6.77	2.45
Sad	6.36	2.44
Angry	6.32	2.48
Upset	6.30	2.39
Frustrated	5.86	2.57
Furious	5.63	2.71
Agitated	5.46	2.65
Irritated	5.35	2.66
Afraid	4.53	2.57
Anxious	4.50	2.56
Happy	2.14	1.84
Excited	1.99	1.72
Anger-related emotion	5.94	2.31

composite		
Anti-Muslim Bias	2.90	2.14
Beliefs about the link between anger and certainty	5.57	2.02
Need for cognitive closure	6.02	1.44
<i>Manipulation Checks</i>		
Uncertainty composite	3.97	2.29
Certain	3.96	2.38
Confident	3.87	2.40
Doubtful	3.89	2.50
Uncertain	4.18	2.62
Negative affect composite	3.45	2.00
Sad	3.64	2.48
Fearful	3.28	2.35
Angry	2.74	2.17
Anxious	4.13	2.68

Table 6. Means and standard deviations for main measures in Study 5.

### **Manipulation Check**

The manipulation influenced scores on the composite measure of uncertainty experienced during the manipulation,  $F(2,212) = 27.73, p < .001, \eta_p^2 = .207$ . Importantly, the uncertainty intolerance ( $M = 4.88, SD = 2.24$ ) and uncertainty tolerance ( $M = 5.73, SD = 2.13$ ) conditions did not differ in how much certainty they elicited,  $p = .688$ . However, both of these conditions elicited greater uncertainty than the control condition ( $M = 2.68, SD = 1.81$ ), both  $p$ 's  $< .001$ . This confirms that both the uncertainty intolerance and tolerance conditions induced similar levels of uncertainty.

The three conditions differed in how much negative affect they elicited during the manipulation,  $F(2,212) = 27.63, p < .001, \eta_p^2 = .207$ . Again, the uncertainty intolerance ( $M = 4.18, SD = 1.74$ ) and uncertainty tolerance ( $M = 4.17, SD = 1.95$ ) conditions did not differ in how much negative affect they elicited,  $p = .969$ . Yet both of these conditions elicited greater negative affect than the control condition ( $M = 1.81, SD = 1.69$ ), both  $p$ 's  $< .001$ .

The three conditions also differed in how much anger they elicited during the manipulation,  $F(2,211) = 6.84, p = .001, \eta_p^2 = .061$ , but, once again, the uncertainty intolerance ( $M = 3.10, SD = 2.21$ ) and uncertainty tolerance ( $M = 3.23, SD = 2.29$ ) conditions did not differ in how much anger they elicited,  $p = .715$ . Yet both of these conditions elicited greater negative affect than the control condition ( $M = 2.08, SD = 1.88$ ), both  $p$ 's  $< .005$ .

Although need for cognitive closure is traditionally used as a stable, trait measure, there was some evidence that responses may have been influenced by the uncertainty tolerance manipulation. The overall effect of the uncertainty intolerance manipulation on the 14 item need for cognitive closure measure was not significant,  $F(2,212) = 1.15, p = .319, \eta_p^2 = .011$ . Yet, a trend emerged whereby participants in the uncertainty intolerance condition ( $M = 6.09, SD = 1.53$ ) scored higher on need for cognitive closure than participants in the uncertainty tolerance condition ( $M = 5.68, SD = 1.39$ ),  $p = .134$ . The control condition ( $M = 5.84, SD = 1.72$ ) fell in between these conditions and did not significantly differ from either one ( $p$ 's  $> .33$ ). It is perhaps not surprising that need for cognitive closure was not significantly affected by the manipulation, as the measure is traditionally used as a trait measure, and prior research attempting to manipulate need for closure did not report a manipulation check (Orehek, 2009). Still, the face validity of the manipulation, coupled with trending effects on the need for cognitive closure measure, point to the effectiveness of the manipulation in inducing uncertainty tolerance/intolerance.

### **Main Effects of Uncertainty Intolerance Manipulation on Key Dependent Variables**

Using one-way ANOVAs, I tested for main effects of the uncertainty intolerance manipulation on feelings of anger experienced after reading the anger-eliciting article.

**Anger.** A marginally significant effect of the manipulation emerged on anger reported after reading the article,  $F(2,216) = 2.53, p = .082, \eta_p^2 = .013$ . Participants in the uncertainty tolerance condition ( $M = 5.81, SD = 2.78$ ) reported feeling significantly less anger than participants in the uncertainty intolerance condition ( $M = 6.72, SD = 2.64$ ),  $p = .033$ . Participants in the uncertainty tolerance condition also reported experiencing marginally less anger than participants in the control condition ( $M = 6.48, SD = 2.39$ ),  $p = .097$ . Participants in the control and uncertainty intolerance conditions did not differ,  $p = .543$ .

Similar effects emerged on a composite measure of emotions experienced after the article that are related to anger (i.e., furious, upset, frustrated). A significant effect of the manipulation emerged on this composite score,  $F(2,216) = 3.41, p = .035, \eta_p^2 = .031$ . Again, participants in the uncertainty tolerance condition ( $M = 5.40, SD = 2.53$ ) reported feeling significantly less anger-related emotions than participants in the uncertainty intolerance condition ( $M = 6.41, SD = 1.89$ ),  $p = .011$ . Participants in the uncertainty tolerance condition felt marginally less anger than participants in the control condition ( $M = 6.01, SD = 2.35$ ),  $p = .093$ . Participants in the control and uncertainty intolerance conditions did not differ,  $p = .303$ .

These findings demonstrate that when the benefits of reducing uncertainty are made salient (i.e., as in the uncertainty intolerance condition), people react to an anger-eliciting situation similarly to how they would react under typical conditions (i.e., as in the control condition). However, when the benefits of accepting uncertainty are made

salient – that is, when people are motivated to attempt to accept uncertainty – their levels of anger are reduced. This provides experimental evidence for the notion that a motivation to reduce uncertainty drives people to feel angry.

