DO PEOPLE BRACE SENSIBLY?
RISK JUDGMENTS, OUTCOME IMPORTANCE, AND RISK PREVALENCE

By

KATHARINE DOCKERY

A THESIS PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE

UNIVERSITY OF FLORIDA

2003

ACKNOWLEDGMENTS

I thank Dr. James Shepperd for his constant guidance and encouragement and for never allowing me to do less than my best work. I thank my husband and my parents for their unconditional love and support, without which this process would have been difficult and painful. Finally, I thank my God, "who is able to do immeasurably more than all we ask or imagine."

TABLE OF CONTENTS

APPENDIX

LIST OF TABLES

LIST OF FIGURES

Abstract of Thesis Presented to the Graduate School
of the University of Florida in Partial Fulfillment of the
Requirements for the Degree of Master of Science

DO PEOPLE BRACE SENSIBLY?
RISK JUDGMENTS, OUTCOME IMPORTANCE, AND RISK PREVALENCE

By

Katharine Dockery

December 2003

Chair: James A. Shepperd, PhD
Major Department: Psychology

Previous research shows that people become pessimistic about impending bad news to "brace for the worst." The current study examined whether the commonality and importance of an event moderates bracing. Students learned about a billing error that would result in an unexpected bill for either 20% (rare event) or 80% (common event) of the students at their university. Students in the common event condition made higher personal risk estimates than did students in the rare event condition. Financially needy students also made higher risk estimates than did non-needy students. Comparing risk estimates to the base rates provided to participants revealed that students in the rare event condition were pessimistic about their risk of receiving a bill, with the financially needy students making the most pessimistic estimates. In contrast, students in the common event condition were optimistic about their risk, with non-needy students making the most optimistic estimates. The discussion explores several possible explanations for these findings.

CHAPTER 1
INTRODUCTION

During the fall of 2002, a series of sniper attacks terrorized life in the greater Washington, DC, region. People living in the area felt unable to leave their houses or send their children to school for fear that they might be the next victims. By the time the assailants were apprehended on October 25, 2002, they had left in their wake ten fatalities and three injuries–out of approximately 4.4 million people living in the counties where the attacks occurred. The chances of any given person being attacked by the snipers were less than 0.00003%, yet activity in Virginia and Maryland was paralyzed until the snipers were caught. Although the objective likelihood that any given person would fall prey to the snipers' bullet was quite low, the behavior of people living in the area (e.g., withholding their children from school, postponing trips to gas stations) suggests that people felt otherwise, perceiving their risk as quite high. What made people so drastically overestimate their risk?

Numerous studies find that people do not fully account for base rate information (Tversky & Kahneman, 1982), give undue weight to salient examples (MacLeod & Campbell, 1992; Slovic, Fischoff, & Lichtenstein, 1982), have a poor understanding of small numbers (Tversky & Kahneman, 1974), and rely on stereotypes (Kahneman & Tversky, 1972) when estimating their risk. Undoubtedly, these errors in thinking contributed to an overestimation of personal risk of being attacked. In this thesis I propose an additional reason people might overestimate their risk. Specifically, I propose that in some instances people may overestimate their risk to avoid negative feelings such

as disappointment associated with having bad events come as a surprise. That is, people may overestimate their risk by making unduly pessimistic predictions in an attempt to "brace for the worst" (Carroll, Dockery, & Shepperd, 2003). The pessimism of residents of the Washington DC area about the risk of a sniper attack may have been motivated in part by an attempt to brace for the worst possible scenario. In fact, people who are bracing themselves may consistently overestimate the risk of rare events in their effort to prepare themselves for the blow of a negative outcome.

This research examines whether the commonality of an event moderates bracing. I specifically address whether people brace more for rare events or for common events. On the one hand, people may brace more in anticipation of negative events that are common because of the greater objective likelihood of experiencing common event, which prompts more worry and fear of disappointment. For example, during an epidemic when large numbers of people are testing positive for a disease, people objectively face a greater risk of catching the disease and thus should be more preoccupied with the disease. In contrast, people should be less concerned about a rare disease for which their objective risk is lower. Thus, one might expect that people are more pessimistic, relative to the base rate, about common negative events. On the other hand, it is also possible that people brace more in anticipation of negative events that are rare. Research shows that the intensity of disappointment depends on the unexpectedness of a negative event. The more unexpected the event, the greater the disappointment people experience (van Dijk, Zeelenberg, & van der Pligt, 1999). Because bracing serves to reduce or avoid negative feelings such as disappointment, people may be more inclined to brace for rare events, which have greater capacity for producing disappointment, than for common events.

Indeed, people may not only brace more for rare events, they may also prepare more in other ways, a finding that would have important implications regarding risk-taking behaviors. For example, travelers who mistakenly believe that they are likely to crash in a plane may take to the far more dangerous highways. The current study tests the competing possibilities regarding the influence of commonality on bracing.

Judging Likelihood

Although people often attempt to predict future outcomes (e.g., the likelihood that rain will spoil a picnic, that stock prices will rise, that traffic will be lighter on one route or another), try as they might they often predict inaccurately (Tversky & Kahneman, 1974). In fact, people often fail to adequately consider information about the actual frequency of an event, or its *base rate*. The base rate for an event, or more accurately, people's perception of the base rate, can influence estimates of an event's likelihood. However, people are often unaware of the base rate for an event, and even available base rate information does not guarantee accurate estimates. People often neglect such information, attending instead to less informative details of a situation (Tversky & Kahneman, 1982).

This phenomenon is related to the process of *anchoring and adjustment*, another example of base rate use in probability judgments. When people employ the anchoring and adjustment heuristic, they make estimations by accounting for present information and then adjusting for differentiating characteristics (Tversky & Kahneman, 1974). Although anchoring and adjustment can lead to better predictions when people objectively consider relevant information, people often do a poor job of using such information or rely on biased perceptions of their capacity to avoid negative outcomes. For instance, participants in one study read scenarios in which the base rates for several

events (car accident, burglary, pet illness, parachute failure, and raffle win) were either high or low and the target was the participant or another person. For every scenario, participants estimated a greater likelihood when the base rate was high than when the base rate was low. However, the estimations for the negative events were consistently lower when the participant was the target of the estimate than when another person was the target (Greening & Chandler, 1997). On the whole, people inadequately consider base rate information when estimating personal likelihood.

Researchers have identified several cognitive biases that can prompt errors in judgments about base rates. First, people sometimes misjudge probability by overusing the *availability heuristic*, a shortcut in decision making in which people base judgments of likelihood on how easily they can generate examples of the event. For instance, people often overestimate the likelihood of a fatal plane crash or homicide because they can easily bring to mind poignant instances of these events from the media (Slovic, Fischoff, & Lichtenstein, 1982). The availability heuristic results in overestimation of probabilities for very salient events (often due to recency, personal experience, or media coverage) and underestimation for less salient events, regardless of the actual rate of occurrence. One study demonstrated use of the availability heuristic by objectively measuring "availability" and relating it to perceived probability. The results showed that quicker speed of retrieval of an occurrence of the event corresponded to higher probability judgments for the event (MacLeod & Campbell, 1992).

Second, people sometimes misjudge probability because they overuse the *representativeness heuristic*, a shortcut in decision making that involves prototype matching. Specifically, people have prototypes for entities such as events, things, and

people, and base judgments of likelihood that a particular example falls within a category on how closely the example matches the prototype. In other words, people perceive their risk for an event as higher when they closely match their stereotypes of someone who would experience that event. For example, people's judgments of their likelihood of being mugged are influenced by how similar they think they are to their stereotype or prototype of the typical mugging victim. The more similar people perceive they are to the stereotype, the more likely they think they will be mugged.

People also hold stereotypes about the likelihood of certain kinds of events. For example, if people believe a negative event is serious, they will also perceive it as rare. The converse is also true – if people believe an event is rare, they will perceive it as more serious (Jemmott, Ditto, & Croyle, 1986). Although these beliefs may often be true (e.g., diseases that cause death *are* usually relatively rare), it is not always the case. For example, the human papilloma virus (HPV) can have serious consequences including infertility and cervical cancer, yet over 40% of college-age women are infected with the virus (Ho, 1998). Clearly, assumptions about the correlation between severity and risk can be misleading and even dangerous.

