Paper to be presented at the DRUID 2012

on

June 19 to June 21

at

CBS, Copenhagen, Denmark,

IN THE MOOD FOR RISK? AN EXPERIMENT ON MOODS AND RISK PREFERENCES

Theresa Michl
Ludwig Maximilian University Munich
Munich School of Management, Institute for IOM
michl@lmu.de

Philipp Koellinger
Erasmus University Rotterdam
Department of Applied Economics, Erasmus School of Economics
koellinger@ese.eur.nl

Arnold Oskar Picot
Ludwig Maximilian University Munich
Munich School of Management, Institute for IOM
picot@lmu.de

Abstract

We investigate moods as a potential cause of temporary fluctuations in risk preferences. Specifically, we conducted an economic experiment (N = 253) on risk preferences that manipulates individuals? moods with film clips, inducing either joy, fear or sadness, and comparing these treatment groups to a control group that did not receive a mood induction. Our experiment uses the incentive-compatible Holt and Laury (2002) measure of risk preferences and differentiates between no, low, and very high financial stakes. We find that sad mood induces risk-aversion when no financial incentives are at stake. When the financial stakes are high, there is no evidence that moods have a significant influence on risk preferences. Moreover, our results show that joy has structurally different effects on risk preferences depending on the financial incentives at play.

Jelcodes:D01,D81

In the mood for risk?
An experiment on moods and risk preferences

ABSTRACT

We investigate moods as a potential cause of temporary fluctuations in risk preferences. Specifically, we conducted an economic experiment (N = 253) on risk preferences that manipulates individuals' moods with film clips, inducing either joy, fear or sadness, and comparing these treatment groups to a control group that did not receive a mood induction. Our experiment uses the incentive-compatible Holt and Laury (2002) measure of risk preferences and differentiates between no, low, and very high financial stakes. We find that sad mood induces risk-aversion when no financial incentives are at stake. When the financial stakes are high, there is no evidence that moods have a significant influence on risk preferences. Moreover, our results show that joy has structurally different effects on risk preferences depending on the financial incentives at play.

Keywords: risk preferences; mood; affect; financial stakes; experiment

JEL Codes: D03, D81

IN THE MOOD FOR RISK?
AN EXPERIMENT ON MOODS AND RISK PREFERENCES

1. Introduction

The behavior of people in situations involving risk seems to be influenced systematically by exogenous events that are not directly related to the decision situation. For example, Eckel et al. (2009) find in a sample of hurricane Katrina evacuees that women are more risk loving in gambling choices directly after the traumatic event of evacuation than one year later. Furthermore, Sunstein (2003) shows that, when strong emotions are involved, people overweigh probabilities for negative events such as terrorist attacks. Even daily events such as rainy or sunny weather (Hirshleifer and Shumway, 2003; Kamstra et al., 2000, 2003; Kliger and Levy, 2003; Levy and Galili, 2008; Saunders, 1993) can affect how individuals decide in risky situations. These findings challenge the assumption that individual risk preferences are stable over time (Stiglitz and Becker, 1977). One possible reason for this observed sensitivity of individual risk-taking behavior to random external circumstances is that such events induce emotional responses in people that exert a temporary influence on risk preferences.

Psychology has a long tradition of studying affect’s influence on decision-making in situations of risk. Most of these studies induce moods experimentally or measure naturally occurring mood. However, many of the studies in this tradition come to conflicting conclusions (e.g., Cheung and Mikels, 2011; Demaree et al., 2011; Heilman et al., 2010; Hockey et al., 2000; Isen and Geva, 1987; Isen and Patrick, 1983; Lee and Andrade, 2011; Leith and Baumeister, 1996; Lerner and Keltner, 2001; Raghunathan and Pham, 1999; Wang, 2006; Yuen and Lee, 2003). As a result, two contrary theories have emerged on the relationship between affect and risk preferences. One theory is the mood maintenance hypothesis (MMH; Isen and Patrick, 1983); another one is the affect infusion model (AIM; Forgas, 1995). While the MMH suggests that positive affect leads to risk-averse behavior and negative affect to risk-seeking behavior (Hockey et al., 2000; Kim and Kanfer, 2009; Kliger and Levy, 2003; Wegener and Petty, 1994), the AIM proposes opposite effects (e.g., Au et al., 2003; Finucane et al., 2000; Grable and Roszkowski, 2008; Hirshleifer and Shumway, 2003; Johnson and Tversky, 1983; Kamstra et al., 2003; Leith and Baumeister, 1996; Levy and Galili, 2008; Yuen and Lee, 2003).

A likely cause for those inconsistent results might be that these studies looked at general positive and negative moods thereby neglecting different effects of specific moods. In particular, looking at the specific effects of negative moods that have the same valence might help to solve the question how specific moods may influence risk preferences (Cheung and Mikels, 2011; Heilman, et al., 2010; Lerner and Keltner, 2001; Raghunathan and Pham, 1999). For instance, although fear and anger are both negatively valenced emotional states, they are assumed to have opposite effects on risk perception. While fear may lead to pessimistic risk assessments and risk aversion, angry individuals may evaluate risk more optimistically and are more risk-seeking (Carver and Harmon-Jones, 2009; Lerner and Keltner, 2001). Furthermore, happy individuals seem to resemble angry individuals in their risk behavior, and also express optimistic risk estimates (Lerner and Keltner, 2001). Therefore, investigating the influence of distinct moods on risk preferences may help explain prior inconsistent findings.

Another possible reason for those inconsistent findings is that most psychological studies do not apply incentive-compatible measures of risk preferences, i.e. individuals make decisions without financial consequences. Instead, risk preferences are mostly measured in hypothetical situations or based on self-reported scales without real financial consequences.[1] Economists have raised questions about the internal and external validity of such studies (Smith, 1982; Croson and Gneezy, 2009). If decisions are without consequences, the decision makers will be less inclined to think carefully about their responses. Furthermore, the participants may be more likely to please the experimenter with an anticipated response rather than trying to maximize their own utility. Following this logic, raising the financial stakes could make the influence of moods on risk preferences disappear.

To address this concern, a number of recent economic studies investigated the role of affective states on decision-making with regard to risk using observed financial investments rather than hypothetical decisions (Hirshleifer and Shumway, 2003; Kamstra et al., 2000, 2003; Kliger and Levy, 2003; Levy and Galili, 2008; Saunders, 1993, Shu, 2010). These studies used naturally occurring mood proxies such as the weather (Hirshleifer and Shumway, 2003; Kliger and Levy, 2003; Levy and Galili, 2008; Saunders, 1993), biorhythm (Kamstra et al., 2000; Yuan et al., 2006), or seasonal affective disorder (Kamstra et al., 2003) rather than induced or directly observed moods.

However, these studies do not provide direct evidence that the reported effects are actually caused by moods and the interpretation of the results has to remain vague about which specific moods are at play. For instance, it is unclear how weather will affect people's moods because some people might like rain while others do not. Especially the negative affective state can differ with regard to valence, for instance, rain might make some people sad and others angry. An incentive-compatible laboratory experiment that induces and measures specific moods can address these issues and examine if distinct moods have a causal influence on risk preferences.

