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# Affect, risk perception and future optimism after the tsunami disaster

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**Abstract**

Environmental events such as natural disasters may influence the public's affective reactions and decisions. Shortly after the 2004 Tsunami disaster we assessed how affect elicited by thinking about this disaster influenced risk perceptions and future time perspective in Swedish undergraduates not directly affected by the disaster. An experimental manipulation was used to increase the salience of affect associated with the disaster. In Study 1 we found that participants reminded about the tsunami had a sense that their life was more finite and included fewer opportunities than participants in the control condition (not reminded about the tsunami). In Study 2 we found similar effects for risk perceptions. In addition, we showed that manipulations of ease-of-thought influenced the extent to which affect influenced these risk perceptions, with greater ease of thoughts being associated with greater perceived risks.

Keywords: affect, risk perception, disaster.

## 1 Introduction

Major societal events such as natural disasters and terrorist attacks influence our thoughts and feelings. In the face of a major environmental event, many people tend to react with emotion and emotion-laden decisions (Lerner et al., 2003). The 2004 East Asian tsunami disaster had a profound psychological impact on many countries, not only those that were directly hit by the tsunami waves. Sweden (pop. 9 million) had an unusually high number of tourists visiting the area at the time of the disaster, resulting in over six hundred Swedes being killed or missing. The Tsunami disaster was therefore considered a major national tragedy in Sweden (Grandien, Nord, & Strömbäck, 2005). A consequence of this tragedy, and the media attention it received (Mann, 2007), was that many Swedes felt deeply involved and saddened (Grandien et al., 2005).

The feelings elicited by such an event may also have an impact on everyday decisions. Previous research in judgment and decision making has shown that preferences are constructed on the basis of various contextual factors (such as incidental affect or mood; Lichtenstein & Slovic, 2006; Peters, 2006; Johnson & Tversky, 1983) and people tend to rely on their affective reactions when making decisions (Slovic et al., 2002; see also Pfister & Böhm, this issue).

Affect is defined here as the specific quality of goodness or badness experienced as a feeling state (with or without awareness) and demarcating a positive or negative quality of a stimulus.[1] Reliance on such feelings in judgment and decision making has earlier been described as an affect heuristic (Finucane et al., 2000; Slovic et al., 2002). Most previous research on affect and decision making has focused on integral affect (affect attached to mental representations of objects; Slovic et al., 2002). However, in many judgments other sources of affect are also present. A large number of studies shows that affective states that are unrelated to the judgmental target influence judgments and decisions nonetheless (Isen, 1997;

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[1] Affective responses can occur rapidly and automatically, and may be elicited by stimulus properties, physical stimulation, perception of one´s immediate environment, thoughts and memories, or proprioceptive cues (Schwarz & Clore, 2007). Mood, one form of affect, is a relatively stable and mild affective state that does not have a specific focal object (Morris, 1999), whereas emotions, another form of affect, are more intense and are of shorter duration. Incidental affect is an affective state, such as a mood state, brought about by environmental or intrinsic stimulation. Integral affect, on the other hand, is elicited by perceiving the target or a mental representation of the target.

Schwarz & Clore, 1983). In a famous example, Johnson and Tversky (1983) found that incidental affect (i.e., a mood state) induced by reading a newspaper article influenced subsequent risk judgments.

However, the effect of incidental affect on judgments is not a stable, unchangeable or unavoidable fact; it should rather be seen as a constructive process where the individual tries to determine if their affective reactions to a target are a reliable and relevant source of information (Clore & Huntsinger, 2007). At the core of this argument lies the notion that when asked to make an evaluative judgment, individuals seek information to determine how they should make this judgment. People tend to use whatever information is available to them at the time of making a decision (Clore & Huntsinger, 2007; Schwarz, 2004). In the absence of other relevant or more salient information, people use their affective reactions to the target to evaluate the object (Pham, 1998; see also deVries, Witteman & Holland, this issue). People in positive moods tend to evaluate objects more favorably than participants in a negative mood (mood-congruence; Schwarz & Clore, 1983; but see Andrade, 2005 for a discussion about mood-incongruent effects). One important point here is that people incorrectly attribute their incidental moods as a reaction to the target. This misattribution can be corrected or changed by introducing information that questions the diagnostic value of the affective reaction for the judgment. For instance, in Schwarz and Clore's (1983) study participants were given a simple reminder about the cause (sunny vs. cloudy weather) of their moods which resulted in mood no longer influencing judgments of well-being. Importantly though, it was the diagnostic value of the affective reaction for the judgment task, not the affective reaction itself, that was affected by this manipulation (Schwarz, 2004).