Third, people sometimes err in judgments of likelihood based on biased perceptions of control, perceiving that desirable items are more likely to occur when they are controllable than when they are uncontrollable. More specifically, people underestimate their risk for certain events when they believe that they can control the outcome. In addition, people tend to overestimate their personal control (McKenna, 1993; Klein & Kunda, 1993), leading them to be overly optimistic about their ability to avoid certain negative events. In a study by Greening and Chandler (1997) described

earlier, people perceived their likelihood of experiencing a variety of negative events as lower than another target's likelihood. For example, most people believe they are better than average drivers, and estimate their chances of getting in a car accident as less than average (McKenna, 1993). However, by definition most people *are* average drivers, and such flawed logic is likely a result of an overestimation of personal control. Thus, probability judgments based on perceptions of personal skill or control are likely to be underestimations. In addition, people may believe that they can control not only their actions, but also their outcomes. For example, smokers may believe they are less likely to get smoking related illnesses than other smokers because, unlike other smokers, they will not be smokers in the future (McKenna, Warburton, & Winwood, 1993; Lee, 1989).

In summary, a variety of factors can cause people to make errors in estimates of an event's base rate, or probability. First, people overuse the availability heuristic, over relying on salient examples to give them clues as to the likelihood of an event. Second, people overuse the representativeness heuristic, judging likelihood based on how closely an event or person matches their prototype for the event or person. Third, people underestimate their risk for negative events and overestimate the likelihood of desirable events when they overestimate how much control they have over their actions or the outcomes.

Avoiding Disappointment as a Source of Judgment Errors

The prior sources of error in likelihood judgment represent cognitive errors that arise from discounting or ignoring information that is hard to comprehend (underusing the base rate), or from overusing common shortcuts in making judgments (the availability and representativeness heuristics), or from attempts to calibrate judgments based on personal information (misperceptions of control). I propose another source of error that

is more motivational in flavor arising from a desire to reduce or avoid negative emotions such as disappointment.

Consistent with previous researchers, I view disappointment as the experience of outcomes falling short of expectations (Van Dijk, Zeelenberg, & van der Pligt, 1999; van Dijk & van der Pligt, 1997; Zeelenberg et al., 2000). People feel disappointed about shattered hopes or expectations, not simply about negative outcomes. In this way, disappointment can be distinguished from the similar emotions of sadness, anger, frustration, and regret (Zeelenberg et al., 2000). Disappointment is specifically associated with absence of a positive, hoped for outcome, whereas sadness, frustration, and anger are generally associated with the presence of a negative outcome (van Dijk, Zeelenberg, & van der Pligt, 1999). Disappointment can be further distinguished from its close relative, regret, in that people feel regret over *actions* and disappointment over *outcomes*, regardless of the precipitating actions (Zeelenberg, van Dijk, & Manstead, 1998).

The intensity of disappointment depends primarily how people's outcomes compare with their expectations. The more expectations exceed outcomes, the more intense the disappointment (van Dijk & van der Pligt, 1997). If people set their sights very high in anticipation of feedback, they are likely to be disappointed by almost any outcome. For example, a student who expects a perfect score on an exam will almost certainly be disappointed. On the other hand, very poor outcomes also make disappointment likely. A student receiving a failing grade is also likely to experience disappointment. Decision affect theory (DAT; Mellers et al., 1997) discusses the emotional consequences of the relationship between expectations and outcomes, noting

that how people feel about an outcome depends on the value of the unobtained outcome (was it better or worse than the outcome obtained?) and the perceived likelihood of receiving the outcome. For example, in a study presenting participants with gambling tasks with varying possible outcomes, subsequent affect depended not only on absolute loss or gain, but also on the possible alternative outcome and the probability of winning (Mellers et al., 1997, Study 1).

Given that the experience of disappointment depends on the relationship between outcomes and expectations, how can people avoid feeling disappointment? Even at the moment of truth, when all control over outcomes is gone, people can still moderate their disappointment over a negative outcome by lowering their expectations (Carroll, Dockery, & Shepperd, 2003; Shepperd, Oullette, & Fernandez, 1996, experiments 2 & 3; see also Gilovich, Kerr, & Medveck, 1993; Sackett, 2002; Sanna, 1999). This process of bracing for the worst results in pessimistic likelihood estimates at the point of feedback. For example, students in one study estimated their scores on an exam at four points in time: one month before the exam (Time 1), immediately after the exam (Time 2), one hour before receiving their exam grades (Time 3), and immediately before receiving the grades (Time 4). Students shifted, first from optimism before the exam to realism immediately after the exam was completed. The realism persisted at Time 3, when the students did not expect feedback for another hour. However, when the graded exams were being distributed, the students became pessimistic in their predictions (Shepperd et al., 1996).

Furthermore, not all outcomes are of equal importance. For example, a test for HIV could have far greater consequences than a test for Strep throat. Do people brace

equally for all events, regardless of importance? Research shows that people, in fact, become more pessimistic about an outcome with severe consequence than they do for one with only mild consequences (Taylor & Shepperd, 1998). Importance can also be in the eye of the beholder. What seems life-threatening to a high school student, for instance, is usually insignificant to a mature adult. If people see an outcome as unimportant or inconsequential for any reason, they will likely maintain realism or even optimism.

In summary, people experience disappointment when outcomes fall short of expectations. People can avoid disappointment by either changing their outcomes or change their expectations. At the moment of truth, however, people can no longer change the outcome. They can, however, change their expectations, avoiding disappointment by making a pessimistic prediction. However, people will only embrace pessimism to avoid disappointment over outcomes they view as important.

Outcome Likelihood and Bracing

Do people brace more for common events or for rare events? On first blush it might appear that reliance on the availability heuristic would lead people to brace more for common events. As discussed earlier, judgments of frequency are based on how easily examples come to mind. The pervasiveness of common events is likely to facilitate access to examples of common events, prompting greater estimates of frequency reliance on the availability heuristic leads to concern over salient events. For example, people who lived in the days of the influenza virus were certainly aware of the high numbers of fatalities and would likely have rated their chances of contracting the illness as high. People would have heard stories the influenza victims, accounts of how the virus devastated families, and what could happen to them if they did not take the appropriate precautions. However, although this argument is intuitively appealing, in reality the

commonality and availability of an event are distinct. As stated earlier, people frequently underestimate the likelihood of very common events. Thus, although some common events are also highly available in memory and the consequences easily imagined, equally often availability and commonality are unrelated.

Availability aside, people may brace more for common events because they have difficulty understanding probabilities. Instead of thinking of likelihood in terms of percentages or probabilities, people may think about likelihood in binary terms -- an event will either happen or it won't. Accordingly, for low probability events, people may conclude that because the event is rare, it will not happen. For high probability events, however, people may conclude that the event is inevitable even though there is some chance that it will not happen. Binary thinking would thus lead people to see common events as inevitable and rare events as entirely avoidable.

While some evidence suggests that people will brace more for common events than for rare events, other evidence suggests that people will brace more for rare events than for common events. First, a great deal of research shows that people underestimate the likelihood of common events and overestimate the likelihood of rare events (Fischoff, 1981; Johnson & Tversky, 1983; Lichtenstein, Slovic, Fischoff, Layman, & Combs, 1978; Pulford & Colman, 1996; Slovic, 1987; Weinstein, & Lyon, 1999; Rothman, Klein, & Weinstein, 1996; Brandstätter, Kühberger, & Schneider, 2002). For example, people underestimated their risk for common diseases, such as the human papilloma virus and chlamydia, and overestimated their risk for rare diseases such as chronic liver disease and cirrhosis (Rothman et al., 1996, see also Lichtenstein et al., 1978). The availability heuristic may account in part for these errors in estimation in that media attention to rare

diseases may prompt people to overestimate the base rate and, as a consequence, overestimate their risk (Slovic et al., 1982). Recent events make this point clear. Following the events of September 11, 2001, people became afraid to travel by air. Although, the risk of dying in a plane crash is extremely low, the vivid plane crashes appeared to have created the perception that travel by plane is highly dangerous and that fatal plane crashes are widespread.

