

Anxiety Sensitivity and Risk-Taking Behaviors

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Abstract

Negative affective states (e.g., anxiety) can have a significant impact on risk-perception and risk-taking behaviors. High trait anxiety has been linked with risk-avoidant decision-making, though little is known regarding the specific facets of anxiety contributing to this negative association. Anxiety sensitivity (AS), or the fear of sensations commonly associated with anxiety due to believing that these sensations can lead to negative consequences, may be particularly relevant to risk decision-making given that risk-taking behaviors generate heightened somatic arousal and produce many of the sensations feared by individuals with high AS. The purpose of this study was to extend previous research by examining the relation between AS and self-reported risk-perception and risk-taking behaviors. A total of 271 participants completed a series of questionnaires that included measures of AS, risk-perception, and risk-taking. The results were consistent with previous research indicating individuals with higher levels of anxiety sensitivity perceived greater risk. Hierarchical regression analysis indicated that AS predicted unique variance in risk perception over and above that accounted for by demographic variables and generalized anxiety. Although AS scores were positively correlated with likelihood to engage in ethical and health/safety risky behaviors, AS scores did not predict participants' risky behaviors over and above neuroticism, anxiety, and demographic variables. The implications of these findings and potential directions for future research are discussed.

Anxiety Sensitivity and Risk-Taking Behaviors

Introduction

Risk-taking refers to participation in behaviors that could lead to an undesirable or dangerous outcome (Byrnes, Miller & Schafer, 1999). Although risk-taking can be adaptive when the benefits of a behavior outweigh the costs or are more probable than the undesirable outcome, it can also be maladaptive when the opposite is true. Reason and judgment are used when assessing risk to determine if the potential gain of a behavior outweighs potential loss (Kahneman, 2003), and research suggests that personality and individual difference variables influence risk perception and risk taking behavior. (Dewberry, Juanchich & Narendran, 2013; Kozhevnikov, 2007). Studies have shown that the Big-5 personality factors (i.e., openness, conscientiousness, extraversion, agreeableness, and neuroticism) exhibit different relationships with risk-preference. For example, individuals high in neuroticism tend to overestimate the probability of negative outcomes and are thus conservative in risk-taking (Peng, Xiao, Yang, Wu & Miao, 2014).

Research also suggests that emotions can have a significant impact on risk-perception and risky behaviors (Loewenstein, Weber, Hsee, & Welch, 2001). Early research on the relation between emotion and risk-taking behaviors primarily focused on broad positive and negative affective states. Positive affect involves the experience of positive emotions (e.g., enthusiasm, confidence) and negative affect involves the experience of negative emotions (e.g., anger, guilt). Research indicates that negative affective states may be differentially linked to risk-taking behaviors, with emotions associated with high levels of arousal (e.g., anger, embarrassment) leading to increased preference for risk-taking (Leith & Baumeister,

1996) and emotions accompanied by low levels of arousal being linked to decreased preference for risk-taking (Mano, 1992). However, subsequent research has raised questions regarding the link between risk taking and emotional arousal. Specifically, research has indicated that fear and anger are both arousal inducing emotions, though fear is associated with risk aversive decision making while anger is associated with risky decision making and risk-seeking behaviors (Lerner & Keltner, 2001). Thus, research has begun to focus on the association between specific emotions and risk-taking.

The Effect of Anxiety on Risk-Taking

Anxiety is one form of negative affect that has been associated with specific patterns of risk-taking behaviors. Research suggests that anxious individuals generally focus on the negative aspects of situations and report increased perception of negative outcomes. In one study using a visual probe task, highly anxious individuals were faster to respond to threatening stimuli, suggesting that they attend to a situation's threatening cues more than non-anxious individuals (Mogg & Bradley, 2002). Research also suggests that anxiety is linked with pessimistic risk appraisal, or viewing a situation with higher perceptions of a negative outcome occurring, which then leads to decision making favoring risk-aversion (Maner & Schmidt, 2006). Thus, individuals with higher levels of neuroticism or trait anxiety may be more prone to exhibit risk averse decision making.