Incidental mood is only one of many sources of experiential information that can be used in judgments. The meta-cognitive experience of the ease or fluency of information processing has been shown to be an important experiential factor informing judgments and decisions (Schwarz & Clore, 2007). In a study on the effect of fluency on decision making, participants were more likely to defer choice when they generated more reasons for making the choice (thus decreasing fluency; Novemsky, Dhar, Schwarz & Simonson, 2007). Studies on perceptual fluency (the subjective ease of perceptual processing) have found that if the color in which a statement is printed makes it easy to read, this can impact the perceived truthfulness of the statement (with an easier-to-read font leading to a higher probability of endorsing a statement as true; Reber & Schwarz, 1999). Thus, as Schwarz (2004, p. 341) notes, it seems that "*the subjective experiences that accompany our thought processes are informative in their own right.*" Consequently, meta-cognitive feelings may further modulate the impact of affect on judgments. Supporting this, a study by Lerner and Gonzalez (2005) showed that fluency manipulations influenced the effect of specific emotions on risk perception.

The conceptual model guiding this research can be described in the following way: 1) We expect that major environmental events such as a natural disaster may influence experienced affect even among individuals not directly affected by the disaster. 2) The experienced affect will, in turn, impact various affective and cognitive judgments. 3) The effects of affect incidental to the judgment task can be diminished by introducing information (such as fluency manipulations) that questions the diagnostic value of experienced feelings for judgments. Specifically, we tested the prediction that affect elicited by thinking about a recent major natural disaster would influence judgments of well-being (Schwarz & Clore, 1983) and future pessimistic/optimistic thinking (Wright & Bower, 1992) in a mood-congruent manner (Schwarz & Clore, 2007). Previous research has documented the effects of laboratory-induced mood using standardized mood induction procedures (autobiographical recall or affect-inducing scenarios). We extended this research by inducing affect through a procedure in which participants were asked to think about a recent and relevant major environmental disaster.

Our research strategy compared ratings of affect and ratings of future personal and societal events in two groups of participants, one reminded about the tsunami and a control group. We hypothesized that reminding participants about the tsunami would elicit negative affect associated with the event. We further anticipated that this affect would spill over to judgments of well-being as well as optimistic/pessimistic thinking.

In Study 1, participants in both conditions completed a measure of future pessimism (future time perspective (FTP) scale, Lang & Carstensen, 2002) and rated their well-being (Pavot & Diener, 1993). The FTP scale was originally developed as an individual difference measure of the perceived time remaining in life (Carstensen, 2006). In Study 1, we used the FTP scale as a dependent variable and we expected to find that individuals reminded about the tsunami perceived life as more finite and limited than participants in a control condition. In Study 2, half of the participants in the tsunami-remind condition were given an additional experimental manipulation (ease-of-thought-generation; Schwarz, 2004). Participants then made risk estimates of various future positive and negative events (Lerner & Gonzalez, 2005). We expected that this manipulation of the ease with which examples of other disasters comes to mind would influence the diagnostic value of feelings for judgments of future risk, but it does not change the feelings themselves.

# 2 Study 1. Future time perspective

As people grow older they experience time as more limited, closed, and finite (Carstensen, 2006). However, chronological age is not the only determinant of how the future is perceived. For instance, Fung and Carstensen (2006) showed that younger adults prioritized emotional goals, a behavior indicative of a limited time perspective, when facing a major environmental event (i.e., the SARS epidemic). Building on these findings, we hypothesized that participants reminded about the tsunami would experience a more limited future time perspective than participants in a control condition. In addition, we expected that participants reminded about the tsunami would experience stronger negative affect and lessened well-being compared to the control group and that this difference would account for the hypothesized difference between conditions.

## 2.1 Method and measures

Twenty-eight men and 77 women with a mean age of 25.3 (SD = 4.1) participated. Data were collected in Sweden during the Spring of 2005, roughly 3–5 months after the tsunami disaster. The tsunami was still very actively covered by the media in Sweden during this time (Mann, 2007).