Second, the disappointment literature reveals that people feel negative outcomes are particularly aversive when unexpected (Mellers et al., 1997; Shepperd & McNulty, 2002). The intensity of disappointment depends not only on the negativity of the outcome, but also on the expectations regarding the outcome (van Dijk & van der Pligt, 1997), and people would naturally have positive expectations when a negative event is unlikely to occur. In other words, if a negative event has a known base rate of 1%, people will probably be fairly certain that the event will not happen to them. On the other hand, if the negative outcome *were* to occur, it would be extremely disappointing because it is so rare and unexpected.

In sum, the question of how the commonality of an event moderates bracing has two possible answers. The first, and most intuitive prediction is that people brace more for common negative events. This possibility is supported by the possibility that people think in binary terms rather than considering probabilities and statistics. The second, opposing prediction is less intuitive and proposes that people brace more for rare negative events, and is supported by research on disappointment and probability judgments of common and rare events.

Overview and Hypotheses

The present study examines whether people brace more for common vs. uncommon negative outcomes by exploring responses to news of a possible financial setback. Specifically, participants believed that either 20% or 80% of students at their university would be affected by an error in the registrar's office that would result in those students receiving an unexpected bill.

Hypothesis 1: I hypothesized that participants in the common risk (80%) condition would estimate their likelihood of receiving a bill as greater than would participants in the rare risk condition (20%). Consequently, I expected to find a main effect of risk condition on risk estimates, with the mean of the common risk condition greater than the mean of the rare risk condition.

Hypothesis 2: In line with the finding that people will be pessimistic about outcomes that are important to them, I hypothesized that, when averaging across the common and rare events, participants who were financially needy would estimate their likelihood of receiving a bill as greater than would participants who were not needy. Consequently, I expected to find a main effect of need on risk estimates, with the mean of the high need participants greater than the mean of the low need participants.

Hypothesis 3: Among participants receiving news of a rare billing error, I predicted that high need participants would be more likely than low need participants to estimate that they would receive a bill. Among participants receiving news of a common billing error, I predicted that high need and low need participants would not differ in their risk judgments. These sets of means would manifest themselves as an interaction of need and risk level.

Hypothesis 4: Based on the literature on disappointment, I hypothesized that high need participants would be pessimistic in the rare risk condition but would be realistic in the common risk condition. Consequently, I predicted that a dependent t-test comparing the predictions of low need participants would reveal that predictions in the rare risk condition would differ significantly from the 20% baseline, but that predictions in the common risk condition would not differ significantly from the 80% baseline.

Hypothesis 5: I hypothesized that low need participants would be realistic in both the common risk and rare risk conditions. Consequently, I predicted that dependent t-tests comparing the predictions of low need participants in the rare and common risk conditions with their respective baselines (either 20% or 80%) would reveal no differences from the baselines.

CHAPTER 2
METHODS

Overview

The methods were adapted from those used Shepperd et al. (2000). This experiment examined students' reactions to the prospect of a financial loss after learning that a high or low percentage of students would be experience the loss. The greater disappointment experienced when a loss is unexpected led me to predict that people would be more pessimistic about the prospect of a loss, relative to the baseline, when they were told that few students would be affected than when they knew most students would be affected. Moreover, I expected that the effect would be due to greater pessimism on the part of financially needy students.

Participants

Introductory psychology students (N = 234) participated voluntarily as part of three class sections and were randomly assigned to either the high likelihood (80%) of receiving a bill condition or the low likelihood (20%) of receiving a bill condition.

Procedure

Participants in three classes received a description of a recently discovered billing error that would affect either 20% or 80% of the student body (see appendix A). Participants in each situation learned that students affected by the error would receive a $178 bill in three to four weeks and that failure to pay the bill would result in their records being flagged.

Participants then completed a questionnaire regarding their reactions to the news of the billing error. First, immediately after learning of the billing error, participants responded to five adjectives assessing state anxiety (calm, nervous, anxious, relaxed, worried). Participants responded to each item with how they felt "right now, at this moment," using a four-step scale (1 = *not at all*; 4 = *very much so*). These items were summed (after reverse coding) and divided by five to produce a measure of anxiety, range = 1 to 4, $M = 2.06$, $SD = 0.76$, Cronbach's $\alpha = .85$.

Second, participants completed the primary dependent measure, estimating their likelihood of receiving the bill. This item asked participants to use a 0 to 100% scale to estimate the probability that they would receive a bill.

Third, previous findings reveal that only financially needy students braced at the prospect of a financial blow (Shepperd et al., 2000). As a consequence, in the present study I assessed financial need by having participants complete the same six items assessing financial need used by Shepperd et al. (2000). Specifically, participants indicated (a) the extent to which they were on a tight financial budget (1 = *not on a tight budget*; 11 = *extremely tight budget*), (b) how much difficulty they had making ends meet (1 = *extreme difficulty*; 11 = *no difficulty*), (c) how much the bill would impact their lives (1 = *little impact*; 11 = *great impact*), (d) what effect the bill would have on their finances (1 = *little impact*; 11 = *great impact*), (e) how dependent they were on financial aid (1 = *not at all dependent*; 11 = *very dependent*), and (f) the extent a bill would affect their budget (1 = *not at all*; 11 = *a great deal*). Three of these items (a, b and e) assessed the extent to which participants faced financial challenges and the remaining two items assessed the financial consequences of receiving the bill. I combined the five items to

form a single index of need because collectively the five items provided a more complete picture of financial neediness. These five items were summed, after a reverse coding item b, and divided by five to form a single index with a potential range of 1 to 11, M = 5.63, SD = 2.70, Cronbach's α = .93. Of note, the first two items were assessed prior to the description of the billing error, and the last three items were assessed after the description of the error. It is possible that the risk manipulation influenced responses to the last three financial need items. However, an independent t-test revealed no difference between participants in the rare and common event conditions on their responses to these three items, $t(178) = 1.43$, $p > .15$. Participants were also asked if they currently were receiving a Bright Futures Scholarship (unique to public universities in Florida), if their tuition was pre-paid, and whether they were paying in-state or out-of-state tuition.

Fourth, participants reported the extent to which they were thinking about the financial difficulties that they would experience in the immediate future as a result of receiving a bill (1 = *not at all*; 11 = *a great deal*) and how disappointed they would be if they received a bill (1 = *not disappointed*; 11 = *extremely disappointed*). These two items were included to address possible processes mediating any effect of financial need on personal estimates. Finally, participants indicated if they estimated their personal risk to be more or less than the 20% or 80% given in the scenario, why they gave that estimate. They were given several options to choose from, including the option to write a reason other than the ones provided.

Of note, one version of the questionnaire included several additional items. However, these items did not yield significant results and are irrelevant to the purposes of this study.

CHAPTER 3
RESULTS

From the initial pool of 234 participants I omitted from analyses data from 54 participants because they doubted the authenticity of the billing error, a fact that was evident from their responses to the item, "I estimated that my probability of receiving a bill was…because…". More specifically, I omitted data from 28 participants because they indicated that they knew their bill well and would have noticed the error, 5 participants because they indicated that scholarships would cover all expenses, 8 because they did not believe that a tuition error had occurred, and 13 due to a clerical error that rendered their responses unusable. Of note, including the responses of these participants did not change my basic findings.

As noted earlier, data were collected from three classes. Preliminary analyses including class as a variable in the model revealed no main effects or interactions involving class. Consequently, I collapsed across class in all subsequent analyses.

Risk Estimates

Did risk judgments vary as a function of need and risk level? Figure 1 displays the probability estimates as a function of need (high or low) and risk condition (rare or common). My first three hypotheses were 1) participants in the common risk (80%) condition would estimate their likelihood of receiving a bill as greater than would participants in the rare risk condition (20%), 2) participants who were financially needy would estimate their likelihood of receiving a bill as greater than would participants who were not needy, across risk conditions, and 3) among participants receiving news of a

rare billing error, high need participants would be more likely than low need participants to estimate that they would receive a bill, but among participants receiving news of a common billing error, high need and low need participants would not differ in their risk judgments.