Several studies serve to illustrate the exclusive link between risk-aversion and anxiety. For example, Maner and colleagues (2007) found that individuals with anxiety disorders exhibited greater risk-avoidance than patients who had mood disorders (e.g., major depressive disorder, bipolar) and non-clinical controls. In another study, patients who met

criteria for generalized anxiety disorder or panic disorder made significantly fewer risky-decisions as compared to non-anxious control participants on a gambling task (Giorgetta et al., 2012).

Although risk-avoidance appears to be specific to anxiety when compared to non-clinical and clinical patients, little is known about the facets of anxiety that are contributing to this association. Anxiety sensitivity, or AS, can be broadly defined as the fear of sensations commonly associated with anxiety due to believing that these sensations can lead to negative physical, cognitive, or social consequences (Reiss & McNally, 1985). For example, a person with high AS may fear an increased heart rate because they believe that it will increase their risk for a heart attack. Research has consistently revealed that high AS predicts the subsequent development of panic attacks and other anxiety disorders (Li & Zinbarg, 2007; Maller & Reiss, 1992; Schmidt, Lerew & Jackson, 1997), and individuals with high AS exhibit many of the same cognitive biases as individuals with anxiety disorders. For example, similar to individuals with anxiety disorders (Mogg & Bradley, 2002), individuals with high AS demonstrate attention biases for threatening cues, are more likely to interpret ambiguous events in a threatening manner, and exhibit higher levels of avoidance in ambiguous situations compared to low AS individuals (Lilley & Cobham, 2005). Individuals with high anxiety sensitivity also exhibit a memory bias for anxiety-related information (McNally, Foa, & Donnell, 1989), and are more likely to interpret normal physiological sensations as potentially harmful (Pollock, Carter, Amir & Marks, 2006).

Research has shown individuals with high AS tend to employ threat avoidant decision making strategies in an effort to minimize exposure to heightened physiological stimulation

(Wilson & Hayward, 2006). For example, studies suggest that individuals with high AS are less likely to engage in physical exercise (Moshier et al., 2014; McWilliams & Asmundson, 2001) or respond to an aggressive attack with aggression (Broman-Fulks, Berman & McClusky, 2007). However, relatively little is known regarding the relation between AS and risk-taking. Given that risk-taking behaviors often generate increased physiological arousal, it is possible that individuals with high AS may be motivated to minimize risk engagement.

To date, only one study has directly examined the relation between AS and risk-taking. Broman-Fulks and colleagues (2014) found that individuals with high AS reported engaging in significantly fewer gambling behaviors than those with low AS. In addition, high AS participants selected significantly fewer cards from high risk decks on the Iowa Gambling Task than low AS participants. However, as this study only examined the relation between AS and gambling behaviors, it is unclear the extent to which their results generalize to other risk-taking behaviors.

The purpose of the present study was to extend previous research by examining the relation between AS and self-reported risk-perception and risk-taking behaviors. Based on previous research suggesting that individuals with high AS tend to perceive higher levels of threat in ambiguous situations, it was hypothesized that high AS would be associated with increased risk perception. In addition, given previous research suggesting that individuals with high AS exhibit decision-making strategies aimed at minimizing exposure to physiological arousal, it was hypothesized that AS would be negatively associated with risk-taking behaviors.

Method

Participants

The sample for the present study was comprised of 271 participants, ages 18 to 66 ($M = 34.88$, $SD = 11.90$), who volunteered to participate in the research for a monetary reward. The sample contained slightly more women (53%) than men, and the ethnic breakdown was: 80% Caucasian, 7% African American, 7% Hispanic, 5% Asian and 1% Other. Participants accessed the study via Amazon's Mechanical Turk (MTurk) service. MTurk is an internet marketplace that allows researchers to post various human intelligence tasks that workers of MTurk can complete for monetary rewards. MTurk is growing in use for research as it is a rapid, inexpensive way to get high-quality data; evidence suggests data obtained from MTurk to be at least as reliable when compared to traditional methods (Buhrmester, Kwang, and Gosling, 2011). To qualify for the study, workers had to be at least 18 years of age, living in the United States, and fluent in English. Informed consent was obtained from participants, and the consent process and research protocol were approved by the Institutional Review Board for the Protection of Human Subjects at Appalachian State University.