**Anti-Muslim Bias.** Given that anger was higher in the uncertainty intolerance than the uncertainty tolerance condition, and both uncertainty intolerance and anger have been shown in past research to contribute to intergroup bias, I tested the effect of the manipulation on anti-Muslim bias to begin to determine whether anger might mediate the effect of uncertainty intolerance on bias. A marginally significant effect of the manipulation emerged on anti-Muslim bias,  $F(2,215) = 2.83, p = .061, \eta_p^2 = .026$ . However, the pattern of effects differed from the effects on anger. The uncertainty intolerance ( $M = 3.06, SD = 2.19$ ) and uncertainty tolerance conditions ( $M = 3.25, SD = 2.26$ ) did not differ from each other,  $p = .595$ . However, the baseline condition ( $M = 2.47, SD = 1.95$ ) differed significantly from the uncertainty tolerance condition,  $p = .025$ , and marginally from the uncertainty intolerance condition,  $p = .097$ . Thus, it appears that simply experiencing uncertainty – irrespective of how people believed they should deal with it – increased anti-Muslim bias. Thus, anger resulting from uncertainty intolerance is not enough to account for the effects of uncertainty on bias.

### **Moderation by Individual Differences in Knowledge**

No effects of the manipulation emerged on knowledge of the link between anger and certainty,  $p = .929$ , allowing me to treat this as a moderator. However, no interaction effects emerged  $p$ 's  $> .15$ .

### **Covariates**

As expected given that uncertainty was held constant across the uncertainty intolerance and uncertainty tolerance conditions, controlling for negative affect elicited during the manipulation did not attenuate the effects of the manipulation on anger or the composite measure of anger-related emotions; in fact, controlling for negative affect experienced during the manipulation (and its interaction with the manipulation) led to *stronger* omnibus effects of the manipulation on anger,  $F(2,209) = 6.27, p = .002, \eta_p^2 = .057$ , and anger-related emotions,  $F(2,216) = 8.62, p < .001, \eta_p^2 = .076$ .

### **Discussion**

Study 5 provides evidence that the motivation to reduce uncertainty leads to greater levels of anger than the motivation to tolerate uncertainty. Thus, consistent with the evidence from the need for cognitive closure measure from Studies 1 and 2, Study 5 demonstrates that a desire to reduce uncertainty causally leads to greater anger. Study 5 also points toward a potential appraisal-based intervention that may prevent the onset of anger at very early stages of the emotion generation process – encouraging people to tolerate uncertainty.

Study 5 did not find clear evidence that compensatory anger responses mediate the effect of uncertainty intolerance on intergroup bias. It is possible that uncertainty intolerance/tolerance that is relevant to the intergroup conflict context would provide different results than this study, which induced uncertainty intolerance/tolerance in one's personal life, disconnected from the intergroup conflict context. Although the effects of the manipulation on the measure of need for cognitive closure were not significant, this is likely due to a weak manipulation check (i.e., a trait measure) rather than a weak



manipulation. Still, future research should develop more situational manipulation check items.

Study 5 equated the experimental conditions on uncertainty and negative affect, thereby helping to mitigate concerns that an alternative explanation can account for my effects. Whereas Study 5 manipulated the desire to reduce uncertainty to isolate the motivational variable driving these effects, Study 6, described next, manipulated participants' expectations that an anger-inducing stimulus could provide them with certainty or not in an effort to provide experimental insight into the precise aspect of anger that people are motivated to seek out.

## CHAPTER 7

### STUDY 6: MANIPULATING ANTICIPATED CERTAINTY FROM ANGER

Studies 2-5 demonstrate that uncertainty leads people to seek out and feel anger – particularly when people are motivated to reduce uncertainty (Studies 2 and 5) and are knowledgeable about the certainty that can be embedded in anger (Study 3). Study 6 aimed to illustrate this mechanism in another way. To determine whether uncertainty leads people to seek out anger *in order to enhance certainty*, Study 6 manipulated uncertainty/certainty and then presented participants with an anger-inducing headline that they were led to believe would make them feel either certain or uncertain about their beliefs. Thus, by manipulating the perceived certainty embedded in anger, I aimed to demonstrate that uncertain people only seek out anger when they believe it contains certainty.

Based on the existing evidence, it remains possible that uncertainty leads people to be motivated to seek out anger for reasons other than to attain certainty. Anger is also associated with other appraisals (e.g., approach motivation, high arousal) that could plausibly be sought out in an effort to alleviate uncertainty. Manipulating the anticipated certainty in the to-be-selected anger-inducing stimulus allows for a demonstration that certainty is the critical element of anger that is being sought out: it allows for a demonstration that people who are uncertain choose anger when certainty is present and do not choose anger when that single element of anger is not present. Such findings would strengthen the broader theoretical position that people seek out specific emotions for their specific appraisals.

#### **Participants**

A total of 406 participants took part in a five minute study via Amazon Mechanical Turk in exchange for either \$0.20 or \$0.30 (pay was increased after a slow response rate). I excluded 36 participants who did not follow instructions on the uncertainty manipulation (which is described in greater detail below), nine participants who failed an attention check item (they were unable to identify the emotion that the headline made previous participants feel), 13 participants who took a substantially shorter or longer time to complete the study than the remainder of the sample (i.e., less than 4 minutes or greater than 30 minutes, with the mean time to complete the study, without excluding these participants, being 7.14 minutes;  $SD = 3.35$ ), three participants who reported not taking the study seriously, and two participants who appeared to take a break from the study immediately between the manipulation and the measures (based on response timers), leaving 343 participants in the final sample (143 males, 199 females, 1 did not report gender).

### **Procedure**

Participants were recruited to participate in a study on “autobiographical memory and information processing” aimed at understanding “how people process information about their lives and the news media.” Participants were randomly assigned to experience uncertainty or certainty. The manipulation was identical to the one used in Study 4, but asked participants to write for at least 2 minutes (rather than at least 3 minutes). I did not include a control condition in this study.

After the manipulation, participants were told that in the next task “we are interested in your attitudes toward the news media” and were given the following instructions:

In the next task, a random selection of participants will be asked to read a news article.

We are interested in the extent to which you are interested in reading a news article entitled:

***"ISIS Leaders Call for More Attacks on Western Targets"***

In our previous research, participants read this article and answered questions about it. We asked participants a) how they felt after reading the article, and b) how [certain/uncertain] they were of their beliefs after reading the article.

**Most participants in our previous studies reported feeling:**

a) angry and

b) [certain/uncertain] about their beliefs after reading the article.

Participants then rated their level of interest in reading the article. I led participants to believe that “a random selection” of participants would read an article so that they would take it seriously, allowing for an ecologically valid measure of preferences for anger. The information about previous participants was designed to lead participants to anticipate that the article would either confirm their beliefs (certain headline condition) or threaten their beliefs (uncertain headline condition).