Consistent with Hypothesis 1, participants in the rare risk condition made lower estimates (M = 42.78, SD = 29.60) than did participants in the common risk condition (M = 56.91, SD = 32.44). That is, participants judged that they were at greater risk of receiving a bill when the billing error was common than when the billing error was relatively rare. For the purpose of illustrating the findings of my second hypothesis, I separated participants into high and low need groups using a median split of their

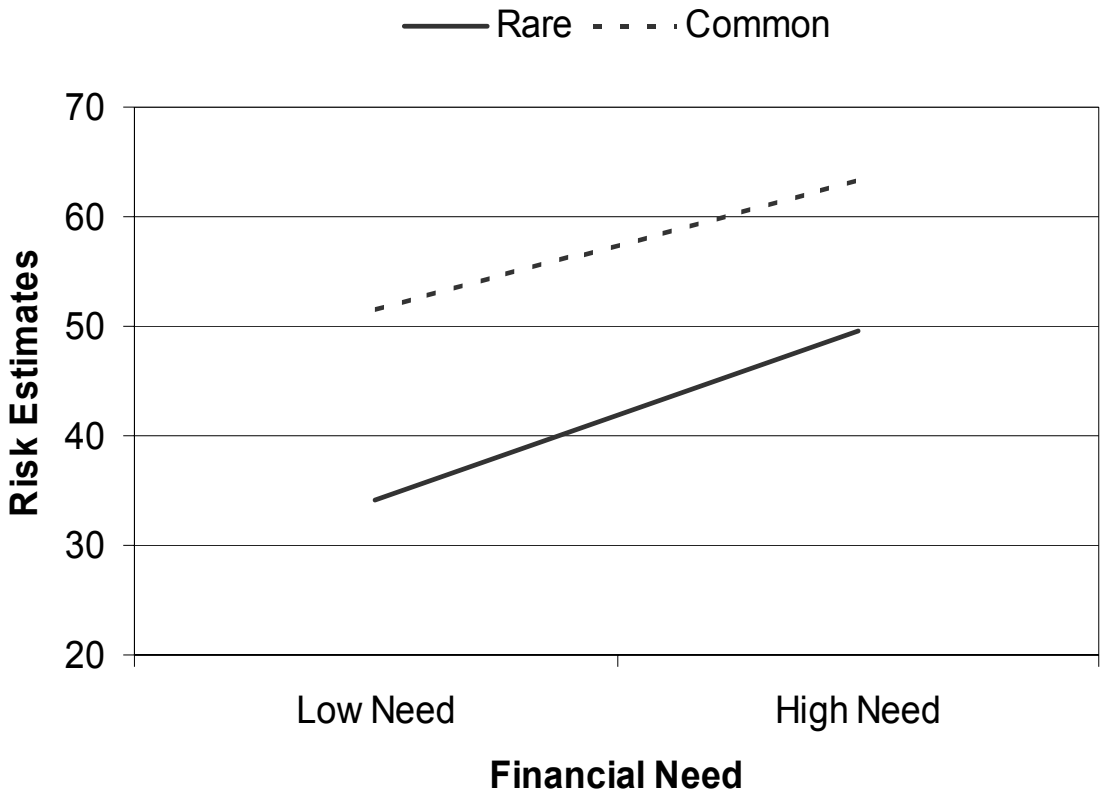

Figure 1. Risk estimates as a function of risk condition and need.

responses to my inventory of need (median = 5.4). Consistent with Hypothesis 2, high need participants made higher estimates (M = 55.63, SD = 29.03) than did low need participants (M = 43.52, SD = 33.36). That is, participants who were financially needy judged they were more likely to receive a bill than did participants who were not financially needy.

Contrary to Hypothesis 3, high need participants made higher estimates than did low need participants regardless of whether the objective likelihood of receiving a bill was high or low. That is, participants who were financially needy judged that they were at greater risk of receiving a bill both when the risk was low and when it was high. Although this finding is consistent with my prediction for the rare risk condition, in the common risk condition I expected participants to make similar predictions regardless of need.

We examined the first three hypotheses statistically using simultaneous multiple regression procedures in which Need (after centering), Risk (rare or common), and the Need by Risk interaction were entered as predictors. Analysis of the risk estimates revealed the predicted main effects of Risk, $F(1, 176) = 12.12$, $p < .001$, eta-squared = .06, and Need, $F(1, 176) = 8.38$, $p < .01$, eta-squared = .05, but did not reveal the predicted need by risk interaction, $F(1, 176) = .03$, $p = .85$, eta-squared = .0002.

We tested two additional hypotheses: 4) high need participants would be pessimistic in the rare risk condition but would be realistic in the common risk condition, and 5) low need participants would be realistic in both the common risk and low risk conditions. To test these hypotheses, I compared participants' estimates to the base rates I provided (either 20% or 80%). Figure 2 presents the results of these analyses. In all

conditions of need and risk, participants made estimates that differed significantly from the base rate. Specifically, both high need, $t(50) = 7.18$, $p < .0001$, and low need, $t(40) = 3.25$, $p < .01$, participants in the rare event condition estimated that their likelihood of receiving a bill was greater than the 20% base line they received ($M = 49.6$, $SD = 29.4$ and $M = 34.2$, $SD = 27.9$, respectively). Likewise, both high need, $t(39) = -3.90$, $p = < .001$, and low need, $t(47) = -5.51$, $p < .0001$, participants in the common event condition estimated that their likelihood of receiving a bill was less than 80% ($M = 63.4$, $SD = 27.0$ and $M = 51.5$, $SD = 35.8$, respectively). In short, all participants in the rare event condition were significantly pessimistic and all participants in the common event condition were significantly optimistic.

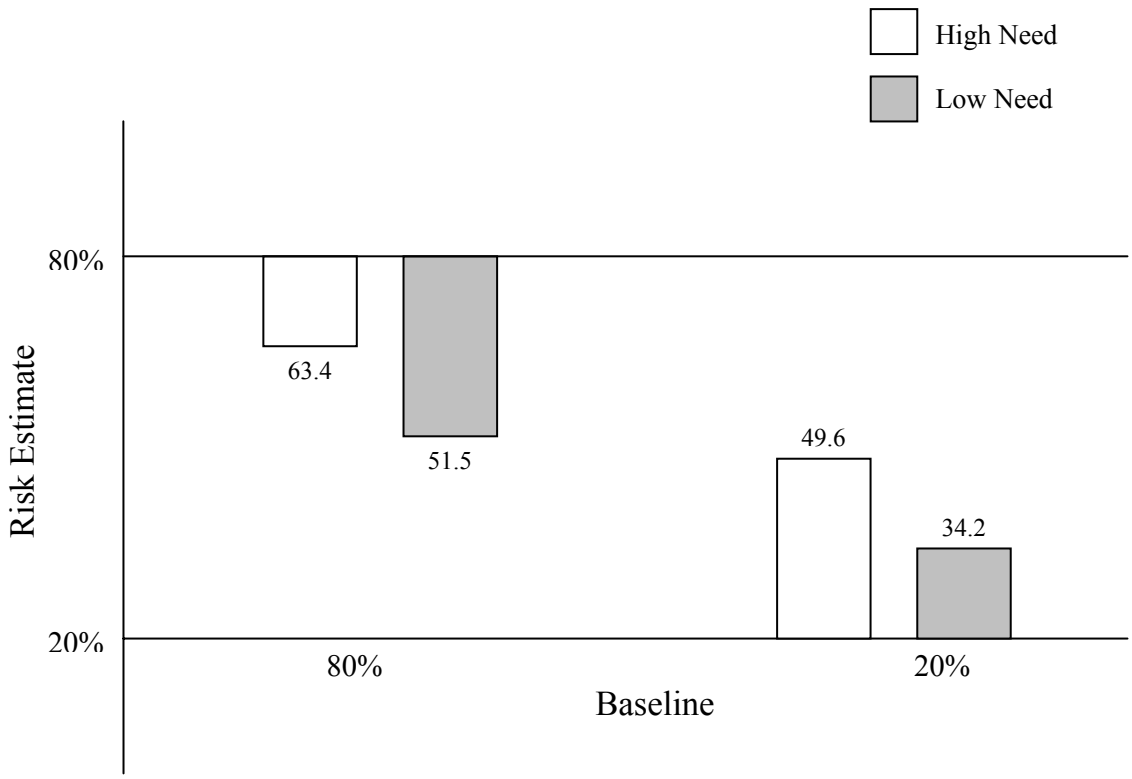

Figure 2. Mean risk estimates as a function of risk condition and need.