Measures

Anxiety Sensitivity Index – 3 (ASI-3; Taylor et al., 2007). Anxiety sensitivity was measured by the ASI-3, an 18-item self-report measure designed to assess general AS and three subcomponents representing fears of physical (e.g., “When my chest feels tight, I get scared that I won't be able to breathe properly”), cognitive (e.g., “When my thoughts seem to speed up, I worry I might be going crazy”), and social concerns (e.g., “When I tremble in the presence of others, I fear what people might think of me”). Participants were asked to rate the

extent to which they agreed with each statement on a five-point Likert-type scale (0=*very little* to 4=*very much*). The reliability and validity of the ASI-3 has been well-established, there is evidence that the psychometric properties of the ASI-3 have improved over the original ASI (Taylor et al., 2007). Cronbach's alpha in the present sample was .89.

Domain-Specific Risk-Taking (Adult) Scale. The DOSPERT (Blais & Weber, 2006) is comprised of two subscales that assess broad risk taking and risk perception. The risk-taking subscale assesses the likelihood of engagement in domain-specific risky activities, whereas the risk perception subscale assesses the extent to which the individual perceives domain specific activities as risky. Both DOSPERT subscales consist of 30 items that ask participants to indicate their likelihood of engagement in the situation described using a seven-point Likert-type scale (1=*extremely unlikely* to 7=*extremely likely*). The DOSPERT assesses risk-taking in five content domains, including: (1) financial decisions, (2) health/safety, (3) recreational, (4) ethical, and (5) social decisions. The financial content domain assesses likelihood of engagement in or perceived risk of a financial decision (e.g., investing 10% of your annual income in a moderate growth mutual fund). The health and safety content domain assesses likelihood of engagement in or perceived risk of health based decision (e.g., driving a car without wearing a seatbelt). The recreational content domain assesses likelihood of engagement in or perceived risk of recreational decisions (e.g., bungee jumping off a tall bridge). The ethical content domain assesses likelihood of engagement in or perceived risk of ethical decisions (e.g., having an affair with a married man/women). The social content domain assesses likelihood of engagement in or perceived risk of social decisions (e.g., admitting that your tastes are different from those of a friend). The DOSPERT scales used in

the present study were empirically derived from the original 40-item scale to be more interpretable by a wider range of respondents in different cultures. Evaluation of the DOSPERT reveals good psychometric properties including test-retest reliability, construct validity and positive alpha scores (ranging from .70 to .84) (Blais & Weber, 2006). Cronbach's alpha in the present sample was .84.

Depression, Anxiety, and Stress Scale-21 – Anxiety Subscale. The *DASS-21* (Lovibond, & Lovibond, 1995) is a self-report measure designed to identify, differentiate and assess depression, anxiety and stress. The *DASS-21* consists of 21 items that ask the participant to indicate how much the statement applied to them over the past week on a 4-point Likert-type scale (0=*never* to 3=*almost always*). For the present study we specifically used the 7 items of the *DASS* that assess anxiety. The Anxiety subscale of the *DASS-21* has been well validated and demonstrates strong convergent validity with other measures of anxiety (e.g., Brief Symptom Inventory Anxiety subscale ($r = 0.61$; Lovibond & Lovibond, 1995). Cronbach's alpha in the present sample was .87.

The Big-5 Inventory. The *BFI* (John & Srivastava, 1999) is a self-report measure designed to assess the five broad personality dimensions: extraversion, agreeableness, conscientiousness, neuroticism, and openness. The *BFI* is a 44 item measure that asks the participant to indicate how much a specified characteristic applies to themselves on a 5-point Likert-type scale (1=*disagree strongly* to 5=*agree strongly*). For the present study we specifically used the 8 items that assess neuroticism. Cronbach's alpha in the present sample was .88.

Procedure

The battery of questionnaires was completed by participants online via Amazon's Mechanical Turk (MTurk) service. MTurk is an online workplace in which users can complete tasks in exchange for payment. Users on MTurk could choose to take the 20-30 minute survey for a monetary reward of \$1.00. After viewing and accepting an informed consent document, participants completed a series of questionnaires about themselves. At the completion of the survey, participants entered a unique code to receive payment. All procedures were reviewed and approved by the Institutional Review Board at Appalachian State University.