Our study reports the results of such an experiment. Specifically, we investigate the influence of three discrete moods (joy, fear, sadness) on risk preferences in the gain domain in a laboratory experiment with none, low, and high financial stakes. We chose to induce joy, fear and sadness since these moods are likely to be present among economic agents in a wide range of situations (Scherer, 2005) and can be triggered by everyday circumstances in most cultures (Ekman, 1992). Participants' mood was measured using subscales of the Positive and Negative Affect Schedule (PANAS-X: Watson and Clark, 1994), a standard measure of mood in the psychological literature that is frequently used (e.g., Harmon-Jones, 2003; Lee and Allen, 2002; Stanton et al., 2000).

Moods are typically described as low-intensity, diffuse, and relatively enduring affective states, and are often elicited without a salient reason. In contrast, emotions are considered as more intense, short-lived affective states, and usually have a definite cause and clear cognitive content. Affect is often used as an umbrella term that refers to individuals' current moods and emotions (Davidson, 1994; Gray and Watson, 2001). It is important to note that these distinctions between mood and emotion are more theoretical than empirical. In research practice, the same methods are often used to induce moods and emotions (Fredrickson 2002).

Furthermore, we used the Holt and Laury (2002) method as an established and frequently used (e.g., Blavatskyy 2009; Colombier et al., 2008; Goeree et al., 2003; Johansson-Stenman, 2010) incentive-compatible measure of risk preferences. As risk preferences appear to be sensitive to the relevant financial stakes' presence and magnitude

---

[1] A noteworthy exception is the study by Lee and Andrade (2011) that looks at the influence of fear in stock market simulations.

(Camerer and Hogarth, 1999; Holt and Laury, 2002), we differentiated between none, low, and high financial stakes. Isen and Patrick (1983) found that subjects faced with hypothetical decisions showed diametrically opposite behavior to those who (erroneously) believed their decisions would affect their course grade. In line with this finding, Croson and Gneezy (2009) question whether previous laboratory experiments with small stakes yield conclusions that can be generalized to high-stakes settings.

With this study, we seek to make the following contributions to existing economic and psychological research. First, we investigate if moods have a causal influence on risk preferences by using a combination of a randomized experimental design and an incentive-compatible measure of risk preferences. Second, we test if the presence and magnitude of financial stakes interacts with the influence of moods on risk preferences. Third, we induce and measure three distinct moods (joy, fear, sadness) using validated techniques, allowing us to differentiate between the effects of these specific moods.

2. Data

2.1 Participants

We conducted a study with 253 participants in the laboratory for economic experiments of a large German university in the summer of 2010 and 2011. In experimental set 1 in summer 2010, we recruited 108 participants; in experimental set 2 in summer 2011, we recruited 145 participants.

Experimental set 1 contained three decision tasks, one of which was the current study on risk preferences. The other two tasks were pilot tests of incentive-compatible measures of ambiguity preferences and overconfidence that are unpublished. The order of the three tasks was randomized to prevent fixed-choice ordering. In experimental set 1, we recruited a total of 322 participants with 142 playing with no financial stakes, 144 playing with low financial stakes and 36 playing with high financial stakes. As experimentally induced moods tend to become weaker as the experiment continues (Kim and Kanfer, 2009), we focus our analysis on those participants that completed the risk preference measurement directly after the mood induction.[2] Among those participants, 48 played with no and low financial stakes, respectively, and 12 played with high stakes. Experimental set 2 only contained the measure of risk preferences. In this set, 37 participants played with no financial stakes, 41 with low financial stakes and 67 with high financial stakes. In the pooled sample from experimental set 1 and 2, there were 85 participants in the no stakes treatment, 89 participants in the low stakes treatment, and 79 participants in the high-stakes treatment.

The experiment was programmed in z-tree (Fischbacher, 2007) and we recruited participants by means of ORSEE (Greiner, 2004). The recruitment system excluded participants for experimental set 2 who had been participating in experimental set 1. In each experimental session, all three mood treatments (i.e., joy, fear, sadness) and a control treatment (i.e., no mood induction) were conducted on personal computers that were randomly matched with the participants. All computers looked identical, and only the experimenters knew the participants' treatment groups. During the entire experiment, participants could not communicate with, hear or see each other. Participants wore

[2] We conducted regression analyses for observations that completed the risk task as second or third task in experimental set 1. The effects of the mood inductions are not significant for these observations any more.

headphones, and their working stations were concealed from the view of other participants by walls. Participants had no time restrictions for completing the experiment.

The sample consisted of 104 males and 149 females with an average age of 24 (SD = 3.41). The youngest and oldest participants were 18 and 43 years old. In total, 243 of the participants were students, 10 were non-students. The 243 students were made up of 2% fine arts, 18% humanities, 32% social sciences, 4% biological science, and 19% physical sciences students. The remaining 25% were studying other subjects.

2.2 Procedure

Upon arrival, participants were introduced to the session and signed consent forms confirming that they have read and understood the terms and conditions of the experiment and that the experimenters answered all their open questions sufficiently. The consent forms also stated that participation in the experiment is voluntary and can be revoked at any time during the experiment. We further used the consent forms to inform participants about the film clips.

At the beginning of the experiment, participants were notified that they would be participating in an experiment on economic decision-making with real financial payoffs. Participants were then asked to complete questions about their socio-economic status, including their age, gender, current occupation, level of education, study subject, relationship status (GEM), and risk preferences (SOEP) that could serve as possible control variables. We measured personality with 10 items using the Big Five Inventory (Gosling et al., 2003). We extracted four components from a rotated factor analysis with eigenvalues greater than 1: extraversion, emotional stability, conscientiousness, and openness. Agreeableness was not a separate factor. Thereafter, participants were asked to complete self-report measures of the Positive and Negative Affect Schedule (PANAS-X; Watson and Clark, 1994) to control for their pre-induction mood.

Subsequently, participants in the three treatment groups watched a film clip to manipulate their mood state (see mood induction process below). After watching the film clip, participants again indicated their mood state (PANAS-X; Watson and Clark, 1994). Participants in the control group did not watch a film clip (Verheyen and Göritz, 2009) and completed the mood questionnaire only once at the beginning of the experiment using the same measurement instrument. Thereafter, participants received separate instructions with respect to the magnitude of the financial stakes (see Appendix A), but solved the same subsequent risk preference task. Table 1 shows the number of subjects across treatment groups for none, low and high financial stakes.

Insert Table 1 about here

The no stakes treatment's instructions indicated that participants would, regardless of their performance, receive a fixed payoff of 9 EUR at the end of the experiment, consisting of 4 EUR attendance fee and 5 EUR to compensate for their time. They were, however, urged to try their best to solve the subsequent tasks. Participants in the low and high stakes treatments were instructed that their payoff at the end of the experiment would depend on their performance in solving the subsequent tasks. These participants received an attendance fee of 4 EUR and the opportunity to earn up to 11.40 EUR more. The participants in the high stakes treatment were additionally told that they had a 1:36 or 2.8% chance to centuplicate their payoff. Thus, the overall maximum amount that participants could win in the low stakes treatment was 15.40 EUR and 1.540 EUR in the high stakes treatment. Participants in the high stakes treatment had to draw a number later the day to determine the winner of this high stakes lottery.