To manipulate access to feelings, we used an experimental approach resembling the techniques developed by Lerner et al. (2003) and studies on affective imagery and decision making (Slovic, 1995). In a between-groups design, half of the participants were asked to write down the first three images that came to mind when hearing the word "tsunami". The other half of the participants (the control condition) were asked to produce images to a neutral word ("round"). Pre-testing showed that this priming manipulation made affect[2] associated with the tsunami disaster salient (Siemer & Reisenzein, 1998) and provided us with the opportunity to study the relative impact of affect in the two conditions.

After the experimental manipulation, participants responded to a series of questions. To measure future time perspective, a version of the FTP scale (Lang & Carstensen, 2002) was used. The measure contains eight items: 1. Many opportunities await me in the future. 2. My future is filled with possibilities. 3. Most of my life lies ahead of me. 4. My future seems infinite to me. 5. There is plenty of time left in my life to make new plans. 6. I have the sense that time is running out. 7. There are only limited possibilities in my future. 8. As I get older, I begin to experience time as more limited. Participants responded to the question "How well does each question describe you" by circling a number between 1 (not at all) and 7 (very well). The measure was reverse-scored where appropriate and averaged across the eight items (Cronbach's alpha = .77) into a single index; higher values indicated a more closed or limited future time perspective. In addition, the Pavot and Diener (1993) subjective well-being scale as well as mood and specific-emotion scales (Västfjäll et al., 2002) were administered. The mood scale consisted of six adjective pairs found in previous research (Västfjäll et al., 2002) to tap valence and activation, respectively. Sleepy-awake, dull-peppy, and passive-active were used to define the activation scale, displeased-pleased, sad-glad, and depressed-happy were used to define the valence scale. Participants were asked to circle a number (range = $-4$ to 0 to +4) that best corresponded with their current feeling. The three adjectives tapping each dimension were averaged into two index variables corresponding to valence and activation, respectively.

The specific emotion scale consisted of the adjectives sad, depressed, anxious, worried, afraid, and angry. Participants were asked to rate how intensely they felt each emotion by circling a number on a unipolar scale anchored by 0 (not at all) to 6 (very much).

Table 1: Means and inferential statistics (df = 102) for mood and specific emotion ratings obtained in the experimental and control conditions.

| Measure | Tsunami-remind | Control | $t$ | $p <$ |
|---|---|---|---|---|
| Mood scales | | | | |
| Valence | $-1.11$ | 0.67 | 13.20 | .01 |
| Activation | 1.33 | 0.20 | 9.16 | .01 |
| Emotion scales | | | | |
| Sad | 2.71 | 0.99 | 14.42 | .001 |
| Depressed | 2.14 | 1.08 | 8.11 | .001 |
| Anxious | 2.34 | 1.02 | 6.92 | .01 |
| Afraid | 1.99 | 0.53 | 9.40 | .001 |
| Worried | 2.25 | 0.87 | 10.65 | .001 |
| Angry | 2.04 | 0.46 | 15.19 | .001 |

## 2.2 Results and discussion

To show that affect indeed was more negative in the tsunami-remind condition than in the control condition, the mood and emotion ratings were submitted to a series of independent t-tests. Negative affect ratings were significantly higher in the experimental condition suggesting that the manipulation was successful (see Table 1).

[2]Pre-testing showed that this procedure in general heightened negative feelings such as sadness, depression, and anxiety and no specific emotion was more salient.

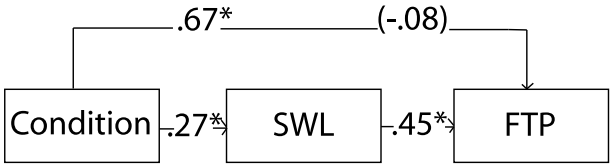


Figure 1: Mediation analysis of Condition and Subjective well-being (SWL) on Future Time Perspective (FTP).

In order to test the primary research hypotheses, that well-being should be lower and FTP more limited in the tsunami-remind condition than in the control condition, two contrasts were performed. As expected, participants reminded about the tsunami rated their overall well-being as lower ($M$ = 3.81) than participants in the control condition ($M$ = 4.50), $t(103) = 9.09$, $p < .001$. Similarly, FTP was more limited ($M$ = 4.80) in the tsunami-remind condition than in the control condition ($M$ =3.22), $t(103) = 2.92$, $p < .001$.