## **Measures**

**Preference for anger article.** After reading the headline for the ISIS article and receiving the information about “previous participants” experiences after reading the article, participants were asked, “Using the scale below, please indicate how interested you would be in reading this article.” Ratings were made on a 9-point scale (1 = *Not at all*; 9 = *Very much*).

**Need for cognitive closure.** Need for cognitive closure was measured at the end of the study as in Studies 3-5 ( $\alpha = .91$ ).

**Beliefs about the link between anger and certainty.** Participants responded to the same item assessing their awareness of the association between anger and certainty as in Studies 2-5.

**Manipulation check.** Participants indicated the extent to which they felt the following emotions during the writing manipulation using a 9-point scale (*Not at all – Very much*): *certain, confident, uncertain, doubtful, sad, angry, anxious*.

The first four items were averaged to create a composite of uncertainty ( $\alpha = .95$ ), and the latter three items were averaged to form a composite measure of negative affect experienced during the manipulation ( $\alpha = .82$ ).

## Results

### Descriptives

Table 7, below, displays the means and standard deviations for all measures across conditions.

<b>Measure</b>	<b>M</b>	<b>SD</b>
Preference for anger article	5.47	2.63
Need for cognitive closure	6.00	1.45
Beliefs about the link between anger and certainty	5.26	2.17
<i>Manipulation Checks</i>		
Certain	5.54	2.77
Confident	5.69	4.31
Doubtful	4.29	2.79
Uncertain	4.57	2.94
Sad	4.03	2.63
Angry	2.30	2.55
Anxious	4.74	2.84

Table 7. Means and standard deviations for main measures in Study 6.

### Manipulation Check

A two-way ANOVA revealed an effect of the uncertainty (writing) manipulation on the composite measure of uncertainty,  $F(2,339) = 478.28, p < .001, \eta_p^2 = .584$ . Participants reported feeling more uncertain in the low certainty condition ( $M = 6.20, SD = 1.88$ ) than participants in the control condition ( $M = 2.16, SD = 1.43$ ),  $p < .001$ . Neither the main effect of the headline manipulation nor the interaction were significant,  $p$ 's  $> .532$ .

The uncertainty (writing) manipulation also influenced negative affect,  $F(2,338) = 168.71, p < .001, \eta_p^2 = .333$ . Upon reflecting back on the writing task, participants reported having experienced more negative affect in the uncertainty condition ( $M = 5.21, SD = 1.94$ ) compared to the certainty condition ( $M = 2.55, SD = 1.79$ ). Neither the main effect of the headline manipulation nor the interaction were significant,  $p$ 's  $> .344$ .

I also analyzed anger as a single item. There was a main effect of the uncertainty (writing) manipulation,  $F(2,337) = 55.36, p < .001, \eta_p^2 = .141$ , whereby participants in the low certainty condition ( $M = 4.16, SD = 2.59$ ) reported experiencing more anger than participants in the high certainty condition ( $M = 2.23, SD = 2.06$ ). Neither the main effect of the headline manipulation nor the interaction were significant,  $p$ 's  $> .310$ .

### **Effects of the Certainty and Anticipated Headline Certainty Manipulations**

A two-way ANOVA was conducted to test for effects of the manipulations on preferences for reading the anger-inducing article. A significant main effect of headline uncertainty emerged,  $F(2,339) = 5.40, p = .021, \eta_p^2 = .016$ . Participants led to believe they would feel uncertain after reading the anger inducing article ( $M = 5.12, SD = 2.58$ ) were less interested in reading the article compared to participants led to believe they would feel certain after reading the article ( $M = 5.80, SD = 2.63$ ). A marginal main effect

of uncertainty (writing) condition also emerged,  $F(2,339) = 2.93, p = .089, \eta_p^2 = .009$ .

Participants in the low certainty condition ( $M = 5.26, SD = 2.72$ ) were less interested in reading the anger article than participants in the high certainty condition ( $M = 5.73, SD = 2.49$ ).

The interaction was not significant,  $F(2,339) = 1.15, p = .284, \eta_p^2 = .003$  (see *Figure 6*), but simple effects suggested that participants were least interested in reading the anger article after they wrote about uncertainty *and* they anticipated that the article would make them feel uncertain ( $M = 4.76, SD = 2.71$ ). This reflected a lower interest in reading the anger article than the three other conditions, including uncertain participants rating the certain headline ( $M = 5.72, SD = 2.65$ ), certain participants rating the uncertain headline ( $M = 5.55, SD = 2.36$ ), and certain participants rating the certain headline ( $M = 5.91, SD = 2.62$ ). Thus, as expected, participants who were uncertain preferred the anger headline when it was expected to make them feel more certain compared to when it was expected to make them feel less certain. However, contrary to expectations, among participants who expected the headline to elicit certainty, uncertain and certain participants did not differ in their preferences for reading the article,  $p = .647$ .

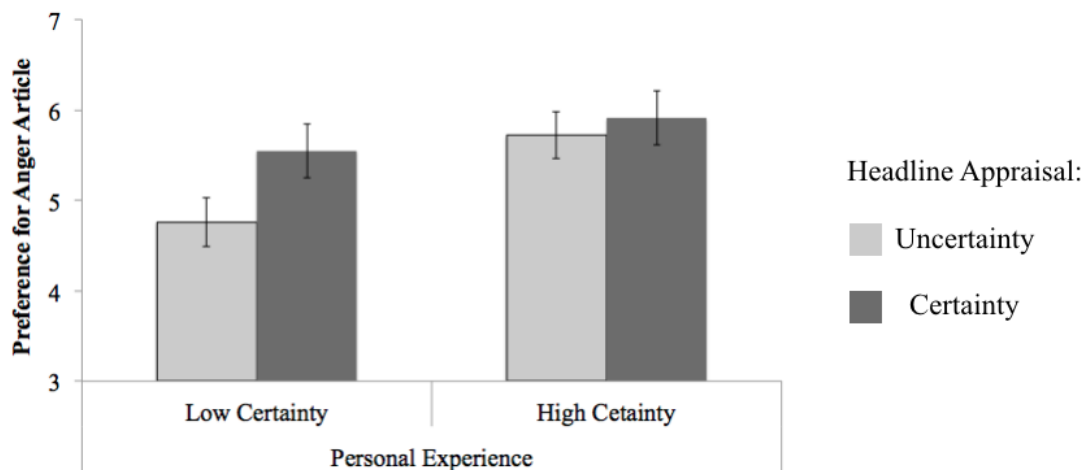


Figure 6. Interaction of writing and headline conditions on preference for anger headline.