In sum, participants who were told that their risk of receiving a bill was 80% made higher personal risk estimates than did participants who were told that their risk was

20%. Furthermore, financially needy students in both risk conditions estimated their risk to be higher than did non-needy participants. Finally, participants in the rare risk condition were pessimistic and those in the common risk condition were optimistic, in both cases regardless of need. However, needy students were more pessimistic in the rare risk condition and less optimistic in the common risk condition than the non-needy students.

Are the Results Due to Outliers?

Two possible explanations for the present findings deserve investigation. A first possible explanation for my findings is that they resulted from the responses of a few outlying participants. Because participants could respond using a scale ranging from 0 to 100, there is considerable opportunity for variability in responses and thus a possibility that the findings were the result of outliers. To test this possibility, I conducted a Chi-square analysis of the number of participants who were optimistic, pessimistic, and realistic in each risk condition.

Table 1 presents the frequencies of low need and high need participants who were optimistic, realistic, and pessimistic, relative to the baseline of 20% or 80%. I categorized estimates below the baseline (i.e., below 20% for rare event and below 80% for common events) as optimistic, estimates equivalent to the baseline (20% in the rare event condition, 80% in the common event condition) as realistic, and estimates above the baseline as pessimistic. I compared the proportion of low need and high need participants who were optimistic, realistic, and pessimistic separately for the rare and common event conditions using chi-square analyses. The estimate frequencies for needy and non-needy participants differed significantly for rare events, $\chi^2(2, N = 92) = 16.78$, $p < .001$, but did not differ significantly for common events, $\chi^2(2, N = 88) = 1.78$, $p > .20$. I

next compared the proportion of participants in the common and rare event conditions who were optimistic, realistic, and pessimistic separately among needy and non-needy participants. The estimate frequencies for rare and common events differed significantly among both needy participants, $\chi^2(2, N = 91) = 62.37, p < .0001$, and non-needy participants, $\chi^2(1, N = 89) = 49.83, p < .0001$. In sum, although the pattern of findings did not differ significantly in one case, these findings suggest that the results of need and risk were not due to a few outlying responses.

Second, I found that people in the rare event condition were generally pessimistic, estimating a risk greater than 20%, and that participants in the common event condition were generally optimistic, estimating a risk less than 80%. It is possible that the high level of pessimism for rare events and the high level of optimism for common events is simply the result of participants in the rare condition having greater room to be pessimistic than optimistic, and the participants in the common condition having greater room to be optimistic than pessimistic. For example, in the rare event condition, participants could be pessimistic by choosing any risk level greater than 20% -- a choice of 80 possible values. However, they could be optimistic by choosing any risk level less than 20% -- a choice of only 20 possible values. In short, the difference in the extent to which participants in the rare and common events conditions displayed optimism and pessimism may be an artifact of how much opportunity they had to display optimism and pessimism.

To examine this possibility, I conducted Chi-square analysis on the number of participants in the common event condition that provided responses above and below 20%, and the number of participants in the rare event condition that provided responses

above and below 80%. The Chi-square analyses examined whether 80% of estimates in each condition fell into the eighty-percentage-point "space" and 20% in to the twenty-percentage point "space." In other words, I compared the expected frequencies (80% or 20% of estimates falling above or below the baseline) with the actual estimate frequencies. Estimates that equaled the base line were excluded from these analyses because they provided no information about systematic errors in responses. If participants were merely responding randomly or supplying responses where they had the greatest room to respond, then in the rare risk condition, 80% of responses should exceed 20% and 20% of responses should fall below 20%. Conversely, in the common risk condition 80% of responses should fall below 80% and 20% of responses should fall below 20%.

Table 2 displays the number of estimates above and below 20% and 80% for each condition. The distribution of responses was consistent with the random responding explanation in all four cases. For common events, neither the estimates of participants high in need, $\chi^2(1, N = 32) = 2.53$, $p = .11$, nor the estimates of participants low in need, $\chi^2(1, N = 39) = .78$, $p > .20$, differed from the expected pattern. Likewise, for rare events, neither the estimates of participants high in need, $\chi^2(1, N = 43) = .98$, $p > .20$, nor the estimates of participants low in need, $\chi^2(1, N = 29) = 2.21$, $p = .14$, differed significantly from the expected pattern. In sum, the distribution of responses was consistent with random responding in all four cases. This distribution of responses suggests that random responding could be responsible for participants' risk estimates.

Mediation Analyses

We included several measures of participants' reactions (i.e., anxiety, disappointment, and future thinking) to the possibility of receiving a financial blow with an eye toward investigating possible mediators of the effect of need on personal risk

estimates. Using procedures recommended by Baron and Kenny (1986), I first examined whether the three potential mediators predicted participants' predictions. Correlation analyses revealed significant relationships between participants' risk estimates and anxiety, $r(180) = .32$, $p < .0001$, disappointment, $r(179) = .20$, $p < .01$, and future thinking, $r(180) = .25$, $p < .001$, indicating that participants who felt more anxious, expected to experience more disappointment, and were thinking more about the future made greater risk estimates. Furthermore, financial need correlated significantly with anxiety, $r(180) = .40$, $p < .0001$, disappointment, $r(179) = .68$, $p < .0001$, and future thinking, $r(180) = .79$, $p < .0001$, indicating that needy students, compared to non-needy students were feeling more anxious, predict that they would experience greater disappointment if they received a bill, and were thinking more about the future consequences of receiving a bill.

We then conducted three separated regression analyses, one each for the three possible mediators. In each case, the mediator was entered into the model first, followed by need, risk condition and the need by risk condition interaction term. In all three cases, when the mediator was added, need no longer predicted participants' risk estimates, all Fs$(1, 175) < 1$, all ps $> .35$, but the mediator did, all Fs$(1, 175) > 8.13$, $p < .01$. Of note, the mediators in no way mediated the effect of risk condition on participants' estimates. Risk condition remained unchanged as a significant predictor of participants' risk judgments in all three cases, all Fs$(1, 175) > 11.16$, $p < .01$. The fact that all three variables completed mediated the effect of need on risk judgments suggests that the three mediators are all tapping a common underlying process.

Table 1. Frequency analyses of optimistic, realistic, and pessimistic risk estimates

	Optimistic		Realistic		Pessimistic	
Condition	Frequency	%	Frequency	%	Frequency	%
Common Event						
High Need	22	55%	8	20%	10	25%
Low Need	29	60%	8	17%	11	23%
Rare Event						
High Need	6	12%	8	16%	37	73%
Low Need	9	22%	12	29%	20	49%

Table 2. Frequency analyses of risk estimates

Condition	Above Baseline		Below Baseline	
	Frequency	%	Frequency	%
Common Event				
High Need				
Observed	10.0	31%	22.0	69%
Expected	6.4	20%	25.6	80%
Low Need				
Observed	10.0	26%	29.0	74%
Expected	7.8	20%	31.2	80%
Rare Event				
High Need				
Observed	37.0	86%	6.0	14%
Expected	34.4	80%	8.6	20%
Low Need				
Observed	20.0	69%	9.0	31%
Expected	23.2	80%	5.8	20%

CHAPTER 4
DISCUSSION

The goal of this study was to examine whether people brace differently when an event is common vs. rare. I predicted that participants would only brace for rare events, displaying pessimism about the likelihood of receiving a bill, and that only participants for whom a bill was particularly consequential would brace. The data generally supported the predictions, although some findings were unexpected.

Looking first at the effect of risk level (Hypothesis 1), participants who believed that 20% of students would receive a bill made lower personal predictions than did participants who believed that 80% of students would be affected. Furthermore, in line with Hypothesis 2 and previous findings that people are pessimistic about outcomes that are important to them, participants high in financial need made higher risk estimates than did low need participants.

Comparing risk estimates to the base line of 20% or 80% yielded an unexpected pattern of results. In the rare risk condition, I predicted that only high need participants would be pessimistic. However, the results show participants were pessimistic, regardless of need, about the likelihood of a rare event. Importantly, high need participants were more pessimistic than were low need participants. Nevertheless, low need participants were also bracing in their estimates. In the common risk condition, I predicted that all participants would be realistic about their risk of receiving a bill. However, the results show that participants were actually *optimistic*, regardless of need,

about the likelihood of a common event. Further analyses confirmed that these patterns were not a result of outliers.