The finding that the experimental manipulation increased negative affect which, in turn, decreased overall subjective well-being is a replication of Schwarz and Clore's findings (1983). The result that future time perspective changed with experienced affect is, however, a novel demonstration. To further show that affect influenced FTP judgments, we conducted a mediation analysis. Because both affect and well-being ratings were more negative in the experimental condition, we decided to test whether well-being (as an overall proxy of affect) mediated the effect of condition on FTP. The choice of well-being ratings as an overall measure of affect was motivated by literature on happiness that suggested that current feelings are integrated into more global assessments of affective well-being (Schwarz & Clore, 1983; Schwarz & Strack, 1999). The subjective well-being measure however includes aspects other than experienced feelings (e.g., life circumstances; Diener, 1984; Pavot & Diener, 1993) and when used as a variable in a mediation analysis it may be more conservative than ratings of current affect.[3] To test mediation, a series of regression models were estimated (Baron & Kenny, 1986). To examine the degree of mediation, we first regressed subjective well-being on the condition variable, then regressed FTP on the condition variable, and finally regressed FTP on both the condition variable and subjective-well being. The degree to which the influence of condition on FTP is reduced when accounting for the influence of subjective well-being expresses the degree of mediation.

The results of these regression analyses are depicted in Figure 1. Subjective well-being mediated the influence of condition on FTP. Specifically: (a) condition predicted SWL ($F(1,103) = 8.59$, regression weight = .27, $p < .05$); (b) condition predicted FTP ($F(1,103) = 82.69$, regression weight = .67, $p < .01$); (c) Subjective well-being predicted FTP ($F(1,103) = 25.91$, regression weight = .45, $p < .01$); and (d) the condition variable dropped significantly when controlling for Subjective well-being ($F(2,102) = 6.37$, regression weight = $-.08$, *ns*.).

Taken together, these findings suggest that thinking about a major environmental event such as the Tsunami disaster elicits negative feelings (as indexed by specific emotion/mood ratings as well as well-being ratings). These feelings in turn influence how people think about and view their future possibilities. Negative feelings lead individuals to be more pessimistic, viewing time as more limited and holding fewer possibilities. Although the FTP scale was originally developed as an individual difference measure (Lang & Carstensen, 2002), the findings here suggest that it also can be used as a dependent variable measuring group differences. In contrast to the present findings, previous research has shown that the FTP measure is relatively uncorrelated with current mood (Lang & Carstensen, 2002). However, these studies have not experimentally manipulated moods which may be why mood effects were not obtained. The FTP scale is used here as a measure of pessimism and the link between mood and optimism-pessimism is well documented in the mood literature (Isen, 1997; Wright & Bower, 1992). Although the finding that participants in the experimental condition experienced a more limited FTP may be predicted from previous research without involving experienced affect as an explanatory variable (Fung & Carstensen, 2006), we extend this research by showing that well-being mediates the effect.

A limited future time perspective may have many detrimental consequences for different individual behaviors such as preference for immediate consumption of food and money at the cost of long-term health behavior and well-being (Shiv et al., 2005). In Study 2, we study risk perception in different domains of one's future life and also test potential measures to counteract the negative impact of feelings on judgments.

# 3 Study 2. Future life expectations and ease-of-thought

In Study 2, future pessimism was assessed by obtaining risk estimates of future events across different decision domains. As in Study 1, a between-groups comparison was used (remind about the tsunami vs. a control group). In addition, we assessed whether the ease with which

[3] Analyses with either the valence mood index or the composite specific emotion index as mediating variables yielded comparable results to the well-being ratings. Subjective well being had strong correlates with these two indices ($r$ = .71 and .68, respectively, $p < .01$).

thoughts about other natural disasters comes to mind may modulate the impact of feelings on risk perception. Previous research has demonstrated that the ease or fluency of thoughts and feelings determines the impact of those thoughts and feelings on judgment (Schwarz, 2004). For example, participants asked to generate eight examples of behaviors that increased the risk of heart disease (a relatively difficult task) were more likely to report that they were invulnerable to heart-disease problems than participants asked to generate three examples (an easy task; Rothman & Schwarz, 1998). The explanation for this result is that participants in the generate-eight condition noticed how difficult it was to think of examples and, on the basis of that difficulty, thought that they must be relatively invulnerable to heart disease.