After the financial instructions and the completion of the decision task, we asked participants in all treatments to indicate their general positive and negative affect (PANAS-X; Watson and Clark, 1994). These were the last questions for participants in the no stakes treatment. Those in the incentive-compatible treatments had a chance to draw their payoff. The payoffs were determined by the computer according to the experimental instructions and observed behavior. Directly after each session, all the participants were thanked and received their payoffs separately. Participants in the high stakes treatment additionally received a card which stated the time and location for the obligatory drawing of the lottery number. At this time, each participant drew one number in the presence of all the 36 other participants. The participants filled in their name, address, and telephone number and signed a form to confirm their number. Two hours later, we drew one number out of 36 numbers for each of the three high stakes sessions. The participants with the winning numbers received hundred times the standard conversion rate of the experimental currency in Euros. Participants had been invited to be present at these draws, but only some were. The drawings of the numbers were video recorded and published on the homepage of the faculty. The winners were immediately informed and the money was transferred to their bank accounts within two weeks.

2.3 Mood Induction Process

We used three film clips extracted from Hollywood movies to induce three-quarter of the participants with joyful, fearful and sad mood. Film clips have been shown to be one of the most effective mood manipulations for positive *and* negative mood states (Gerrards-Hesse et al., 1994; Westermann et al., 1996). In total, 193 participants were induced with either joyful (64), fearful (64), or sad mood (65) using film clips from “When Harry met Sally” (1989), “Paranormal Activity” (2007), and “The Champ” (1979) (Gross and Levenson, 1995; Hewig et al., 2005). All participants watched the film clips on their own computers while wearing head phones.

Prior to viewing the film clips, participants were asked to become involved in the feelings suggested by the situation and to clear their mind of all thoughts, feelings, and memories. Mood induction is assumed to be more intense when explicit instructions are given (Westermann et al., 1996). After the film clip, participants had to indicate whether they had seen the movie before. At the end of the experiment, those receiving the negative mood treatments were shown the film clip of the joyful mood treatment as a counter induction (Göritz and Moser, 2006).

2.4 Measures

2.4.1 Mood measurement

We measured participants’ specific moods at the beginning of the experiment (once in the control group and twice in the treatment groups) and their general positive and negative affect at the end of the experiment before the payoff information using the short version of the Positive And Negative Affect Schedule (PANAS-X; Watson and Clark, 1994). We used the joviality subscale (e.g., happy, joyful, delighted) to assess individuals’ level of joy at the beginning of the experiment, the fear subscale to measure participants’ level of fear (e.g., afraid, scared, frightened), and the sadness subscale to measure participants’ level of sadness (e.g., sad, blue, downhearted). At the end of the experiment, positive (e.g., active, alter, attentive) and negative (e.g., afraid, scared, nervous) affect were assessed to check how long the mood induction lasted.

2.4.2 Risk preferences

To measure risk preferences, we used an adaptation of the Holt and Laury (2002) method in which participants choose between a series of lotteries, with each lottery offering one of two payoffs (see Appendix B, Table B1). These payoffs are structured so that one lottery is less risky than the other. The series is designed such that the expected value of the safe choice is higher than the expected value of the risky choice at the beginning. The difference in expected values between the two choices gets successively smaller until it reverses, such that the riskier choice has an increasing advantage in the expected value further on. The point at which the participants switch from the safe to the risky lottery defines their level of risk preference. One of the decision options was randomly chosen and determined with real money at the end of the experiment in the incentive-compatible (low and high financial stakes) treatments. Hence, the incentive-compatible treatments prompted the participants to contemplate the consequences of their behavior.

30 participants in total or 10 participants in each financial stake condition, respectively, displayed choices that are not compatible with expected utility theory. These participants either preferred the safe option in the last lottery choice (i.e. a sure win of 800ED), although this choice is strictly dominated by the "risky" option (i.e. a sure win of 1540ED); or these participants switched between the lotteries more than once and thus display inconsistent preferences. We excluded these participants from further analyses to avoid inference problems (Andersen et al., 2006; Holt and Laury, 2002). In our sample, females ($\chi^2 = 6.26$, $p = 0.01$) were more likely than males to exhibit inconsistent or unreasonable choices in the sense specified above.

3. Results

3.1 Mood Inductions

All mood inductions appear to have worked successfully according to participants' self-evaluations: Joy after induction was rated significantly higher than joy before induction (t[63] = -6.19, p < 0.001, d[3] = 1.65). Participants showed higher fear after induction than before induction (t[63] = -5,17, p < 0.001, d = 1.30). Also, sadness after induction was rated significantly higher than sadness before induction (t[64] = -4.91, p < 0.001, d = 1.23). Table 2 shows the factor scores of the principal component analyses of the self-reported moods[4] across treatments after mood induction. The table illustrates that the self-reported moods' means are highest in the respective mood treatment.

Insert Table 2 about here
----

[3] Cohen (1988) suggests that d = 0.20 denotes a small effect, d = 0.50 a medium effect, and d = 0.80 a large effect.

[4] This procedure considers all available information, whereas sum scores ignore mood differences among people arising from other moods. Factor scores and sum scores of all three moods correlated almost perfectly (*r*s > 0.95, p < 0.001).

We checked if participants' emotional reactions to the film clips differed with regard to gender (Croson and Gneezy, 2009; Hagemann et al., 1999), personality traits (Gross et al., 1998), or prior viewing of the movie (Gross and Levenson, 1995). Women self-reported higher fear ($t[62] = -3.15$, $p = 0.003$, $d = 0.80$) and higher sadness ($t[63] = -2.25$, $p = 0.03$, $d = 0.57$) after induction compared to men. It is a typical finding that men intentionally report lower levels of negative moods than women (e.g., Blier and Blier-Wilson, 1989; Sutton and Farrall, 2005). We found no further evidence that personality traits or prior viewing of the film had an influence on mood inductions strength.

3.2 Descriptives and Correlations

Figure 1 illustrates the proportion of safe choices in respect of each of the ten lottery decisions. The horizontal axis indicates the number of safe choices and the vertical axis the probability of safe choices. People in a sad mood show the highest risk-aversion compared to people in a neutral mood. People in a joyful and in a fearful mood also seem to have a tendency to be more risk-averse than people in a neutral mood. A one-way ANOVA with LSD post-hoc test revealed that, overall, a sad mood is associated with significantly higher risk aversion compared to a joyful ($p = 0.04$), fearful ($p = 0.07$), and neutral mood ($p = 0.02$).

Insert Figure 1 about here

Correlation results in Table 3 show that our careful randomization procedures were not entirely successful in distributing personal characteristics equally across treatments. Therefore, we included personality characteristics in the following regressions as control variables. The experimental sequence[5], gender, age, financial stakes and self-reported risk preferences were not correlated with our measure of risk preferences.