### **Moderation**

No effects of the manipulation emerged on need for cognitive closure,  $p$ 's > .57, or on awareness of the association between anger and certainty,  $p$ 's > .06. I thus tested whether people who were uncertain wanted to read the anger headline when they expected it to make them feel certain *and* when they wanted to reduce uncertainty. The three-way interaction between writing condition, headline condition, and need for cognitive closure was not significant,  $F(2,335) = 1.57, p = .212, \eta_p^2 = .001$ . The three-way interaction between writing condition, headline condition, and awareness of the association between anger and certainty was also not significant,  $F(2,335) = 0.37, p = .546, \eta_p^2 = .005$ .

### **Discussion**

Study 6 tested whether people who are uncertain seek out anger only when they believe it will make them feel certain. The results did not support my hypotheses. Although people who were uncertain avoided the anger article more than any other group when they thought it would make them feel more uncertain, they did not prefer the anger article (compared to people who felt certain when) they thought it would make them feel more certain.

There were several potential limitations to this study. First, the uncertainty manipulation only lasted for 2 minutes, which is substantially shorter than manipulations used in past research. It is possible that the manipulation was not strong enough. Second, there was also no time delay between the manipulation and the headline rating task – the latter task came immediately after the former. Past research on compensatory reactions to



uncertainty suggests that a delay is needed for compensatory effects to emerge. Third, although participants were told that a random selection of participants would read an article, which was intended to encourage participants to take the rating task seriously, participants were also told that the study would last only 5 minutes and half of this time had gone by after they completed the manipulation. Thus, the cover story may not have been sufficiently elaborate and participants therefore may not have anticipated that their rating of their desire to read the anger-inducing article would influence their emotional experience in a tangible way. For this reason, participants may not have made their ratings with the intention of influencing the emotions or appraisals they would experience. Relatedly, the cover story may have not provided participants sufficient opportunity to get angry because it did not place emphasis on the facts presented in the article headline (which could have provided a reason to feel anger toward ISIS). It is important to note that all three of these methodological decisions – the short manipulation task, the lack of a time delay, and the brief cover story – were all made this study shorter and therefore inexpensive to run (the study ended up costing a total of just \$150 to run approximately 400 participants), thereby conserving resources that could be used in the future to improve upon this paradigm. It is also important to note that these decisions were not purely made on financial grounds. I reasoned that if effects could be detected with a short writing task, without a time delay, and with a simple cover story, I could be confident that they would emerge under even more hospitable methodological conditions. Clearly, this turned out not to be the case, and I have learned that these effects do not emerge even under these less hospitable conditions.

While the paradigm pioneered in this study may need additional refining, it has the potential to causally demonstrate that people who are uncertain prefer anger precisely because it promises to provide them with a sense of certainty. Future research should address these three methodological limitations and continue to pursue this strand of evidence for the proposed model. Future research should also either manipulate need for cognitive closure or measure it prior to the study in order to more appropriately test whether people who are uncertain and motivated to reduce it would seek out anger only when it has the potential to restore certainty. In sum, this paradigm promises to be valuable and informative, but likely needs additional refining before it can provide strong evidence for or against my proposed model.

## CHAPTER 8

### STUDY 7: EXTENSION TO CONTROL AND GUILT

All of the data presented thus far for the proposed appraisal-based model of emotional preferences has focused on one appraisal-emotion pair (i.e., certainty and anger). Study 7 aimed to extend the model by considering a second appraisal-emotion pair: control and guilt. Research demonstrates that guilt is an emotion that evokes a sense of responsibility and control (Smith & Ellsworth, 1985). Given that people have a strong desire for control (e.g., Kay, Whitson, Gausher, & Galinsky, 2009), an appraisal-based perspective on emotional preferences would predict that people may want to feel guilty to enhance appraisals of control, responsibility, and efficacy. Thus, people who lack a sense of control over outcomes may be especially likely to want to feel guilty. In other words, even though guilt is typically experienced as a negative emotion, people might be motivated to seek it out to restore appraisals of control. To provide an initial test of this idea, I used a paradigm similar to the one I used in Study 4. I manipulated the sense of control using an autobiographical writing task and measured preferences for and experiences of guilt by asking participants to write about personal life experiences in which they felt guilty.

#### **Participants**

A total of 287 participants took part in the study via Amazon Mechanical Turk in exchange for \$0.75. I excluded 39 participants who did not follow instructions on the uncertainty manipulation, the brief listing of several emotional life events, or the guilt induction writing task (see below for details about these tasks) and four participants who

reported not taking the study seriously, leaving 244 participants in the final sample (81 males, 161 females, 2 unreported).

## **Procedure**

Participants were recruited to participate in a study on “autobiographical memory and information processing” in which they would “write about several life experiences” to help us better understand “how people process information about their lives.”

Participants were randomly assigned to write about an experience in which they had total control over a situation, no control over a situation, or neither (in a neutral condition).

The manipulations were adapted from those used by Whitson and Galinsky (2008). The instructions for the high/low control conditions were as follows:

In this first task, we are interested in how people process particular autobiographical memories.

We would like you to write about a particular incident in which something happened and you [had complete control / did not have any control] over the situation. Please write about the situation in which you felt [in complete control / a complete lack of control] – what happened, how you felt, etc.

Please describe this experience in as much detail as possible. Please write for at least 3 minutes. The continue button will appear below after 3 minutes have elapsed.

In the neutral condition, participants were asked to write about a typical experience in their lives:

In this first task, we are interested in how people process particular autobiographical memories.

We would like you to write about a typical experience in your life. Please write about a typical and ordinary life experience – what happened, how you felt, etc.

Please describe this experience in as much detail as possible. Please write for at least 3 minutes. The continue button will appear below after 3 minutes have elapsed.

I chose not to include a distractor task in this study given that the literature on compensatory control does not typically include time delays as in the literature on uncertainty compensation.

Next, I assessed participants' preferences for experiencing a variety of negative emotions: guilt, sadness, and surprise. I selected these emotions because guilt is a negative emotion high in sense of responsibility and control (and thus should be desirable among individuals with a low sense of control), sadness is a negative emotion low in sense of responsibility and control (and thus should not be desirable among individuals with a low sense of control) and surprise is a positive emotion low in sense of responsibility and control (and thus, despite its positivity, should also not be desirable among individuals with a low sense of control). As in Study 4, participants generated possible topics to write about for the longer writing task to follow; they were told:

In the upcoming writing task, you will be asked to write for several minutes about a personal life experience in which you felt a specific emotion.