Building on this logic, we asked participants to list a more difficult six (versus an easier two) examples of major natural disasters during the last one hundred years. We expected that participants in the difficult condition should notice that such events are very rare and thus experience less confidence in their feelings about the tsunami disaster as a basis for risk judgments. In other words, the difficult ease-of-thought generation should render incidental affect from the tsunami disaster relatively less diagnostic for judgments (Pham, 1998).

The design of Study 2 closely resembles Lerner and Gonzalez's (2005) Study 1, but with one important difference: Rather than studying the effects of specific emotions we focus on the effects of generalized moods on risk perception. We predict (in line with Lerner and Gonzalez's findings for specific emotions) that an ease-of-thought manipulation will interact with the effects of incidental affect on judgments, effectively debiasing risk estimates in the hard (list many) condition but not in the easy (list few). However, since the affect induced by thinking about the tsunami does not directly rely on the ease with which one can list six vs. two other major disasters, it may be predicted that well-being ratings will be relatively untouched by this manipulation. Thus, we expect that one experimental manipulation (tsunami-remind vs. control) will influence both well-being and risk perception, whereas the second experimental manipulation (ease-of-thought) will only influence risk perception.

## 3.1 Method and measures

Fifty men and 75 women with a mean age of 27.1 (SD = 6.2) participated. The study was run in Sweden 3–4 months after the tsunami disaster.

In addition to the tsunami-reminder manipulation used in Study 1, half of the participants in the remind condition were given an "ease-of-thought-generation" manipulation (Schwarz, 2004) in which they were asked to list either six (hard) or two (easy) other major natural disasters that occurred anywhere in the world during the last 100 years.[4] After the experimental manipulation, participants responded to a series of questions. To measure risk perception, we used a modified version of the scale developed by Lerner and Gonzalez (2005). Participants indicated from 1 (extremely unlikely) to 7 (extremely likely) the likelihood that each of 15 events would happen to them at any point in their future life. This measure is thus similar to the FTP scale in that it taps future pessimism. However, rather than asking specific questions about the remaining time in life and the possibility of changing one's circumstances, the risk perception scale asks participants to judge the likelihood of various positive and negative events in different life domains (social, health, financial, recreational). The 15 items were: 1. I enjoyed my job. 2. I had a heart attack before age 50. 3. My achievements were written up in a newspaper. 4. I chose the wrong career. 5. I married someone wealthy. 6. I received recognition in my profession. 7. I could not find a job for 6 months. 8. My income doubled within 10 years after my first job. 9. I developed gum problems in my mouth. 10. I did something in a job interview that made me embarrassed. 11. I said something idiotic in front of my class mates. 12. I got lost at night for more than 15 minutes. 13. I was on an airplane that encountered severe turbulence. 14. I received favorable medical tests at age 60. 15. I encountered a dangerous snake while on vacation.

The measure was averaged (with reverse scoring for the appropriate items) across the 15 items into an overall pessimistic future risk index (Cronbach's alpha = .89). In addition, the Pavot and Diener (1993) subjective well-being scale used in Study 1 was administered.[5]

Overall, we expected that participants in the tsunami-remind condition who were asked to list few natural disasters (easy condition) would give more pessimistic risk estimates than participants in the control and tsunami-remind difficult (list many natural disasters) condition. Furthermore, we expected that participants in the tsunami-remind conditions would report an overall lower well-being than participants in the control condition, independent of the ease-of-thought manipulation.

## 3.2 Results and discussion

To test the hypotheses, three contrasts were performed for both the subjective well-being ratings and the risk esti-

[4]The ease-of-thought manipulation was only used in the tsunami-remind conditions since our hypothesis pertains to the debiasing effect of this manipulation in this experimental condition.

[5]Mood and discrete emotion scales were however not included in this study. We chose to only include well-being as a measure of affect since both pre-studies and Study 1 consistently showed that negative affect ratings discriminated between the two conditions and, further, that these ratings co-varied with well-being ratings (see footnote 3).

mates. As expected, participants in the control condition reported significantly higher well-being ($M$ = 4.86) than participants in the tsunami-remind difficult ($M$ = 3.95, $t(74)$ = 3:30, $p < .05$) and the tsunami-remind easy ($M$ =3.82, $t(82)$ = 3.79, $p < .05$) conditions. The difficult and easy conditions did not differ ($t(88) = 0.43$, *ns*).