Insert Table 3 about here

3.3 Regression Results

We performed poolability tests (Chow, 1960; Gujarati, 1970) to examine whether moods had structurally different effects in the financial stakes treatments. Table 4 shows regression results for the pooled model and for the poolability test. A positive coefficient denotes risk-averse preferences and a negative coefficient indicates risk-seeking preferences. In the pooled model, sadness leads to risk aversion ($\beta = 0.19$, $p = 0.02$). In the poolability test, we find some evidence that joy has structurally different coefficients in the financial stakes treatments. More precise, joyful people seem to be more risk-seeking in the low stakes treatment ($\beta = -0.22$, $p = 0.09$). This finding indicates that a pooled analysis of the three financial stake conditions is not appropriate for joy and risk preferences.[6]

Insert Table 4 about here

[5] In experimental set 2, we asked participants about their risk preferences in the loss domain before we asked about their risk preferences in the gain domain. The experimental sequence variable describes this sequence of loss and gain domain. Because of ethical reasons and the laboratory's rules we did not require participants to pay us in case of loss. Thus, the measure of risk preferences in the loss domain was not incentive-compatible and we only include risk preferences in the gain domain in the current study.

[6] A poolability analysis across gender showed no evidence against poolability.

Table 5 shows three OLS regressions for the no, low and high financial stakes treatment.[7] In the no stakes treatment, we find that sadness leads to risk aversion ($\beta = 0.24$, $p = 0.08$). This influence of sadness becomes weaker and insignificant in the incentive-compatible treatments. The effects of fear and joy on risk preferences are not significant; however, the coefficients reveal that joy indeed has a structurally different effect on risk preferences in dependence of the financial stakes. The coefficients are positive, i.e. risk averse, in the no and high stakes treatment and negative, i.e. risk-seeking, in the low stakes treatment. All three models are robust to different model specifications such as the exclusion or inclusion of control variables and using sum scores instead of PCAs of personality.

Insert Table 5 about here

----

4. Discussion

To the best of our knowledge this is the first study that investigates the influence of three specific moods (joy, fear, sadness) on risk preferences in an incentive-compatible laboratory experiment with no, low and high financial stakes. Our results show a causal relationship between sadness and risk aversion compared to a neutral mood when decisions have no financial consequences. When decisions have low or high financial consequences, we find no evidence that moods influence risk preferences. This is consistent with the argument that higher financial stakes motivate individuals to process the given information more systematically and to contemplate their decisions more carefully. Moreover, we find a structurally different effect of joy on risk preferences in dependence of the financial stakes. Our findings imply that the influence of moods on risk preferences needs to be investigated based on specific moods and in the context of (different) financial consequences.

The result that sadness leads to risk aversion when decisions have no financial consequences supports the affect infusion model (AIM; Forgas, 1995). The AIM suggests four information processing styles, namely direct, motivated, heuristic, and substantive, that are differently prone to affect infusion along a process continuum. Affect infusion is unlikely to occur in a mood-congruent direction during (1) direct access of a preexisting response or (2) motivated processing in service of a preexisting goal. This is the case because both strategies involve highly predetermined and directed information search patterns that require little generative, constructive processing. In contrast, affect is supposed to have a mood-congruent effect when a (3) heuristic or a (4) substantive processing strategy is used (Forgas, 1995). These strategies tend to be used when the task requires a higher degree of constructive processing. As heuristic processing is by definition a truncated, simplified processing style that only allows affect infusion through the use of the affect-as-information heuristic (Schwarz and Clore, 1983), it can be assumed that heuristic processing may play a somewhat limited role in more complex decision making situations such as in situations of risk (Forgas and George, 2001). We suppose that participants in our experiment engaged in substantive processing when solving the risk preferences task. Forgas and George (2001) describe substantive processing as relying on memory-based procedural rules and combining stored knowledge structures with new stimulus information in order to create a new response.

---

[7] Running the same model on the pooled sample of the low and high stakes treatment does not yield significant effects of moods either (including and excluding joy from the sample).

The AIM can explain for the no financial stakes treatment why sadness leads to risk aversion when people engage in, presumably, substantive processing strategy. However, the AIM seems not to be able to give a comprehensive explanation in terms of information processing strategies for our null results on joy and fear. For people in the fear treatment, we have no reason to assume that they engaged in a different information processing strategy than substantive information processing. Following AIM's assumption, fear should have induced risk-averse preferences. Although the fear coefficients are positive across all three financial stakes treatments indicating risk-averse preferences the effects are not significant. Hence, there must be other explanations besides explanations derived from the AIM. Recent studies show a significant relationship between fear and decisions under risk (Chanel and Chichilnisky, 2009; Heilman et al., 2010; Lee and Andrade, 2011). The study by Chanel and Chichilnisky (2009) measured fear in the context of a terrorist attack which is likely to have induced much stronger fear than our film clip. The study by Heilman et al. (2010) did not apply an incentive-compatible risk measure thereby possibly overestimating fear's influence. Lastly, Lee and Andrade's (2011) study used a different film clip for the fear induction, i.e., The Exorcist, that may also have a stronger effect on participants' mood than our fearful film clip.

We can summarize our results on joy and risk preferences in two points. First, joy has no significant effect on risk preferences. Second, joy has structurally different effects on risk preferences in dependence of financial stakes. Although joyful people may be more likely to engage in heuristic processing (Ruder and Bless, 2003) rather than substantive processing, heuristic processing is also described as a high infusion strategy in the affect infusion model (Forgas and George 2001) and thus should have infused risk preferences. Hence, if we assume that individuals engaged in substantive or heuristic information processing strategies, both being high infusion strategies, to solve the risk task, the AIM cannot explain why joy did not show a significant effect on risk preferences.

Another possible explanation for the null result of joy and risk preferences is that people generally are in a positive resting mood (e.g., Clore and Huntsinger, 2007; Schwarz and Clore, 1983). Table 2 showed that the mean difference between participants in the control treatment without mood induction and participants in the joy treatment is only 0.20. The film clip to induce joy had only a slight impact on participants' positive resting mood. Instead, participants watching the sad film clip seem to have experienced their sad mood as a stronger deviation from their default mood, i.e. positive resting mood. This conscious deviation from the default mood, i.e. positive mood, might explain why we find an effect of sadness, but not of joy.

Furthermore, we find structurally different effects of joy on risk preferences in dependence of financial stakes. Following the directions of the coefficients, it seems that joyful people are risk-averse in the no and high stakes treatment, while risk-seeking in the low stakes treatment. The AIM assumes that individuals' decisions are consistently biased in a mood-congruent manner if people engage in high infusion information processing strategies. When experiencing positive affect people tend to be risk-seeking because they perceive their environment more appealing, and, consequently are likely to make more favorable judgments. In contrast, individuals in a fearful and sad mood perceive their environment as more insecure and gloomy and are thus more cautious in their risk behavior (Forgas 1995, Leith and Baumeister 1996). Hence, while the AIM can explain the consistently risk-averse effects of sadness and fear, it cannot explain why we find structurally different effects for joy. Instead, the mood maintenance hypothesis (MMH; Isen and Patrick, 1983) may explain our inconsistent results on the relationship between joy and risk preferences.