Possible Explanations

How do I explain this pattern of optimism and pessimism? One possible explanation for the findings is that participants who were low in financial need were simply less engaged in the procedures because the consequences were unimportant to them, resulting in muted effects of risk level on their estimates. Although presumably low need participants saw the event as less important than did high need participants, the results do not point to this difference as the sole player in my findings. Only in the rare risk condition could I describe low need participants' estimates as a "muted" version of the effect found with high need participants. In the common risk condition, participants low in need actually deviated more from the base line than did high need participants, ruling out the possibility of a "muted effects" explanation.

A second possible explanation lies in the finding that people consistently overestimate the risk of rare events and underestimate the risk of common events (Fischoff, 1981; Johnson &Tversky, 1983; Lichtenstein, Slovic, Fischoff, Layman, & Combs, 1978; Pulford & Colman, 1996; Slovic, 1987; Weinstein, & Lyon, 1999; Rothman, Klein, & Weinstein, 1996; Brandstätter, Kühberger, & Schneider, 2002). This research suggests that when people do not know the base rate for an event, they make predictions based on available knowledge and what seems reasonable. People often have some sense of the true base rate, but this sense is imperfect. As a consequence, they underestimate how rare the rare events are and overestimate how common the common events are. If they knew the true base rates, their estimates would conform more to the base rates. Thus, perhaps students simply overestimated the likelihood of receiving a bill

when the risk was 20% and underestimated when the risk was 80% because they were making their best estimates based on their available knowledge of the event. However, this explanation falls apart in light of the fact that the participants in this study had knowledge of the exact base rate. Moreover, analyses of the distribution of participants who were optimistic, realistic, and pessimistic confirms that participants were not merely overestimating their risk when the event was rare and underestimating their risk when the event was common.

Third, perhaps participants were simply using the availability heuristic when making their estimates. With the availability heuristic, judgments of likelihood are based on how easily examples come to mind. Although available information such as past billing problems with the registrar's office may account for the differences in estimates between needy and non-needy participants, it does not explain the fact that both needy and non-needy participants overestimated their risk for a rare outcome and underestimated their risk for a common outcome. Alternatively participants may have employed the availability heuristic in conjunction with an anchoring and adjustment process. Specifically, participants may have used the base rates provided to them then adjusted their estimates from the base rates based on their experience. Thus, both needy and non-needy participants may have had some experience with billing problems and so they adjusted their estimates somewhat from the base rate. Prior research, however, has found that needy students experience more billing problems than do non-needy students (Shepperd et al., 2000). The greater experience may have prompted greater upward adjustment from 20% in the rare risk condition and less adjustment from 80% in the common risk condition. Although this explanation seems plausible, it does not explain

why participants, particularly participants high in need, supplied estimates below 80% in the common risk condition.

Fourth, perhaps participants had difficulty understanding the probabilities of 20% and 80%. Instead of judging their risk in terms of percentages, perhaps participants were thinking in binary terms, such that they interpreted a 20% risk as "I won't receive a bill" and an 80% risk as "I will receive a bill." Again, this explanation is easily refuted. If, in fact, participants were thinking in binary terms, they would have made estimates of 0% and 100%. Examination of the data reveals that less than 11% of participants made an estimate of 0%, and fewer than 6% of participants made estimates of 100%, hardly evidence for a binary thinking explanation.

A final possible explanation for the findings is that the estimates were randomly distributed and that the distribution of estimates reflects nothing more than people supplying estimates where they had the most room to estimate. Thus, participants were pessimistic in the rare event condition because they had more room to be pessimistic than optimistic. Conversely, people were optimistic in the common event condition because they had more room to be optimistic. As I noted earlier, the distribution of responses does not rule out this explanation. However, it is difficult to conceive why financial need would differentially impact random responses. Thus, although chance may play a role in the results, it seems that chance cannot fully account for all of the findings. In addition, the distribution of optimistic, pessimistic, and realistic responses does not support an explanation of the findings as due to outliers.

The Role of Disappointment

I proposed at the outset of this study that differences in people's risk estimates for rare and common events would result from differences in their expectations of

disappointment. Previous studies show that people experience disappointment to the extent that their expectations exceed their outcomes (van Dijk & van der Pligt, 1997). People can avoid feeling disappointed in one of two ways: a) improve outcomes, or b) lower expectations. In this study, the outcome, a bill of $178, was out of the participants' control. Therefore, keeping their expectations of a positive outcome low was the only option available to mitigate possible disappointment. Thus, perhaps participants were pessimistic about rare events to avoid being caught off guard. In contrast, perhaps participants did not need to be pessimistic about common events, for which their expectations were low from the start. Do my results support this proposal? Admittedly, the findings are mixed in their support for the role of disappointment. On the one hand, participants' reported expectations of feeling disappointment did not mediate the effect of risk condition on personal estimates. In fact, expected disappointment seemed to be a facet of financial need rather than a response to the risk manipulation. Thus, concerns with disappointment did not differentiate risk estimates for rare and common events.

On the other hand, a close look at the pattern of risk estimates may bring disappointment back into the picture. Ignoring, for a moment, participants' self-reported expectations for disappointment, the pattern of results conceptually supports the initial predictions. Concerning rare events, participants were pessimistic across levels of financial need, with high need participants displaying stronger pessimism than low need participants. Although I initially predicted realism from low need participants, their slight pessimism is understandable when one takes into account that the bill was for $178, a considerable sum of money for a college student. In other words, perhaps all

participants wanted to be prepared to some degree when the bill could catch them off guard.

Concerning common events, participants were optimistic across levels of financial need, with low need participants displaying stronger optimism than high need participants. Although I initially predicted realism from all participants in the common risk condition, varying degrees of optimism are not inconsistent with an explanation of disappointment's role in risk predictions. In this explanation, I propose that people do not want to be surprised by a negative event. When the baseline is high enough, people no longer need to embrace a pessimistic outlook to prepare themselves for disappointment because reality does that for them. In fact, people may even become slightly optimistic, taking advantage of the affective benefits of a positive outlook while still remaining relatively prepared for the worst. For example, participants who estimated 70% in the common risk condition may have concluded that this estimate sufficiently prepared them for the possibility of receiving a bill while offering the subjective comfort that their risk, while high, was still lower than the risk of others. In light of this adjustment to my original model of disappointment and risk, participants' estimates in the common risk condition fit quite well. Participants high in need sacrificed only a small degree of "preparedness" and became only slightly optimistic, while low need participants, for whom the consequences of the bill would be minor, adopted a relatively highly optimistic outlook.

In sum, a number of explanations fail to account for the results of this study. First, low need participants did not display a muted version of the high need participants' pattern of estimates. Second, participants did not simply overestimate low probabilities

and underestimate high probabilities. Third, participants were not responding to the salience of the bill. Fourth, participants did not interpret their risk of receiving a bill in binary terms. Fifth, the pattern of results was not due the presence of outliers. Sixth, although initial analyses suggests that the distribution of estimates might simply arise from participants were responding where there was the most room to respond, this explanation does not explain why participants high in need rated their risk as greater than did participants low in need. Finally, I propose an explanation based on the differing role of disappointment in predictions for rare and common events. Although this explanation is tentative and not without inconsistencies (i.e., the self-reported expectations of disappointment), it does capture the complete picture of my findings in a way that other explanations fail to do.

Limitations and Implications

The present study addressed a previously unexplored question about bracing for bad news. Although the results begin to paint a picture of the role of commonality and importance in people's perceptions of risk, I acknowledge several limitations of this study. As just discussed, the role of disappointment requires clarification in order to form conclusions about why people brace differently for common and rare events. I used a single item measure of expected disappointment, and this single item may have been insufficient to capture the complex experience of affective prediction. In fact, disappointment mediated the effect of financial need, suggesting that my measure of disappointment (along with anxiety and thoughts about the future) may have tapped something more related to importance than to an expected affective experience. Examining disappointment more fully would be an important goal for future research in this area.