For the risk estimates, participants in the control condition reported less pessimistic estimates (M = $-.19$) than participants in the tsunami-remind easy condition ($M$ = $-.96$, $t(74)$ =5.18, $p < .01$), but similar estimates to the participants in the tsunami-remind difficult ($M$ = $-.22$, $t(73)$ = - 0.13, *ns*). Further, risk estimates in the easy condition were significantly higher than those in the difficult condition ($t(87) = 4.75$, $p < .01$).

Taken together, these findings suggest that thinking about the tsunami decreased perceived well-being and systematically biased risk estimates. In addition, the effect on risk estimates was modulated by the ease with which participants could list few versus many natural disasters. Combining the logic of research on fluency (Schwarz, 2004) and mood effects (Schwarz & Clore, 2007), generating many disasters (hard condition) likely produced the experience of difficulty/low fluency, which then caused the participants in the hard condition to question the diagnostic value of their feelings for estimating risk. In the easy condition, the subjective ease-of-thought/fluency should explain why these participants were less likely to question the validity of their feelings for the judgment task. These findings are consistent with previous research on fluency and decision making (Lerner & Gonzalez, 2005; Novemsky et al., 2007). In addition to this replication, we found that the ease-of-thought manipulation did not substantially influence ratings of well-being. Schwarz (2004) suggested that the subjective experience of fluency is a form of metacognitive experience that helps inform judgments. While the validity and relevance of feelings as a proxy of risk estimates may have been called into question by the fluency manipulation, there is little reason why the validity of the feelings per se should be questioned by this manipulation. However, previous research has noted that the experience of fluency may generate positive affect which potentially could influence the obtained difference between the easy and hard conditions (Reber, Schwarz & Winkielman, 2004). Several suggestions regarding why fluency is marked with positive affect have been offered, ranging from perceptual harmony to the adaptive value of processing information with ease (Schwarz & Clore, 2007). While we cannot completely refute the possibility that the fluency manipulation induced positive affect in the present research, the finding that well-being ratings were comparable in the hard vs. easy conditions suggests that this effect was minor. Most importantly, even if participants in the easy condition had more positive affect than participants in the hard condition, this feeling did not impact the judgment task. If the positive affect associated with fluency had spilled over to the risk estimates, we would expect that participants in the easy condition would have rated the risk of future negative outcomes lower than participants in the hard condition. However, the reverse pattern was found, suggesting that the positive affect associated with fluency experiences neither changed the negative affect elicited by the experimental manipulation, nor did it influence the judgment task.

# 4 General Discussion

The results of these studies suggest that the negative affect elicited by thinking about a recent major natural disaster leads to a more pessimistic view of the future. Participants reminded about the recent tsunami disaster felt that their life had fewer possibilities and that time was limited (Study 1) and that the risk of future self-relevant negative events was high and the likelihood of positive events was low (Study 2). This finding is consistent with other research documenting the effects of emotions elicited by major events on judgment and decision-making (Lerner et al., 2003). The implication of this infusion of affect in everyday judgment is vast. Not only may judgments be affected when the affect is considered relevant, such as the perceived risk of travelling to areas affected by the disaster, but also perhaps affected are everyday decisions concerning consumption, health, social and financial domains.

Emotions and moods are usually determined in a highly idiosyncratic manner (Morris, 1999) suggesting that the overall effect of feelings on individual everyday decisions will vary considerably across individuals. Therefore, the net effect on a societal level will vary depending on the mean mood of the population (Hirschliefer & Shumway, 2003). However, in the case of affect elicited by an event that is important or relevant for a whole society or country, the impact of affect on individual decisions as well societal decisions may be much more homogenous and far-reaching. The current research does not speak directly to this issue since we did not directly assess this type of national mood change in a whole population. Instead, we studied a sample of people who recently experienced the aftermath of natural disaster. Although it is difficult to conclude with certainty that the experimental approach used here is representative of the effects on a whole population, a comparison with other data suggests that the reactions of our participants resembled that of the larger population. In other studies conducted in Sweden using nationally representative samples immediately following the tsunami, and six months later, we have found effects on judgment tasks similar to those

found in the present study, suggesting that the experimental manipulation used here is a reasonably valid approach to investigate the effects of feelings associated with the tsunami disaster (Västfjäll, Peters & Slovic, 2007).