The MMH generally posits that individuals in a positive affective state want to maintain their current emotional state, and thus avoid risky decisions whose poor outcome could change this (Isen and Patrick 1983). Likewise, individuals in a negative affective state want to improve their current state, and are thus willing to take greater risks by choosing higher but riskier payoff options (Leith and Baumeister 1996). Thus, individuals seek to regulate their mood by making judgments that will maximize the likelihood of facilitating or maintaining a positive mood state. Early studies in this notion showed that, under positive affect, individuals are more risk-averse if the risk is moderate to high, but that they are risk-seeking in low-risk situations (Isen and Geva, 1987; Isen, Nygren and Ashby 1988, Isen and Patrick 1983). Although participants in this study could not improve or maintain their mood state through wins or losses in this study, these early studies' results may explain our results for the structurally different effects of joy on risk preferences. When no or high financial incentives are at stake, joyful people tend to show risk-averse preferences. When the financial stakes are low, joyful people tend to be more risk-seeking.

5. Conclusion

The AIM seems to be able to give insights how negative moods influence risk preferences and when affect infusion is likely to occur. In contrast, The MMH appears to be able to explain how positive moods influence risk preferences. Hence, three implications are important to note for further conclusions. First, the influence of specific positive and negative moods on risk preferences is different. Second, the significance of sad mood on risk preferences depends on the presence of financial consequences. Third, the directive influence of positive mood on risk preferences seems to depend on the magnitude of the financial stakes.

The first implication about investigating specific mood states and their effects on risk preferences is especially important for moods of the same valence. The notion about studying negative moods of the same valence is supported by existing studies (e.g., Leith and Baumeister, 1996; Lerner and Keltner, 2001; Raghunathan and Pham, 1999). This differentiation is necessary in order to understand and possibly regulate moods' effects on risk preferences. We further argue that making people aware of their moods requires knowing which specific mood state has an effect on risk preference.

The second implication about moods' significant influence on risk preferences is twofold. On one hand, decisions under risk should have real financial consequences to regulate moods' influence. This indicates that variable financial incentives are a good motivator to contemplate about decisions and to improve decision quality in terms of expected utility theory. On the other hand, when no financial incentives are at stake, people should be aware of their specific mood state and the possible mood effects on their decision. Moods are typically described as low-intensity, diffuse, and relatively enduring affective states, while emotions are considered as more intense, short-lived affective states. The AIM and MMH mainly pertain to the effects of low-intensity moods rather than the consequences of high-intensity emotions. Thus, the effects of emotions on decision making can be very complex and may vary as are people's cognitions of their emotional situations. Low-intensity moods, in contrast, do tend to have subtle but consistent and predictable cognitive and behavioral consequences. Once people become consciously aware of their moods their responses will very much come to depend on their particular motivational goals at the time (Forgas and George, 2001).

In addition, making people aware of the information processing strategies they use to make decisions may be useful to decrease affect infusion on risk preferences. If decisions under risk need to be made under conditions of open and constructive rather than simplified processing, these information processing strategies are more likely to be prone to affect infusion. In such situations, mood may either directly (Schwarz and Clore, 1983) or indirectly, through primed associations in memory (Bower, 1981), infuse the decision. Affect infusion may even be enhanced when more extensive and constructive processing is employed (Forgas and George, 2001). This counterintuitive prediction occurs because more extensive and elaborate processing increases the likelihood that affectively primed information will be inadvertently incorporated into the decision making process. This is not to say that all decisions should be made with low-infusion information processing strategies, but rather should it make people aware that especially decisions that require higher cognitive capacity are more prone to affect infusion.

Regarding the third implication that moods' influence on risk preferences seem to vary across financial stakes it may be worthwhile – after being aware of one's specific mood states and its possible effects – to consider the context of the decision at hand. Recent findings (e.g., Dohmen et al. 2011, Weber et al. 2002) suggest that risk preferences are context-dependent and domain-specific, respectively. For example, people tend to be more risk-seeking in sports and healthcare and more risk-averse in financial decision (Dohmen et al. 2011). These domain differences of risk preferences may be due to emotional differences and to different levels of stakes. Thus, different emotional states may lead to different risk preferences in certain domains because the domains' stakes are different. This underlines once again that future studies should investigate specific mood states instead of general mood states. In addition, investigating the influence of specific mood states on risk preferences in different domains and with varying levels of stakes will contribute to our understanding, when and how affective states influence individuals' risk preferences.

Coachings and (self-) trainings may help people to learn about their specific mood states and their effects on decisions under risk. People could be taught in recognizing their bodily cues as specific moods. In addition, people should be aware in which context their decisions are made and thus, which stakes are at play. Finally, such trainings may teach how to engage in information processing strategies that are less prone to affect infusion despite the fact that the decision at hand requires substantive processing. Being aware of specific affective influences in different contexts and being able to engage in processing strategies that control them will improve the consistency and quality of decisions in risky situations and should thus be a desirable goal for all decision makers.

REFERENCES

Andersen, S., Harrison, G., Lau, M., Rutström, E., 2006. Elicitation using multiple price list formats. Experimental Economics 9: 383-405.

Au, K., Chan, F., Wang, D., Vertinsky, I., 2003. Mood in foreign exchange trading: Cognitive processes and performance. Organizational Behavior and Human Decision Processes 91, 322-338.

Blavatskyy, P., 2009. Betting on own knowledge: Experimental test of overconfidence. Journal of Risk and Uncertainty 38, 39-49.

Blier, M.J., Blier-Wilson, L.A., 1989. Gender differences in self-rated emotional expressiveness. Sex Roles 21, 287-295.

Bower, G.H. 1981. Mood and memory. American Psychologist 36, 129-148.

Camerer, C., Hogarth, R., 1999. The effects of financial incentives in experiments: A review and capital-labor-production framework. Journal of Risk and Uncertainty 19, 7-42.

Carver, C., Harmon-Jones, E., 2009. Anger is an approach-related affect: Evidence and implications. Psychological Bulletin 135, 183-204.

Chanel, O., Chichilnisky, G., 2009. The influence of fear in decisions: Experimental evidence. Journal of Risk and Uncertainty 39, 271-298.

Cheung, E., Mikels, J.A., 2011. I'm feeling lucky: The relationship between affect and risk-seeking in the framing effect. Emotion 11, 852-859.

Chow, G., 1960. Tests of equality between sets of coefficients in two linear regressions. Econometrica 28, 591-605.

Clore, G.L., Huntsinger, J.R., 2007. How emotions inform judgment and regulate thought. Trends in Cognitive Sciences 11, 393-399.

Cohen, J., 1988. Statistical power analysis for the behavioral sciences. Hillsdale, NJ: Lawrence Erlbaum.

Colombier, N., Boemont, L.D., Lohéac, Y., Masclet, D., 2008. Risk aversion: an experiment with self-employed workers and salaried workers. Applied Economics Letters 15, 791-795.

Croson, R., Gneezy, U., 2009. Gender differences in preferences. Journal of Economic Literature 47, 448-474.

Davidson, R., 1994. On emotion, mood, and related affective constructs. In: Ekman, P., Davidson, R. (Eds.). The nature of emotion: Fundamental questions, New York, NY: Oxford University Press, 51-55.

Demaree, H.A., Burns, K.J., DeDonno, M.A., Agarwala, E.K., Everhart, D.E., 2011. Risk dishabituation: In repeated gambling, risk is reduced following low-probability "surprising" events (wins or losses). Emotion, Advance online publication doi: 10.1037/a0025780.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., Wagner, G.G. 2011. Individual risk attitudes: measurement, determinants and behavioral consequences. Journal of the European Economic Association 9, 522-550.