First, however, we would like you to generate a possible life experience that you might write about for each of the emotions listed below.

Please think about experiences that made you feel each of the following emotions. Then, in a brief sentence, please describe an experience for each emotion type.

Participants listed experiences in which they felt guilt, sadness, and surprise. Then, on the following page, their responses reappeared, and they were asked to rate the extent to which they wanted to write (and think) about each of the three experiences to a

greater extent using 9-point scales (*Not at all interested – Very interested*). Specifically, they were told:

Next, you will see the experiences you generated on the previous page. Please indicate the extent to which you are interested in writing about each of the following experiences for the upcoming full-length writing task:

Next, to ensure that all participants experienced guilt, we told participants, as a cover story, that while their ratings will be taken into account, the emotion they write about during the full length writing task will also be determined by an element of chance. Then, all participants were asked to write about an experience in which they felt guilt, and were told to write as much as they wanted:

On the next page, you will receive your writing prompt. Please note that because we are looking to obtain a sampling of experiences from each type of emotion, you might not be asked to write about the emotion you indicated the strongest preference for. Because we want a somewhat even sampling of each emotion type, an algorithm will generate an emotion for you to write about based on the preferences you expressed as well as an element of chance.

Click continue to receive your writing prompt and begin the writing task.

Based on your responses, as well as an element of chance, you were assigned to write about a life experience in which you felt **guilt**.

In the space below, please write about a recent personal life experience in which you felt guilt. You can write about the same experience you briefly described earlier, or you can write about a different experience.

**Be sure to describe what you were/are guilty about, why you felt/feel guilty about it, and how the emotion manifested itself. Please describe this in as much detail as possible.**

There is no timer for this task. Write as much as you feel is necessary to fully describe the experience. Click the continue button below when you are done writing.

## Measures

After the guilt induction, the following measures were obtained.

**Guilt writing task word count.** As an indirect and unobtrusive index of engaging in behaviors that prolong the experience of anger, I computed the length of each participant's written response (using a word count function).

**Emotions.** Immediately after the guilt induction, participants were asked to indicate the extent to which they "currently feel" the following emotions a 9-point scale (1 = *Not at all*, 9 = *Very much*): *Guilt, Sadness, Surprise, Anger, Fear, Happiness, Anxiety, Shame, Excitement, Regret, Embarrassment.*

**Desire to eliminate emotions.** To assess the extent to which participants want to continue feeling particular emotions, I asked participants to: "Imagine that there was a pill that could eliminate the guilt you feel right now. To what extent would you want to take such a pill?" Participants responded on a 9-point scale (1 = *Not at all*, 9 = *A great deal*).

**Need for control.** Rather than measure need for cognitive closure, as in the previous studies, I used 14 items from the need for control scale (Burger & Cooper, 1979; see appendix) to assess the desire for control (e.g., "I enjoy being able to influence the actions of others," "I enjoy having control over my own destiny," "I prefer a job where I have a lot of control over what I do and when I do it," "I try to avoid situations where someone else tells me what to do." Participants responded using a 6-point scale (1 = *Strongly Disagree*, 6 = *Strongly Agree*;  $\alpha = .82$ ).

**Beliefs about the link between guilt and responsibility.** Participants responded to the same question assessing their awareness of the association between guilt and a sense of responsibility using the following item: “To what extent do you think that when people feel guilt they feel a strong sense of responsibility?” Participants responded on a 9-point scale (1 = *Not at all*, 9 = *Extremely*).

**Manipulation check.** Participants indicated the extent to which they felt the following emotions during the sense of control manipulation using a 9-point scale (*Not at all – Very much*): *In control, Sense of responsibility, Sad, Fearful, Angry, Anxious, Guilty, Ashamed*. Participants’ writing responses were displayed back to them at the top of the screen to remind them which writing task these questions were referring to.

The first two items were averaged to form a composite measure of control ( $\alpha = .70$ ). The latter six items were averaged to form a composite measure of negative affect ( $\alpha = .87$ ). The last two items were averaged to form a composite measure of guilt ( $\alpha = .84$ ).

## Results

### Descriptives

Table 8, below, displays the means and standard deviations for all measures across conditions.

<b>Measure</b>	<b>M</b>	<b>SD</b>
<i>Preference for writing task</i>		
Guilt	4.13	2.63
Sadness	4.61	2.68
Surprise	5.80	2.61
Guilt writing task word count	116.27	83.39
<i>Emotions after the guilt writing task</i>		
Guilt	5.31	2.61
Regret	5.14	2.79



Sadness	4.73	2.70
Happiness	4.49	2.49
Shame	4.27	2.75
Anxiety	4.12	2.72
Embarrassment	3.80	2.61
Anger	3.00	2.37
Excitement	2.92	2.32
Fear	2.74	2.31
Surprise	2.43	1.88
Beliefs about the link between responsibility and guilt	7.21	1.66
Need for control	4.34	0.70
<i>Manipulation Checks</i>		
Control composite	4.34	0.70
In control	5.96	2.73
Sense of responsibility	6.46	2.41
Negative affect composite	3.36	2.07
Fearful	3.24	2.64
Sad	3.96	2.78
Angry	5.08	2.80
Anxious	3.30	2.76
Guilt composite	2.57	2.19
Guilty	4.39	2.87
Ashamed	2.67	2.44

Table 8. Means and standard deviations for main measures in Study 7.

### Manipulation Check

The control manipulation had the anticipated effect on ratings on the composite measure of control,  $F(2,239) = 55.33, p < .001, \eta_p^2 = .317$ . Participants reported experiencing less control in the low control condition ( $M = 4.53, SD = 2.18$ ) than participants in the neutral condition ( $M = 6.60, SD = 1.77$ ),  $p < .001$ , who reported experiencing less control than participants in the high control condition ( $M = 7.57, SD = 1.59$ ),  $p = .001$ .

The control manipulation also influenced negative affect,  $F(2,239) = 23.13, p < .001, \eta_p^2 = .162$ . Participants reported having experienced more negative affect in the low control condition ( $M = 4.51, SD = 2.02$ ) compared to both the high control condition ( $M$

= 2.84,  $SD = 1.74$ ),  $p < .001$ , and the neutral condition ( $M = 2.69$ ,  $SD = 1.93$ ),  $p < .001$ . The high control and neutral conditions did not differ,  $p = .610$ .