Does this suggest that affect elicited by a major natural disaster, and its effect on judgments, is different from other type of mood effects? Previous research studying the emotional impact of natural disasters/major events has found that generalized anxiety and depression (Lau et al., 2006), negative well-being (Grandien et al., 2005) and negative specific emotions (Lerner et al., 2003) tend to increase compared to normal times. The results from the manipulation check in Study 1 seem consistent with this increased negative response in that the experimental manipulation resulted in a general increase in specific negative emotions and negatively valenced mood. Again, this finding is in line with the results of the nationally representative sample; immediately after the tsunami, a generalized negative response was found. When the same negative emotions were measured six months later, all ratings significantly decreased (Västfjäll, Peters & Slovic, 2007). Other studies using nationally representative Swedish samples have found similar effects (Grandien et al., 2005). As pointed out earlier, it seems that the main difference between a normal mood change and a change brought about by a natural disaster lies in the fact that national moods are large-scale reactions that may be quite homogenous across individuals. Further, this type of affect is continually bolstered by new information (from media, other people, etc.; Mann, 2007) that is associated with uncertainty (How many people were killed? Did I know someone who went on vacation in Thailand?), and may therefore not dissipate as quickly as a normal change in mood (Russell, 2003). This type of change in affective tone or affective background may therefore be more similar to chronic impairments of the mood system (Morris, 1999). However, research has demonstrated that chronic affect influences risk perceptions and judgments in similar ways to normal incidental mood (Gasper & Clore, 1998). For that reason, we expect that the present results will be informative for any type of study on affect and its impact on judgments.

Another major finding was that the potentially large impact of affect on behavior was mitigated by very subtle manipulations of the ease with which examples of other disasters came to mind. The result that participants who were asked to list many (in contrast to few) other natural disasters corrected for the effect of their feelings on risk estimates is consistent with the notion that metacognitive processes have important biasing/debiasing effects on judgments (Schwarz et al., 2007). The extent of correction on judgments may depend on the naive theory used by the participant (Schwarz, 2004). In the present case, it seems likely that participants realized that natural disasters are relatively rare phenomena and tried to correct for this by minimizing reliance on their affective reactions. However, it may be argued that this assumes that participants were aware of their reactions, what caused them, and had a naive theory about how feelings may spill over to judgments. The present results cannot be used to infer the exact psychological mechanisms involved in these correction effects and future research is needed to resolve this issue. However, the mere fact that correction processes could be relatively easily elicited using simple manipulations has important implications for everyday judgments. Many of the negative effects of the feelings associated with a major environmental event such as risk aversion concerning travel after a disaster (Grandien et al., 2005) and over-insurance when affective images of terrorism are made salient (Hsee & Kunreuther, 2000), as well as the impact of those feelings on everyday decisions, could be mitigated by simple reminders of the low probability of the event. However, rather than simply stating that the event is of low probability (experience by description; Hertwig et al., 2004), fluency manipulations let individuals experience (through meta-cognitive feelings) that the event is unlikely. Such manipulations may prove to be more effective than traditional means of providing debiasing information (Schwarz et al., 2007). Although beyond the scope of the current article, future research could further address this issue by contrasting debiasing techniques that rely on description against techniques relying on experiential information. However, the finding that experienced feelings were relatively unaffected by the fluency manipulations suggests that the potential impact of affect may persist over time. The implication of this finding is that debiasing strategies would need to be used repeatedly for each new judgment for the duration of the mood.

Another force counteracting the effects of fluency is motivated information processing. Rothman and Schwarz (1998) found that fluency effects could be reversed when participants were motivated to think about an issue carefully. It is thus possible that strategies relying on low fluency to debias affect-laden risk perception could backfire and individuals still would exhibit biased judgments similar to that of individuals not using these strategies.

Overall, this research suggests that major environmental events may send psychological ripples globally, with the consequence that individuals and societies remote from the actual disaster may change their everyday decision behavior. The findings reported here may be used to better understand public risk perception and decision behavior in the aftermath of natural disasters. Further, the present research is a first step towards developing means to counteract the sometimes negative impact of feelings on judgments.

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