In this study, financial need served as my measure of the importance of consequences. Although I believe that need was a valid measure of importance, future studies should seek to replicate my findings using an importance manipulation. Furthermore, this study used 20% and 80% as the definitions of rare and common, respectively. Commonality is a relative concept, and one could make the argument that 20% isn't very rare, or that 80% isn't common enough. I chose 20% and 80% for practical reasons, and it is the job of future research to determine the generality of my findings with varying degrees of commonality.

Conclusion

Do people brace sensibly? At first glance, my findings appear to suggest that people do not. Why would people be pessimistic about events that are unlikely to occur and optimistic about near certainties? Upon further examination, a possible answer emerges: perhaps people merely need to prepare "enough" for future outcomes. To illustrate this point, I return to the Washington sniper. Although people were at extremely low risk of becoming the next victim, they were prepared for the worst. Given the potential consequences of being unprepared, bracing for the worst served to keep people mindful of their risk. In contrast, consider the life of an Israeli living in Jerusalem. For the Israeli, danger lies in every unattended bookbag and every ride on the bus. In order to maintain sanity and proceed with necessary daily activities, the Israeli may actually embrace optimism in an otherwise paralyzing situation. Were the Washington, DC, residents being realistic? No. Is the optimistic Israeli being realistic? No. However, it seems possible that each form of unreality serves the purpose at hand.

APPENDIX A
QUESTIONNAIRE A

By completing this survey, you are giving consent for your answer to be used by researchers at the University of Florida. Your participation is voluntary and no compensation will be provided. You may skip any question you are uncomfortable answering. Your answers will be anonymous. Thank you for your help.

1. To what extent are you on a tight financial budget?

1 2 3 4 5 6 7 8 9 10 11
not on a tight budget — extremely tight budget

2. How much difficulty do you have making financial ends meet?

1 2 3 4 5 6 7 8 9 10 11
no difficulty — extreme difficulty

In processing the summer semester tuition and fees, the Office of the Registrar discovered that **20% of students** were underbilled by $178 for a one time Information Technology fee imposed this semester. The fee was not itemized on the bills so it is unlikely you would know if you were underbilled. This billing error did not result from any problems with financial aid. Thus, students receiving financial aid are no more likely than students not on financial aid to be affected by this billing error. The registrar's office intends to bill students affected by this error for the difference. The bills will be sent in 1 to 2 weeks. Because scholarships, grants, and loans have already been disbursed, students affected by this error will be required to pay the Registrar's office directly. Students who fail to pay the difference will have their records flagged and they will not be permitted to graduate or register for the next semester.

Read each of the following items. Circle the number that best indicates <u>how you feel right now, at this moment</u>.

	Not at all	Some-what	Moderately so	Very much so
1. calm	1	2	3	4
2. nervous	1	2	3	4
3. anxious	1	2	3	4
4. relaxed	1	2	3	4
5. worried	1	2	3	4

Please respond to the following questions:

3. Were you aware of this situation? Yes No

4. Using a scale from 0 to 100%, what is the probability that <u>you</u> will receive a $178 bill from the Registrar's office? Please give your **true "gut feeling"** in providing this estimate.

_____ %

5. If you received the bill, how much would this impact <u>your</u> life?

1 2 3 4 5 6 7 8 9 10 11
little impact — great impact

6. If you received the bill, how disappointed would you be?

1 2 3 4 5 6 7 8 9 10 11
not disappointed — very disappointed

7. If you received the bill, to what extent would this experience affect <u>your</u> budget?

1 2 3 4 5 6 7 8 9 10 11
little effect — great effect

8. If you received the bill, what effect would this experience have on <u>your</u> finances?

1 2 3 4 5 6 7 8 9 10 11
little effect — great effect

9. To what extent were you thinking ahead about difficulties the bill would present in the immediate <u>future</u>?

1 2 3 4 5 6 7 8 9 10 11
not at all — very much

10. Do you have pre-paid tuition? Yes No

11. Your sex (circle one): Male Female

12. Are you currently a Bright Futures Scholarship recipient or do receive some other form of scholarship that covers your tuition expenses? Yes No

13. If you estimated that your probability is less than 20% on item 5, check the reason below that best applies to you. Choose only ONE response.

I estimated that my probability of receiving a bill is <u>LESS than</u> 20% because:

_____ a. I know pretty well what my tuition and fee charges should be and I would have noticed an error before.

_____ b. I feel pretty lucky and believe that this sort of error won't happen to me.

_____ c. When these sorts of errors have occurred in the past, it usually happened to other people but not me.

_____ d. I think it's wise to be optimistic and not to imagine the worst. After all, if you think bad things will happen to you, then they often do happen.

_____ e. Other (please specify): _____

_____

_____

14. If you estimated that <u>your</u> probability is <u>greater than</u> 20% on item 5, check the reason below that best applies to you. Choose only <u>ONE</u> response.

I estimated that my probability of receiving a bill is <u>GREATER than</u> 20% because:

_____ a. I know pretty well what my tuition and fee charges should be and I had already suspected or detected the error myself.

_____ b. I am bracing for the worst. Bad news feels worse when it is unexpected. I'm expecting a bill so I'll be ready for it.

_____ c. I always seem to get hit by unexpected expenses or bills. I'm sure this is just another instance.

_____ d. The university has made mistakes on my bills in the past and they have probably made a mistake in my case again.

_____ e. Other (please specify): _____

_____

_____

15. If you estimated that <u>your</u> probability is <u>equal to</u> 20% on item 5, then place a check here: ___

APPENDIX B
QUESTIONNAIRE B

By completing this survey, you are giving consent for your answer to be used by researchers at the University of Florida. Your participation is voluntary and no compensation will be provided. You may skip any question you are uncomfortable answering. Your answers will be anonymous. Thank you for your help.

1. To what extent are you on a tight financial budget?

1	2	3	4	5	6	7	8	9	10	11
not on a tight budget										extremely tight budget

2. How much difficulty do you have making financial ends meet?

1	2	3	4	5	6	7	8	9	10	11
no difficulty										extreme difficulty

In processing the summer semester tuition and fees, the Office of the Registrar discovered that **80% of students** were underbilled by $178 for a one time Information Technology fee imposed this semester. The fee was not itemized on the bills so it is unlikely you would know if you were underbilled. This billing error did not result from any problems with financial aid. Thus, students receiving financial aid are no more likely than students not on financial aid to be affected by this billing error. The registrar's office intends to bill students affected by this error for the difference. The bills will be sent in 1 to 2 weeks. Because scholarships, grants, and loans have already been disbursed, students affected by this error will be required to pay the Registrar's office directly. Students who fail to pay the difference will have their records flagged and they will not be permitted to graduate or register for the next semester.

Read each of the following items. Circle the number that best indicates <u>how you feel right now, at this moment</u>.

	Not at all	Some-what	Moderately so	Very much so
1. calm	1	2	3	4
2. nervous	1	2	3	4
3. anxious	1	2	3	4
4. relaxed	1	2	3	4
5. worried	1	2	3	4

Please respond to the following questions:

3. Were you aware of this situation? Yes No

4. Using a scale from 0 to 100%, what is the probability that <u>you</u> will receive a $178 bill from the Registrar's office? Please give your **true "gut feeling"** in providing this estimate.

_____ %

5. If you received the bill, how much would this impact <u>your</u> life?

1	2	3	4	5	6	7	8	9	10	11
	little impact									great impact

6. If you received the bill, how disappointed would you be?

1	2	3	4	5	6	7	8	9	10	11
	not disappointed									very disappointed

7. If you received the bill, to what extent would this experience affect <u>your</u> budget?

1	2	3	4	5	6	7	8	9	10	11
little effect										great effect

8. If you received the bill, what effect would this experience have on <u>your</u> finances?

1	2	3	4	5	6	7	8	9	10	11
little effect										great effect

9. To what extent were you thinking ahead about difficulties the bill would present in the immediate <u>future</u>?

1	2	3	4	5	6	7	8	9	10	11
not at all										very much

10. Do you have pre-paid tuition? Yes No

11. Your sex (circle one): Male Female

12. Are you currently a Bright Futures Scholarship recipient or do receive some other form of scholarship that covers your tuition expenses? Yes No

13. If you estimated that your probability is less than 80% on item 5, check the reason below that best applies to you. Choose only ONE response.