I also analyzed effects on the guilt-shame composite separately. The control manipulation condition did differ in the amount of guilt participants recall experiencing,  $F(2,238) = 6.97$ ,  $p = .001$ ,  $\eta_p^2 = .055$ . Participants reported having experienced more guilt in the low control condition ( $M = 3.28$ ,  $SD = 2.52$ ) compared to both the high control condition ( $M = 2.17$ ,  $SD = 1.72$ ),  $p = .001$ , and the neutral condition ( $M = 2.23$ ,  $SD = 2.07$ ),  $p = .001$ . The high control and neutral conditions did not differ,  $p = .846$ .

### **Main Effects of the Control Manipulation on Key Dependent Variables**

**Guilt writing task word count.** No effect of the manipulation emerged on the number of words participants wrote during the guilt writing task,  $F(2,241) = .47$ ,  $p = .627$ ,  $\eta_p^2 = .004$ .

**Preferences for guilt, sadness, and surprise.** Consistent with my primary hypothesis, participants in the low control condition ( $M = 4.52$ ,  $SD = 2.81$ ) expressed a stronger preference for writing about a guilt experience compared to participants in the high control condition ( $M = 3.70$ ,  $SD = 2.52$ ),  $p = .047$ . Given that the neutral condition fell in the middle of the other two conditions ( $M = 4.13$ ,  $SD = 2.52$ ) and did not differ significantly from either one ( $p$ 's = .30 and .33), the omnibus test for differences among all conditions was not significant,  $F(2,241) = 1.99$ ,  $p = .138$ ,  $\eta_p^2 = .016$ . Yet given that the conditions were not equated on guilt experienced during the writing manipulation, I controlled for this variable, as well as the interaction between condition and guilt (as recommended by Yzerbyt, Muller, and Judd, [2004] when the manipulation has an effect on the covariate). In this analysis, the omnibus test of the effect of the manipulation on

preferences for guilt was significant,  $F(2,235) = 4.14, p = .018, \eta_p^2 = .034$ . Thus, these analyses provide preliminary support for the notion that people who feel a lack control prefer to feel guilty. No effects emerged on preferences for sadness or surprise,  $p$ 's > .48.

**Emotions.** No effects emerged on emotions reported after the guilt writing task,  $p$ 's > .23.

**Desire to eliminate emotions.** No effect of the manipulation emerged on the desire to eliminate guilt or sadness via a pill,  $p$ 's > .59.

### **Moderation by Individual Differences in Motivation and Knowledge**

No effects of the manipulation emerged on need for control,  $F(2,239) = 0.06, p = .939$ , or knowledge about the association between guilt and a sense of responsibility,  $F(2,239) = 0.72, p = .490$ , allowing me to treat these variables as moderators.

To test whether preferences for guilt emerge more strongly when people are aware of guilt's association with a sense of responsibility, I tested whether responses to this item moderated the effect of the manipulation on the key dependent variables. Only one significant interaction emerged. Knowledge about the relationship between guilt and a sense of responsibility moderated the effect of the manipulation on the desire to eliminate guilt with a pill,  $\Delta R^2 = .041, F(2,234) = 5.05, p = .007, \eta_p^2 = .041$  (see *Figure 7*). Among participants who were aware that guilt can be associated with a sense of responsibility (1 SD above the mean), those in the low control condition expressed less interest in eliminating their guilt with a pill relative to those in both the high control condition,  $p = .006$ , and the neutral condition,  $p = .018$ . No significant effects of conditions emerged among participants who did not believe that people who feel guilty feel a sense of responsibility (1 SD below the mean). Further, in the low control

condition, greater knowledge of the control-responsibility link was associated with less interest in taking a pill to reduce guilt,  $b = -.52$ ,  $SE = .20$ ,  $p = .011$ , but this relationship was absent in the high control condition,  $b = .14$ ,  $SE = .20$ ,  $p = .483$ , and nearly reversed in the neutral condition,  $b = .30$ ,  $SE = .17$ ,  $p = .083$ . Thus, when people experience normal levels of control, the more knowledge people have about guilt, the more they want to reduce it. However, when people lack a sense of control and know that guilt can confer it, they do not want to eliminate their guilt.

No interactions emerged with need for control,  $p$ 's  $> .19$ .

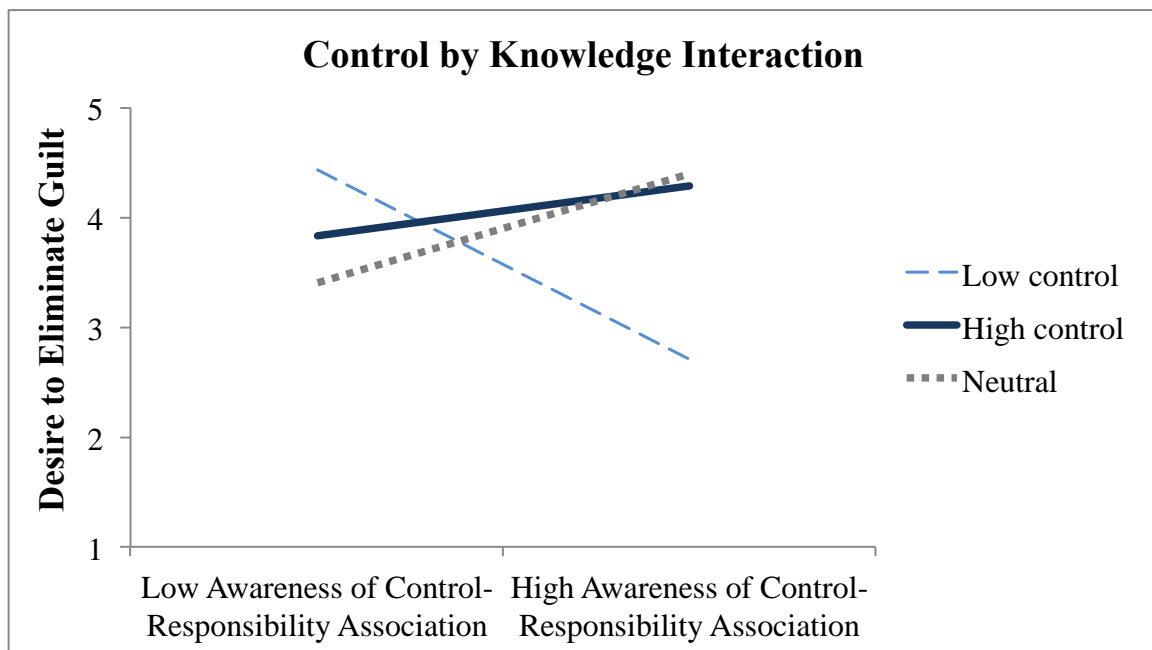


Figure 7. The effects of control and beliefs about the association between anger and certainty on the desire to eliminate guilt.