Eckel, C.C., El-Gamal, M.A., Wilson, R.K., 2009. Risk loving after the storm: A bayesian-network study of hurrican Katrina evacuees. Journal of Economic Behavior & Organization 69, 110-124.

Ekman, P., 1992. An argument for basic emotions. Cognition and Emotion 6, 169-200.

Finucane, M., Alhakami, A., Slovic, P., Johnson, S., 2000. The affect heuristic in judgments of risks and benefits. Journal of Behavioral Decision Making 13, 1-17.

Fischbacher, U., 2007. z-Tree: Zurich toolbox for ready-made economic experiments. Experimental Economics 10, 171-178.

Forgas, J., 1995. Mood and judgment: The affect infusion model (AIM). Psychological Bulletin 117, 39-66.

Forgas, J.P., George, J.M. 2001. Affective influences on judgment and behavior in organizations: An information processing perspective. Organizational Behavior and Human Decision Processes 86, 3-34.

Fredrickson, B., 2002. Positive emotions. In: Snyder, C., Lopez, S. (Eds.). Handbook of positive psychology, Oxford University Press: New York, NY, 120-134.

Gerrards-Hesse, A., Spies, K., Hesse, F., 1994. Experimental inductions of emotional states and their effectiveness: A review. British Journal of Psychology 85, 55-78.

Goeree, J.K., Holt, C.A., Palfrey, T.R., 2003. Risk averse behavior in generalized matching pennies games. Games and Economic Behavior 45, 97-113.

Göritz, A., Moser, K., 2006. Web-based mood induction. Cognition and Emotion 20, 887-896.

Gosling, S., Rentfrow, P., Swann, W., 2003. A very brief measure of the Big-Five personality domains. Journal of Research in Personality 37, 504-528.

Grable, J., Roszkowski, M., 2008. The influence of mood on the willingness to take financial risks. Journal of Risk Research 11, 905-923.

Gray, E., Watson, D., 2001. Emotion, mood, and temperament: Similarities, differences and a synthesis. In: Payne, R., Cooper, C. (Eds.). Emotions at work: Theory, research and applications in management, West Sussex: Wiley, 21-34.

Greiner, B., 2004. The online recruitment system ORSEE - A guide for the organization of experiments in economics. In: Kremer, K., Macho, V. (Eds.). Forschung und wissenschaftliches Rechnen 2003. GWDG Bericht 63 (Research and scientific computation 2003. GWDG report 63), Göttingen: Gesellschaft für Wissenschaftliche Datenverarbeitung, 79-93.

Gross, J., Levenson, R., 1995. Emotion elicitation using films. Cognition and Emotion 9, 87-108.

Gross, J., Sutton, S., Ketelaar, T., 1998. Relations between affect and personality: Support for the affect-level and affective-reactivity views. Personality and Social Psychology Bulletin 24, 279-288.

Gujarati, D., 1970. Use of dummy variables in testing for equality between sets of coefficients in linear regressions: A generalization. American Statistician 24, 18-22.

Hagemann, D., Naumann, E., Maier, S., Becker, G., Lürken, A., Bartussek, D., 1999. The assessment of affective reactivity using films: Validity, reliability and sex differences. Personality and Individual Differences 26, 627-640.

Harmon-Jones, E., 2003. Anger and the behavioral approach system. Personality and Individual Differences 35, 995-1005.

Heilman, R., Crisan, L., Houser, D., Miclea, M., Miu, A., 2010. Emotion regulation and decision making under risk and uncertainty. Emotion 10, 257-265.

Hewig, J., Hagemann, D., Seifert, J., Gollwitzer, M., Naumann, E., Bartussek, D., 2005. A revised film set for the induction of basic emotions. Cognition and Emotion 19, 1095-1109.

Hirshleifer, D., Shumway, T., 2003. Good day sunshine: Stock returns and the weather. The Journal of Finance 58, 1009-1032.

Hockey, G., Maule, A., Clough, P., Bdzola, L., 2000. Effects of negative mood states on risk in everyday decision making. Cognition and Emotion 14, 823-856.

Holt, C., Laury, S., 2002. Risk aversion and incentive effects. American Economic Review 92, 1644-1655.

Isen, A., Geva, N., 1987. The influence of positive affect on acceptable level of risk: The person with the large canoe has a large worry. Organizational Behavior and Human Decision Processes 39, 145-154.

Isen, A., Patrick, R., 1983. The effect of positive feelings on risk taking: When the chips are down. Organizational Behavior and Human Decision Processes 31, 194-202.

Johansson-Stenman, O., 2010. Risk Aversion and Expected Utility of Consumption over Time. Games and Economic Behavior 68, 208-219.

Johnson, E., Tversky, A., 1983. Affect, generalization, and the perception of risk. Journal of Personality and Social Psychology 45, 20-31.

Kamstra, M., Kramer, L., Levi, M., 2000. Losing sleep at the market: The daylight saving anomaly. American Economic Review 90, 1005-1011.

Kamstra, M., Kramer, L., Levi, M., 2003. Winter blues: A SAD stock market cycle. American Economic Review 93, 324-343.

Kim, M., Kanfer, R., 2009. The joint influence of mood and a cognitively demanding task on risk-taking. Motivation and Emotion 33, 362-372.

Kliger, D., Levy, O., 2003. Mood-induced variation in risk preferences. Journal of Economic Behavior & Organization 52, 573-584.

Lee, K., Allen, N.J., 2002. Organizational citizenship behavior and workplace deviance: The role of affect and cognitions, Journal of Applied Psychology 87, 131-142.

Lee, C.J., Andrade, E.B., 2011. Fear, social projection, and financial decision making. Journal of Marketing Research 48, 121-129.

Leith, P., Baumeister, R., 1996. Why do bad moods increase self-defeating behavior? Emotion, risk taking, and self-regulation. Journal of Personality and Social Psychology 71, 1250-1267.

Lerner, J., Keltner, D., 2001. Fear, anger, and risk. Journal of Personality and Social Psychology 81, 146-159.

Levy, O., Galili, I., 2008. Stock purchase and the weather: Individual differences. Journal of Economic Behavior & Organization 67, 755-767.

Raghunathan, R., Pham, M., 1999. All negative moods are not equal: Motivational influences of anxiety and sadness on decision making. Organizational Behavior and Human Decision Processes 79, 56-77.

Ruder, M., Bless, H. 2003. Mood and the reliance on the ease of retrieval heuristic. Journal of Personality and Social Psychology 85, 20-32.

Saunders, Jr., E., 1993. Stock prices and Wall Street weather. American Economic Review 83, 1337-1345.

Scherer, K., 2005. What are emotions? And how can they be measured? Social Science Information 44, 695-729.

Schwarz, N., Clore, G.L., 1983. Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. Journal of Personality and Social Psychology 45, 513-523.

Shu, H., 2010. Investor mood and financial markets. Journal of Economic Behavior & Organization 76, 267-282.

Smith, V., 1982. Microeconomic systems as an experimental science. American Economic Review 72, 923-955.

Stanton, A.L., Kirk, S.B., Cameron, C.L., Danoff-Burg, S., 2000. Coping through emotional approach: Scale construction and validation. Journal of Personality and Social Psychology 78, 1150-1169.