Results

Bivariate correlations were conducted to examine the relation between AS and risk perception (see Table 1). Pearson's correlation was used to determine the strength of the correlation, ranging from -1 to 1 and represented by r ; the closer the r -value is to 1 the stronger the correlation. The correlation was determined statistically significant if the p -value was less than .05. Results indicated that ASI-3 total scores were significantly correlated with DOSPERT-RP total scores ($r = .15, p < .05$), as well as DOSPERT-RP Social ($r = .25, p < .05$) and Recreational ($r = .26, p < .05$) subscales. Analysis of the ASI-3 subscales revealed that the ASI-3 Social Concerns subscale was positively correlated with the Social subscale of the DOSPERT-RP ($r = .26, p < .05$). None of the other ASI-3 and DOSPERT-RP subscales were significantly correlated.

Table 1 also presents the bivariate correlations between ASI-3 scores and the likelihood of taking the specified risk. ASI-3 total scores were positively correlated with the

DOSPERS-RT Ethical ($r = .25, p < .05$) subscale. In addition, ASI-3 total scores were positively correlated with the DOSPERT-RP Health and Safety ($r = .21, p < .05$) subscale.

A hierarchical linear regression was conducted to determine whether ASI-3 scores uniquely predicted risk-perception after controlling for age, gender, trait anxiety and neuroticism. In the final block (see Table 2), demographic variables, trait anxiety, neuroticism and ASI-3 total scores explained 9.6% of the variance in risk-perception. Age, gender, and race were entered in Block 1, where age ($p = .022$), and gender ($p = .036$) were found to be significant predictors of risk-perception. The addition of DASS-Anxiety and BFI-Neuroticism entered in Block 2 did not significantly add to the predictive ability of the model ($p = .17$), age remained the only demographic with predictability ($p = .008$). When ASI-3 scores were added in Block 3 they predicted an additional 2.4% of risk-perception over and above demographics, DASS-anxiety and BFI-neuroticism.

A second linear regression was conducted to determine whether ASI-3 total scores predict risk taking above and beyond demographics, trait anxiety, and neuroticism. In the final block (see Table 2) demographic variables, trait anxiety, neuroticism and ASI-3 total scores explained 9.9% of the variance in risk-taking. Age, gender and race were entered in Block 1, where age ($p = .003$), and gender ($p = .025$) were found to be significant predictors of risk-taking. DASS-Anxiety and BFI-Neuroticism were added in Block 2, DASS-Anxiety ($p = .035$), age ($p = .024$) and gender ($p = .018$) were found to be significant predictors of risk-taking. When ASI-3 scores were added in Block 3 they did not significantly add to the predictive ability of the model ($p = .789$). DASS-Anxiety ($p = .042$), age ($p = .024$) and gender ($p = .017$) remained be significant predictors in risk-taking. In conclusion, after

controlling for age, gender, trait anxiety and neuroticism, ASI-3 scores did not significantly predict likelihood of taking a specified risk. The ASI-3 was shown to be more significant in perceiving risk rather than predicting the likelihood of engaging in the specified risk.

Discussion

The purpose of the present study was to extend previous research by examining the relation between AS and self-reported risk-perception and risk-taking behaviors. Previous research suggests individuals with AS have an increased perception of negative outcomes as well as heightened attention to threatening stimuli within an environment (Maner & Schmidt, 2006). Consistent with previous research and in support of the first hypothesis, results of this study indicated that AS was positively correlated with risk perception, with individuals with higher AS perceiving greater risk in situations. Increased risk-perception was especially found when the risk was related to social recreational domains.

The second hypothesis predicted AS to be negatively correlated with risk-taking behaviors based on previous research indicating that high AS individuals consistently make efforts to avoid heightened physiological arousal (Moshier et al., 2013). Contrary to expectations, results indicated a positive correlation between ASI-3 scores and DOSPERT-RT ethical and health/safety subscales, with individuals with high AS rating themselves as being more likely to take risks in ethical and health/safety domains. However, regression analyses indicated that AS did not predict risk taking after controlling for neuroticism, trait anxiety, and demographics. One possible explanation for this finding was that there may have been an insufficient number of participants who had high levels of AS in the study. Taylor and colleagues (2007) suggest a normative sample to have a mean ASI-3 total score