### Covariates

Given that negative affect experienced during the control manipulation differed by condition, I reran the analyses controlling for negative affect. The effects on preferences for guilt and the desire to eliminate guilt remained unchanged.

## Discussion

Study 7 sought to extend the evidence for the appraisal-based perspective on emotional preferences to a second appraisal-emotion pair. Study 7 demonstrated that people who lack a sense of control express a stronger preference for guilt. Further, those who lack a sense of control but are aware of the link between guilt and a sense of responsibility report that would they would be reluctant to eliminate their guilt if given the opportunity. Study 7 therefore provides initial evidence that people seek out emotions for their appraisals that goes beyond using anger as a test case. It suggests that people may want to experience guilt – a negative emotion – in order to attain the appraisals it is associated with. This somewhat counterintuitive finding may have broader implications for research on guilt, an emotion that people sometimes try not to feel. The present research suggests that it may be possible to give people an incidental reason to feel guilt (e.g., an appraisal deficit). This work also provides a proof of concept that appraisal-based emotional preferences may extend broadly to other emotions. By providing additional evidence for the theorized mechanism using an entirely different context, this study enhances confidence in the mechanism hypothesized to underlie the findings from all 7 studies, and begins to build a broader network of evidence supporting the broader proposition that negative emotions may be sought out when particular appraisals are desired.

## CHAPTER 9

### GENERAL DISCUSSION

Are people motivated to experience emotions for their cognitive impacts? I found that people who tend to be uncertain tend to experience greater levels of anger (Study 1), that people experiencing momentary uncertainty, and who are motivated to reduce this uncertainty, hold stronger preferences for anger, experience higher levels of anger (Study 2), and expect to engage in behaviors that would prolong their anger (Study 3) to a greater extent than people who are not experiencing uncertainty or those who tend to be tolerant of their uncertainty. I also found that people experiencing uncertainty choose to write more about an anger-inducing event they experienced, report expending effort to feel more angry about their experience, and actually end up feeling more angry about it (Study 4). When people are motivated to tolerate and accept their uncertainty, they report feeling less anger in response to an article about anger-inducing current events (Study 5). Finally, when people experience a lack of control, they feel more guilty about a personal life experience, suggesting they may be more receptive to feeling guilt when it can address their appraisal needs (Study 7). Taken together, these findings provide considerable evidence that 1) people tend to seek out and experience emotions that address their appraisal needs, and that 2) that people become more receptive to feeling negative emotions because of fundamental *motivations* to experience particular cognitive appraisals.

The primary implication of this work is that emotions appear to be shaped not only by cognitive appraisals themselves, but by a *motivation* to experience those cognitive appraisals. Thus, this work illustrates a need to incorporate a motivational

component into cognitive appraisal theories of emotion. By using cognitive appraisal theories as a lens through which to understand emotional preferences, this work sheds light on a new class of reasons for why people experience emotions. In a broader sense, this work begins to more fully integrate the literatures on affect and cognition and emotion regulation.

This research has employed numerous novel methods for inducing anger and measuring emotional preferences. Evidence for my perspective emerged consistently across numerous research designs (correlational, experimental), manipulations (certainty, need for cognitive closure, sense of control), emotion inductions (video, article, writing tasks), and samples (undergraduate students, more diverse online samples). The fact that my hypotheses were supported across this diversity of methodologies begins to point toward the scope and generalizability of the hypothesized processes.

The model of appraisal-based emotional preferences that I propose has the potential to develop into a broad and comprehensive framework for understanding emotional preferences that goes beyond the existing literature. My framework does not contradict existing research on emotional preferences; rather it complements and extends that work. Whereas Tamir's (2009) research on utility focuses on people's preferences for emotions based on situations they anticipate being in *after* choosing how they want to feel, my work focuses on people's preferences for emotions based on appraisals they experience *before* choosing how they want to feel. Moreover, the nature of the mechanism underlying each phenomenon is fundamentally different: the processes I outline can be best understood as efforts to *compensate* for appraisal deficits, whereas the processes Tamir discusses can be best understood as efforts to *match* emotions to

situational demands. Despite these differences, these perspectives are highly complementary and could benefit from further integration.

### **Potential to Inform Interventions**

This research has the potential to inform interventions that prevent the onset of emotions by boosting the sought-after appraisal. The potential of this work to transform emotion regulation interventions lies in the possibility that intervening on appraisals can stem the experience of the earliest stages of the development of negative emotions. Just as people engage in addictive behaviors such as drinking, smoking, and gambling in pursuit of immediate gains while ignoring potentially harmful longer-term consequences, it may be that people turn to negative emotions such as anger not always because the situation demands it, but because of its (not always obvious) ability to cater to appraisal needs. Individuals may be unaware that they are preferentially entering into anger-inducing situations in order to temporarily fulfill a need to feel certain. By intervening on the cognitive underpinnings of anger – a sense of uncertainty – it may be possible to stem anger before it arises efficiently preventing a potential cycle whereby people implicitly seek solutions to their appraisal needs in ways that ultimately lead to more problems.

This work also suggests a role for interventions that *increase* negative emotions such as guilt. Thus, interventions could work in both directions. It should be noted that anger is sometimes associated with positive outcomes in some contexts (e.g., Kitayama et al., 2015) and thus it may be desirable in some cases to increase anger. Making people aware of the motivational factors that alter their emotional responses to situational stimuli could help them modulate their own emotional experiences more effectively and provide them with the opportunity to exert more control over their emotions. If emotions are not



straightforward responses to situations but rather depend on unrelated personal needs, interventions that increase people's awareness of these processes may allow them to expend more effort on emotion regulation efforts and mitigate undesirable emotions.