Stiglitz, G, Becker, G. 1977. De gustibus non est disputandum. American Economic Review 67, 76-90.

Sunstein, C., 2003. Terrorism and probability neglect. Journal of Risk and Uncertainty 26, 121-136.

Sutton, R.M., Farrall, S., 2005. Gender, Socially Desirable Responding and the Fear of Crime. Are Women Really More Anxious about Crime? British Journal of Criminology 45, 212-242.

Tversky, A., Kahneman, D., 1991. Loss aversion in riskless choice: A reference-dependent model. Quarterly Journal of Economics 106, 1039-1061.

Verheyen, C., Göritz, A., 2009. Plain texts as an online mood-induction procedure. Social Psychology 40, 6-15.

Wang, X., 2006. Emotions within reason: Resolving conflicts in risk preference. Cognition and Emotion 20, 1132-1152.

Watson, D., Clark, L.A., 1994. The PANAS-X: Manual for the positive and negative affect schedule - Expanded form. Iowa City, IA: University of Iowa.

Weber, E.U., Blais, A.-R., Betz, N.E., 2002. A domain-specific measure risk-attitude scale: Measuring risk perceptions and risk behaviors. Journal of Behavioral Decision Making 15, 263-290.

Wegener, D., Petty, R., 1994. Mood management across affective states: The hedonic contingency hypothesis. Journal of Personality and Social Psychology 66, 1034-1048.

Westermann, R., Spies, K., Stahl, G., Hesse, F., 1996. Relative effectiveness and validity of mood induction procedures: A meta analysis. European Journal of Social Psychology 26, 557-580.

Yuen, K., Lee, T., 2003. Could mood state affect risk-taking decisions? Journal of Affective Disorders 75, 11-18.

Yuan, K., Zheng, L., Zhu, Q., 2006. Are investors moonstruck? Lunar phases and stock returns. Journal of Empirical Finance 13, 1-23.

Table 1
Number of subjects across experimental treatment groups

	No stakes	Low stakes	High stakes	***Total***
No mood induction	20	18	18	***56 (60)***
Joy induction	18	19	17	***54 (64)***
Fear induction	20	21	17	***58 (64)***
Sadness induction	17	21	17	***55 (65)***
Total	*75 (85)*	*79 (89)*	*69 (79)*	***223 (253)***

Note: 30 subjects are excluded from this table because they had inconsistent risk preferences or did not understand the decision task. The numbers in brackets are the numbers of subjects without exclusions. (see also risk preferences measure)

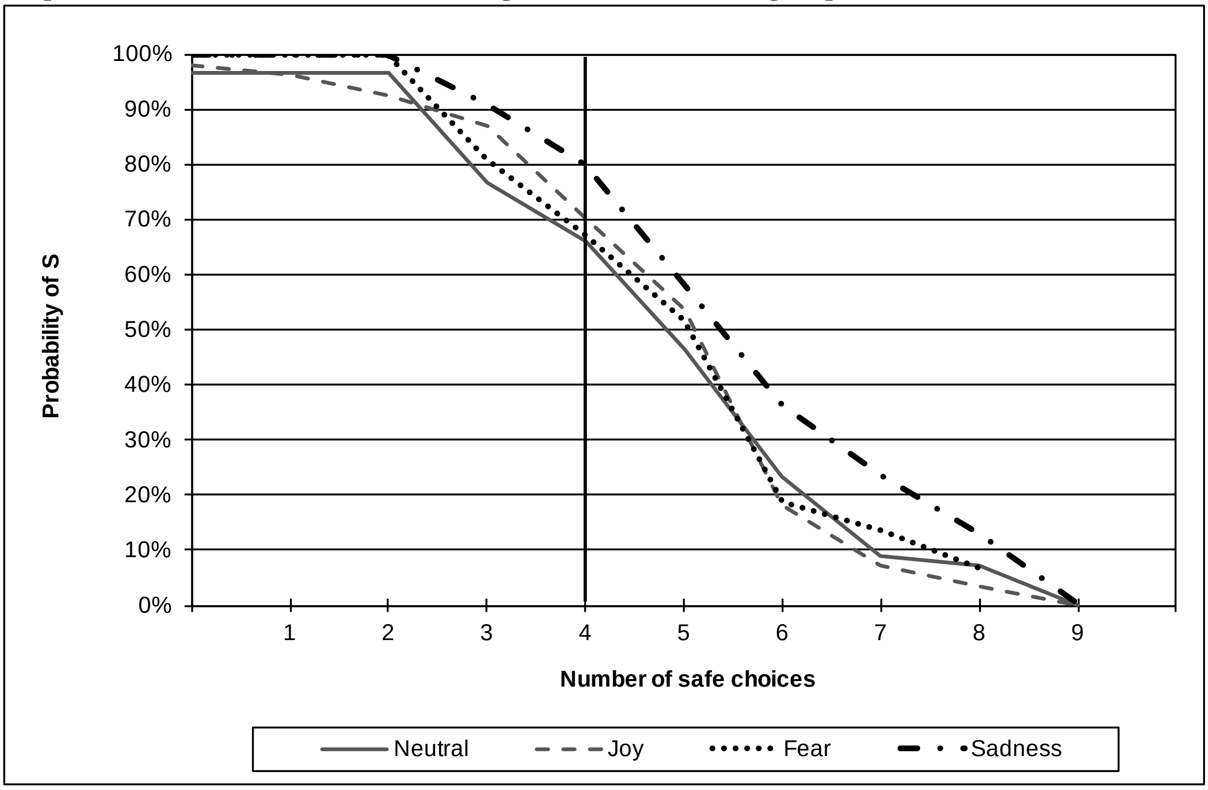
Table 2
PCA factor scores of self-reported moods across treatments after mood induction

	Self-reported joy		**Self-reported fear**		**Self-reported sadness**	
	Mean	*Std. Err.*	*Mean*	*Std. Err.*	*Mean*	*Std. Err.*
No mood induction	0.5	0.7	-0.3	0.5	-0.1	0.7
Joy induction	0.7	1.0	-0.4	0.4	-0.3	0.4
Fear induction	-0.4	0.8	1.0	1.3	-0.4	1.0
Sadness induction	-0.7	0.6	-0.3	0.8	0.8	1.2

Note: Principal component analysis (PCA) factor scores are based on PANAS-X items. Varimax rotation is applied.

Figure 1

Proportion of safe choices - Data averages across treatment groups



Note: The vertical black line indicates risk neutrality.