of about 10 for a non-clinical sample and a total score of about 14 for a clinical sample. The mean ASI-3 total score for the present study was 10.7, with a standard deviation of 9, and more than 15 percent of the sample scored above the clinical mean. Thus, it does not appear that too few participants with high AS can account for the lack of predictive ability of AS in the risk taking analyses. Another potential explanation lies in the mode of assessing risk taking in the present study. Previous research indicating a negative association between AS and gambling-related risk taking utilized self-report measures of activities participants had previously engaged in and a behavioral measure of risk-taking. In contrast, the present research asked participants to report the likelihood that they would engage in specific risky behaviors. Thus, it is possible that individuals with high AS perceive higher levels of risk in activities and believe that they would be likely to engage in risky behaviors, though when presented with the opportunity to take risks, they decline to or elect to avoid risk. Additional research will be needed to further evaluate this potential explanation. Alternatively, it is possible the DOSPERT- Risk Taking scale is not effectively portraying potential benefits to be gained by each specified risk. When deciding whether to engage in risk-taking, one must weigh the potential benefits and maladaptive outcomes of the risk; greater risks being taken when there is a greater perceived benefit. In contrast, research showed that smaller perceived risks were associated with greater expected benefits for all five risk domains of the DOSPERT scales (Weber, Blais & Betz, 2002). This research suggests that participants could not conceptualize the benefit being gained from the specified risk as measured by the DOSPERT-Risk Taking scale.

Finally, the positive correlation between AS and risk-taking in the health/safety domain can partly be understood in the context of research on AS and substance abuse. Previous research has indicated that high AS is a risk factor for substance abuse and dependence. Because AS amplifies anxiety, it is possible that it could lead to use of psychotropic drugs that have capabilities to eliminate, control or reduce anxious feelings (Stewart, Samoluk & MacDonald, 1999). Consistent with this theory, data show alcohol consumption to be significantly and positively correlated with AS. For example, one study showed high AS participants consumed significantly more drinks per week than low AS participants- 7.4 drinks per week vs. 2.2 respectively (Stewart, Peterson & Pihl, 1995). When analyzing risk-taking behaviors at the item level in the present study, it was found that ASI-3 total scores were most correlated with the DOSPERT-RT health and safety subscale item, “drinking heavily at a social function”. This significant, positive correlation suggests that as levels of AS increase, the likelihood the individual is to drink heavily at a social function increases, which may reflect an attempt for individuals with high levels of AS to reduce or control anxious feelings (Stewart, Samoluk & MacDonald, 1999). Future research in AS would benefit from examining a wider range of risky behaviors, such as excessive drinking.

The present research contained several strengths that aid in its contribution to the literature, including the examination of the relation between AS and risk perception and risk taking across a variety of domains, (i.e. social, recreational, ethical, financial and health/safety) and the use of a relatively large sample size that was fairly representative of age and gender in the United States. Another strength of the study was the large monetary reward of \$1.00 that was offered to MTurk workers. Studies have shown that MTurk workers

are willing to work for a compensation as low as 2 cents to complete a 30 minute survey, however, when the compensation amount is larger, the researcher was able to gain more responses and in a shorter period time (Buhrmester, Kwang, & Gosling, 2011). This high monetary reward not only increases the worker's interest in taking the study but there is also reason to believe it may increase credibility of the worker's answers; the worker will be more focused on providing truthful answers for the survey to ensure they will gain the reward. Another strength is the diversity of the present sample; MTurk samples are slightly more diverse than standard internet samples and are significantly more diverse than American college student samples (Buhrmester, Kwang, and Gosling, 2011). However, several study limitations also need to be taken into consideration when interpreting the findings. One limitation was the sole use of self-report measures. Broman-Fulks and colleagues (2014) were able to utilize self-report and behavioral measures (i.e. Iowa Gambling Task), finding significant results of risk-aversion among individuals with high AS during the behavioral risk-taking task. Perhaps an explanation for why the second hypothesis was not supported was because the likelihood of taking a specified risk was not measured efficiently by only self-report measures and thus risk-aversion was unable to be illustrated. The participants did not actually take any risks in this study and were not given an incentive too. Future research on AS may benefit from assessing risk-taking with both self-report and behavioral measures. Another limitation may have been the use of MTurk as the sole means of collecting data. MTurk is a well-established and trusted internet marketplace, however, there are a few variables that should be acknowledged in regards to the accuracy of information gained by this survey site. Anyone with access to a computer can be an active