### **Limitations and Future Directions**

Despite the amount of evidence accumulated in this dissertation in support of this phenomenon, additional research is needed to further rule out alternative explanations. Specifically, additional research is necessary to continue to rule out the possibility that the negative affect that inevitably coincides with uncertainty is driving the effects. In Study 4, controlling for negative affect or anger experienced during the uncertainty manipulation weakened or eliminated the effects. If uncertainty is inherently a negative experience, this may not be surprising, as controlling for negative affect could effectively covary out the effect itself. Future research should continue to take the approach employed in Study 5 – equating the conditions on uncertainty and negative affect and manipulating uncertainty intolerance. Future work might also include a negative affect comparison condition in an effort to show that negative affect and uncertainty produce different effects. But given that negative affect would also be predicted to elicit uncertainty, one might expect such a condition to produce *similar* effects. Thus, an approach similar to the one used by Tiedens and Linton (2001) – inducing negative affect while manipulating the level of certainty evoked – may be useful. Experimental approaches may prove to be more effective than statistical approaches in attempting to disentangle uncertainty from negative affect. The present research argued most forcefully against a negative affect or “vulnerability” interpretation of the effects by providing positive evidence that the effects emerged for motivational reasons.

There were several other limitations in this research. Continuing to attempt to isolate anger from other negative emotions in the measurement of emotional preferences and experiences will likely remain a challenge, but using participant-generated inductions that direct participants to generate a specific emotion (as in Study 4) may be helpful in achieving this. Future research should continue to refine the paradigm used in Study 6 in order to more effectively test which component of anger people who are uncertain may be seeking out. Effects did not emerge on the exact same DVs across studies and individual differences in need for cognitive closure did not consistently moderate the effects. Given the limitations identified in Study 3 associated with measuring need for closure as a moderator at the end of a study, future research must either measure need for closure prior to the study or manipulate it.

There are many other methodological tools that future research might utilize to continue to address the questions I have focused on here. Additional implicit measures of emotional preferences should be employed. For example, future work could use implicit measures of attitudes toward anger, such as an implicit association test (IAT) assessing associations between anger and positive versus negative concepts, or other social cognitive measures of anger accessibility (e.g., lexical decision task). An IAT could also be used to assess peoples' *implicit knowledge* about the association between anger and certainty. This implicit measure might prove to be a more consistent moderator than explicit measures, as most of people's awareness of the relationship between emotions and appraisals is likely stored on an implicit level and developed through associations people subconsciously make when experiencing the co-occurrence of particular emotions with particular appraisals over time.

Future research might employ psychophysiological measures of emotion as implicit indices of how people want to feel. Such measures would go a long way in circumventing the concerns about social desirability associated with reporting preferences for negative emotions. The use of physiological measures of anger could also help establish more concrete links between uncertainty-induced anger and important downstream outcomes, such as physical health. Research demonstrates that anger is associated with health issues such as hypertension, coronary heart disease, atherosclerosis, and stroke (Anderson, McNeily, & Myers, 1991; Leventhal & Patrick-Miller, 2000; Matthews, Salomon, Brady, & Allen, 2003; Matthews, 2005; Smith, 2006). Connecting uncertainty management concerns to physiological reactions to anger could help illustrate the downstream cardiovascular implications of appraisal-based emotional preferences. Thus, this work could have implications for both mental and physical health interventions.

Study 5 began to test the implications of these processes for intergroup relations. Future work should continue to consider these implications. For example, future work might test whether uncertainty makes people more likely to become activists fighting against social causes that make them angry, thus showing potential *positive* downstream consequences of anger for social activism and dissent.

In future work, I will consider the implications of this work for emotional aging research. Research demonstrates that older adults experience anger to a markedly lower degree than younger adults, a surprising phenomenon that has led anger to be labeled a “special case” in emotional aging research (e.g., Blanchard-Fields, 2007). A future study might test whether older adults’ greater prioritization of meaning in life (e.g., Carstensen

et al., 1999) and possible subsequent feelings of certainty and self-assuredness explain this age difference in preferences for and reactivity to anger. That is, it may be that as people get older, they feel more certain and do not feel the need to pursue anger. Finally, although the present research used healthy samples, subsequent studies should consider the generalizability to individuals who have clinical levels of trait anger. Certainty inductions or uncertainty tolerance might have especially dramatic effects in reducing anger among such individuals.

Future research should begin to integrate research on the appraisal-based emotional preference perspective with other factors known to influence emotional preferences, such as utility and cultural context, which likely work in conjunction with and moderate these effects. While the present research relied on need for closure as a theoretically relevant moderator to illustrate the motivational nature of the effect, testing these ideas cross-culturally could serve a similar function by showing, for example, show people seek out emotions that

## **Conclusions**

People appear to prefer emotions because of the appraisals they contain. As the first foray into the study of emotional preferences based on appraisal dimensions, this program of research promises to pioneer theoretical advances in the study of emotion, has the potential to transform the way we think about the causes and interventions for the experience of negative emotions, and may one day be used to understand a broad range of phenomena in intergroup, interpersonal, and health-relevant contexts.

## **APPENDIX:**

### **INDIVIDUAL DIFFERENCES MEASURES**

#### **Need for cognitive closure items**

I don't like situations that are uncertain.

I dislike questions which could be answered in many different ways.

I find that a well ordered life with regular hours suits my temperament.

I feel uncomfortable when I don't understand the reason why an event occurred in my life.

I feel irritated when one person disagrees with what everyone else in a group believes.

I don't like to go into a situation without knowing what I can expect from it.

When I have made a decision, I feel relieved.

When I am confronted with a problem, I'm dying to reach a solution very quickly.

I would quickly become impatient and irritated if I would not find a solution to a problem immediately.

I don't like to be with people who are capable of unexpected actions.

I dislike it when a person's statement could mean many different things.

I find that establishing a consistent routine enables me to enjoy life more.

I enjoy having a clear and structured mode of life.

I dislike unpredictable situations.

### **Need for control items**

I prefer a job where I have a lot of control over what I do and when I do it.

I enjoy political participation because I want to have as much of a say in running government as possible.

I try to avoid situations where someone else tells me what to do.

I would prefer to be a leader than a follower.

I enjoy being able to influence the actions of others.

I enjoy making my own decisions.

I enjoy having control over my own destiny.

I consider myself to be generally more capable of handling situations than others are.

I'd rather run my own business and make my own mistakes than listen to someone else's orders.

When I see a problem, I prefer to do something about it rather than sit by and let it continue.

When it comes to orders, I would rather give them than receive them.

I wish I could push many of life's daily decisions off on someone else.

I prefer to avoid situations where someone else has to tell me what it is I should be doing.

I would rather someone else take over the leadership role when I'm involved in a group project.

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