Table 3
Correlations

	Risk preferences elicited	Neutral	Joy	Fear	Sadness	Sequence	Gender
Neutral	-0.09						
Joy	-0.06	-0.32***					
Fear	-0.02	-0.32***	-0.34***				
Sadness	0.17**	-0.33***	-0.34***	-0.34***			
Sequence	-0.09	-0.02	-0.01	0.01	0.02		
Gender	0.04	0.03	0.02	-0.09	0.03	0.11**	
Age	0.03	0.00	0.05	0.01	-0.07	0.08	-0.10
Extra.	-0.02	-0.15**	0.17***	0.00	-0.03	-0.05	0.09
Conscient.	-0.02	-0.03	0.09	0.04	-0.10	-0.01	0.29***
Emot.Stab.	0.05	0.02	-0.05	0.02	0.00	-0.15**	-0.28***
Open.	0.12*	0.10	-0.03	-0.14**	0.08	-0.03	0.11*
Nostakes	-0.05	0.02	-0.01	0.01	-0.02	-0.21***	-0.10
Lowstakes	0.08	-0.00	0.01	-0.01	0.00	-0.16**	0.04
Highstakes	-0.03	-0.01	0.00	0.00	0.01	0.37***	0.06
Risk preferences self-report	0.16**	-0.03	-0.03	0.02	0.04	-0.04	-0.20***

	Age	Extra.	Conscient.	Emot.Stab.	Open.	Nostakes	Lowstakes	Highs
Extra.	0.04							
Conscient.	0.00	0.00						
Emot.Stab.	-0.07	0.00	0.00					
Open.	-0.08	-0.00	-0.00	-0.00				
Nostakes	-0.09	-0.04	-0.07	-0.01	0.00			
Lowstakes	-0.01	0.04	0.04	0.04	0.01	-0.52***		
Highstakes	0.10	0.00	0.03	-0.04	-0.01	-0.48***	-0.50***	
Risk preferences self-report	0.03	0.29***	-0.04	0.19***	0.24***	-0.04	0.08	-0.04

Note: Pearson correlation coefficient, N = 223.
Sequence = experimental sequence, Extra. = Extraversion, Conscient. = Conscientiousness, Emot.Stab. = Emotional Stability, Open. = Openness.
* denotes > 90% confidence
** denotes > 95% confidence
*** denotes > 99% confidence

Table 4
OLS regressions on risk preferences

	Model 1: pooled		*Model 2: Poolability test*	
	β	***p***	***β***	***p***
Treatment				
Joy	0.03	0.68	0.13	0.37
Fear	0.06	0.44	0.02	0.89
Sadness	0.19**	0.02	0.23	0.11
Low stakes	0.07	0.33	0.18	0.25
High stakes	0.04	0.59	0.01	0.94
Low stakes*Joy			-0.22*	0.09
High stakes*Joy			0.04	0.73
Low stakes*Fear			0.01	0.92
High stakes*Fear			0.06	0.61
Low stakes*Sadness			-0.04	0.75
High stakes*Sadness			-0.04	0.78
Model diagnostics				
N	223		223	
R^2	0.05		0.11	
Prob < F	0.11		0.12	

Note: *β*s are standardized. Control variables: Personality scores (based on principal components), self-reported risk preference before the experimental treatment, experimental sequence.
Reference groups are neutral treatment and no stakes. The results are robust for the exclusion of control variables and the inclusion of additional the control variables gender and age. Results are also robust to using personality sum scores instead of principal components.
* denotes > 90% confidence
** denotes > 95% confidence

Table 5

OLS regression on risk preferences – by stakes

	Model 1: no stakes		***Model 2: low stakes***		***Model 3: high stakes***	
	β	***p***	***β***	***p***	***β***	***p***
Treatment						
Joy	0.20	0.16	-0.21	0.16	0.22	0.15
Fear	0.06	0.68	0.02	0.90	0.13	0.38
Sadness	0.24*	0.08	0.17	0.23	0.17	0.26
Model diagnostics						
N	75		79		69	
R^2	0.20		0.17		0.16	
Prob > F	0.08		0.13		0.27	

Note: *β*s are standardized. Control variables: Personality scores (based on principal components), self-reported risk preference before the experimental treatment, experimental sequence.

Reference groups are neutral treatment and no stakes. The results are robust for the exclusion of control variables and the inclusion of additional the control variables gender and age. Results are also robust to using personality sum scores instead of principal components.

* denotes > 90% confidence

APPENDIX A.

Experimental Instructions

You will now receive detailed instructions regarding the course of the experiment. It is crucial for the success of our study that you fully understand the instructions. Please read the instructions carefully and do not hesitate to contact the experimenters in case you have any questions.

No-stakes wording:

The amount of money you can earn in this experiment is expressed in Experimental Dollars (ED). Irrespective of the result of the experiment, you will receive a participation fee of 9 Euro. You should try throughout the experiment as hard as possible to achieve a good result and to make all your decisions as if you would play for real money.

Low-stakes wording:

The amount of money you can earn in this experiment is expressed in Experimental Dollars (ED). However, you will be paid out in cash in Euro. The conversion rate of ED to Euro is 100:1. In other words, you will receive Euro 0.01 for every ED you will earn during the experiment and you will be paid out this amount in cash after the experiment. Thus, the best you can do throughout the experiment is to try as hard as possible to achieve a good result and keep in mind that you are playing for real money.

High-stakes wording:

The amount you can win in this experiment is expressed in experimental dollars (ED). These will be converted into Euro and paid out at the end of the experiment. The conversion rate from ED to Euro is determined in a lottery in which you participate. Today at 5pm at [address was handed out to the participants after the experiment] every one of the 36 participants will draw a lot with a unique number on it. From these numbers, one winner will be randomly chosen by another lottery at 7pm at the same location. Attendance is not required for the lottery at 7pm. The lottery will be recorded on video and displayed on the Internet. The winner of the lottery will be notified immediately via email and telephone and the high conversion rate will be paid out to the winner. Independent from this procedure, every participant will be paid out with the normal conversion rate directly after this experiment.

The normal conversion rate of ED to Euro is 100:1. In other words, you will receive Euro 0.01 for every ED you will earn during the experiment and you will be paid out this amount in cash after the experiment. However, the winner of the lottery will be paid with a conversion rate of 1:1! In other words, the lottery winner will receive 100 times as much money for every ED he or she earned during the experiment. Your chances of being the winner is 1:36 or 2.8%. Since you could be the winner, the best you can do throughout the experiment is to try as hard as possible to achieve a good result and to make all your decisions as if you would play for the high stakes of 1:1.

[The following text is identical to the instructions in Holt and Laury (2002)]

APPENDIX B.

Table B1
Lottery Choice Task

Options S	Option R	S	R
1/10 of ED 800, 9/10 of ED 640	1/10 of ED 1540, 9/10 of ED 40	O	O
2/10 of ED 800, 8/10 of ED 640	2/10 of ED 1540, 8/10 of ED 40	O	O
3/10 of ED 800, 7/10 of ED 640	3/10 of ED 1540, 7/10 of ED 40	O	O
4/10 of ED 800, 6/10 of ED 640	4/10 of ED 1540, 6/10 of ED 40	O	O
5/10 of ED 800, 5/10 of ED 640	5/10 of ED 1540, 5/10 of ED 40	O	O
6/10 of ED 800, 4/10 of ED 640	6/10 of ED 1540, 4/10 of ED 40	O	O
7/10 of ED 800, 3/10 of ED 640	7/10 of ED 1540, 3/10 of ED 40	O	O
8/10 of ED 800, 2/10 of ED 640	8/10 of ED 1540, 2/10 of ED 40	O	O
9/10 of ED 800, 1/10 of ED 640	9/10 of ED 1540, 1/10 of ED 40	O	O
10/10 of ED 800, 0/10 of ED 640	10/10 of ED 1540, 0/10 of ED 40	O	O