I estimated that my probability of receiving a bill is <u>LESS than</u> 80% because:

_____ a. I know pretty well what my tuition and fee charges should be and I would have noticed an error before.

_____ b. I feel pretty lucky and believe that this sort of error won't happen to me.

_____ c. When these sorts of errors have occurred in the past, it usually happened to other people but not me.

_____ d. I think it's wise to be optimistic and not to imagine the worst. After all, if you think bad things will happen to you, then they often do happen.

_____ e. Other (please specify): _____

_____

_____

14. If you estimated that <u>your</u> probability is <u>greater than</u> 80% on item 5, check the reason below that best applies to you. Choose only <u>ONE</u> response.

I estimated that my probability of receiving a bill is <u>GREATER than</u> 80% because:

_____ a. I know pretty well what my tuition and fee charges should be and I had already suspected or detected the error myself.

_____ b. I am bracing for the worst. Bad news feels worse when it is unexpected. I'm expecting a bill so I'll be ready for it.

_____ c. I always seem to get hit by unexpected expenses or bills. I'm sure this is just another instance.

_____ d. The university has made mistakes on my bills in the past and they have probably made a mistake in my case again.

_____ e. Other (please specify): _____

_____

_____

15. If you estimated that <u>your</u> probability is <u>equal to</u> 20% on item 5, then place a check here: ___

LIST OF REFERENCES

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173-1182.

Brandstätter, E., Kühberger, A., & Schneider, F. (2002). A cognitive-emotional account of the shape of the probability weighting function. *Journal of Behavioral Decision Making, 15,* 79-100.

Bruine de Bruin, W., Fischhoff, B., Millstein, S. G., & Halpern-Flesher, B. L. (2000). Verbal and numerical expressions of probability: "It's a fifty-fifty chance." *Organizational Behavior & Human Decision Processes, 81,* 115-131.

Carroll, P., Dockery, K., & Shepperd, J. A. (2003). *Exchanging optimism for pessimism in personal predictions*. Unpublished manuscript.

Fischoff, B. (1981). *Acceptable risk*. New York: Cambridge University Press.

Gilovich, T., Kerr, M., & Medvec, V. H. (1993). Effect of temporal perspective on subjective confidence. *Journal of Personality and Social Psychology, 64,* 552-560.

Greening, L., & Chandler, C. C. (1997). Why it can't happen to me: The base rate matters, but overestimating skill leads to underestimating risk. *Journal of Applied Social Psychology, 27,* 760-780.

Ho, G. Y., Bierman, R., Beardsley, L., Chang, C. J., & Burk, R. D. (1998). Natural history of cervicovaginal papillomavirus infection in young women. *New England Journal of Medicine, 338*(7)*,* 423-428.

Jemmot, J. B., Ditto, P. H., & Croyle, R. T. (1986). Judging health status: Effects of perceived prevalence and personal relevance. *Journal of Personality & Social Psychology, 50,* 899-905.

Kahneman, D., & Tversky, A. (1972). Subjective probability: A judgment of representativeness. *Cognitive Psychology, 3,* 430-454.

Klein, W. M., & Kunda, Z. (1994). Maintaining self-serving social comparisons: Biased reconstruction of one's past behaviors. *Personality and Social Psychology Bulletin, 19,* 732-739.

Lee, C. (1989). Perceptions of immunity to disease in adult smokers. *Journal of Behavioral Medicine, 12,* 267-277.

Lichtenstein, S., Slovic, P., Fischoff, B., Layman, M., & Combs, B. (1978). Judged frequency of lethal events. *Journal of Experimental Psychology: Human Learning and Memory, 4,* 551-578.

MacLeod, C., & Campbell, L. (1992). Memory accessibility and probability judgments: An experimental evaluation of the availability heuristic. *Journal of Personality and Social Psychology, 63,* 890-902.

McKenna, F. P. (1993). It won't happen to me: Unrealistic optimism or illusion of control. *British Journal of Psychology, 84,* 39-50.

McKenna, F. P., Warburton, D. M., & Winwood, M. (1993). Exploring the limits of optimism: The case of smokers' decision making. *British Journal of Psychology, 84,* 389-394.

Mellers, B. A. (2000). Choice and the relative pleasure of consequences. *Psychological Bulletin, 126,* 910-924.

Mellers, B. A., Schwartz, A., Ho., K., & Ritov, I. (1997). Decision affect theory: Emotional reactions to the outcomes of risky options. *Psychological Science, 8,* 423-429.

Nisan, M. (1972). Dimension of time in relation to choice behavior and achievement Orientation. *Journal of Personality and Social Psychology, 21,* 175-182.

Nisan, M. (1973). Perception of time in lower-class black students. *International Journal of Psychology, 8,* 109-116.

Pulford, B. D., & Colman, A. M. (1996). Overconfidence, base rates and outcome positivity/negativity of predicted events. British Journal of Psychology, 87, 431-445.

Rothman, A. J., Klein, W., & Weinstein, N. D. (1996). Absolute and relative biases in estimations of personal risk. *Journal of Applied Social Psychology, 26,* 1213-1236.

Sackett, A. M. (2002). *Optimism and accuracy in performance predictions: An experimental test of the self-protection hypothesis.* Unpublished Masters Thesis, Yale University, New Haven, CT.

Sanna, L. J. (1999). Mental simulations, affect, and subjective confidence: Timing is everything. *Psychological Science*, *10*, 339-345.

Shepperd, J. A., Findley-Klein, C., Kwavnick, K. D., Walker, D., & Perez, S. (2000). Bracing for loss. *Journal of Personality and Social Psychology, 78,* 620-634.

Shepperd, J. A., & McNulty, J. K. (2002). The affective consequences of expected and unexpected outcomes. *Psychological Science, 13,* 85-88.

Shepperd, J. A., Ouellette, J. A., & Fernandez, J. K. (1996). Abandoning unrealistic optimism: Performance estimates and the temporal proximity of self-relevant feedback. *Journal of Personality and Social Psychology, 70,* 844-855.

Slovic, P. (1987). Perception of risk. Science, 236, 280-285

Slovic, P., Fischoff, B., & Lichtenstein, S. (1982). Facts versus fears: Understanding perceived risk. In D. Kahneman, P., Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp.463-489). New York: Cambridge University Press.

Taylor, K. M., & Shepperd, J. A. (1998). Bracing for the worst: Severity, testing and feedback as moderators of the optimistic bias. *Personality and Social Psychology Bulletin, 24,* 915-926.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty. *Science, 185,* 1124-1131.

Tversky, A., & Kahneman, D. (1982). Evidential impact of base rates. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp.153-160). New York: Cambridge University Press.

Van Dijk, W. W., & van der Pligt, J. (1997). The impact of probability and magnitude of outcome on disappointment and elation. *Organizational Behavior and Human Decision Processes, 69,* 277-284.

Van Dijk, W. W., Zeelenberg, M., & van der Pligt, J. (1999). Not having what you want versus having what you do not want: The impact of type of negative outcome on the experience of disappointment and related emotions. *Cognition and Emotion, 13,* 129-148.

Weinstein, N. D., & Lyon, J. E. (1999). Mindset, optimistic bias about personal risk and health-protective behavior. *British Journal of Health Psychology, 4,* 289-300.

Zeelenberg, M., van Dijk, W. W., & Manstead, A. S. R. (1998). Reconsidering the relation between regret and responsibility. *Organizational Behavior and Human Decision Processes, 74,* 254-272.

Zeelenberg, M., van Dijk, W. W., Manstead, A. S. R., & van der Pligt, J. (2000). On bad decisions and disconfirmed expectancies: The psychology of regret and disappointment. *Cognition and Emotion, 14,* 521-541.

BIOGRAPHICAL SKETCH

Katharine Dockery, born Katharine Sweeny, was born in 1980 in Burlington, Vermont. In 2002 she received a Bachelor of Science degree in psychology at Furman University, graduating summa cum laude. She then began her graduate education in social psychology at the University of Florida, where she will receive her Master of Science degree in December of 2003 and intends to receive her Doctorate of Philosophy in 2006.