worker on MTurk. As noted, this is a strength of the marketplace as it allows researchers to access a more diverse sample size, however it is also a weakness as it leads researchers to question just who it is they are obtaining information from. There is often an assumption that workers will be untruthful, that they will: select random answers and not fully read or pay attention to the survey content so they can gain their monetary reward as quickly as possible. To ensure this does not happen, researchers add validity items to their surveys, “If you’re reading this, select ‘very frequently’ as your answer”. In this example, if a worker did not select ‘very frequently’ it can be assumed they were not actively participating in the survey and thus should not be rewarded. The present study contained validity items and if the worker incorrectly answered two or more validity items their responses were removed from the data and they were not compensated. Perhaps use of another marketplace or survey means in compliment to MTurk would increase trust in the sample.

In summary, the present study found that AS has a significant and positive correlation with risk-perception especially in social and recreational domains. AS was also found to have a significant and positive correlation with risk-taking as evidenced by the DOSPERT’s ethical and health/safety subscales. This unexpected positive correlation can be partly explained by the sole use of self-report measures, previous research indicating alcohol use as a means to cope for anxious individuals and, the use of MTurk as the sole means for collecting data. Future research on AS and risk-taking behaviors can benefit from using self-report measures in compliment with behavioral tasks as well as collecting data from other or various surveying marketplaces. In addition, research on AS can benefit from examining a wider range of risky behaviors, such as excessive drinking.

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Table 1:

Bivariate Correlations between ASI-3 and DOSPERT Risk Perception and Risk Taking totals and subscales

	ASI3 Total	ASI3 Physical	ASI3 Cognitive	ASI3 Social
DOSPERT-RP Total	.15*	.07	.06	.21**
DOSPERT-RP Social	.25**	.12	.23**	.26**
DOSPERT-RP Recreation	.17*	.14	.23**	.17*
DOSPERT-RP Ethical	.04	-.03	.01	.11
DOSPERT-RP Financial	.08	.06	-.03	.14*
DOSPERT-RP Health and Safety	.03	.02	-.06	.10
DOSPERT-RT Total	.11	.05	.12	.10
DOSPERT-RT Social	-.05	-.03	-.10	.01
DOSPERT-RT Recreation	.07	.02	.10	.06
DOSPERT-RT Ethical	.25**	.20**	.20**	.22**
DOSPERT-RT Financial	.34	-.00	.10	-.00
DOSPERT-RT Health and Safety	.21**	.16**	.21**	.15*

Table 2:*Linear Regression Analysis between ASI-3 and DOSPERT-RP and DOSPERT-RT total scores*

<i>Risk-Perception</i>									
Variable	Model 1			Model 2			Model 3		
	<i>B</i>	<i>SE B</i>	<i>p</i>	<i>B</i>	<i>SE B</i>	<i>p</i>	<i>B</i>	<i>SE B</i>	<i>p</i>
Age	0.38	0.16	.02	0.46	0.17	.01	0.50	0.17	.00
Gender	7.90	3.74	.04	6.25	3.83	.10	6.39	3.78	.09
Race	0.46	1.97	.81	0.87	1.98	.66	1.06	1.97	.59
Anxiety				0.20	0.56	.73	-0.38	0.61	.53
Neuroticism				0.42	0.29	.14	0.27	0.29	.36
Anxiety Sensitivity							0.57	0.26	.02
<i>R</i> ²		.05			.07			.09	
<i>Risk-Taking</i>									
Variable	Model 1			Model 2			Model 3		
	<i>B</i>	<i>SE B</i>	<i>p</i>	<i>B</i>	<i>SE B</i>	<i>p</i>	<i>B</i>	<i>SE B</i>	<i>p</i>
Age	-0.44	0.14	.00	-0.35	0.15	.02	-0.35	0.15	.02
Gender	-7.64	3.39	.02	-8.29	3.46	.02	-8.33	3.47	.02
Race	-1.12	1.70	.51	-1.12	1.71	.48	-0.35	1.71	.48
Anxiety				1.10	0.52	.04	1.12	0.57	.04
Neuroticism				-0.93	0.26	.72	-0.08	0.27	.77
Anxiety Sensitivity							-0.06	0.24	.79
<i>R</i> ²		.07			.09			.09	