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Decisions, Decisions: The Influence of Anxiety on Decision Making

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Abstract

The purpose of the present study was to better understand the influence of state anxiety on decision making, including how constructs such as trait anxiety and emotional intelligence may moderate this relationship. Participants were randomly assigned to a state anxiety-inducing condition or a control condition. They were then prompted to complete a computerized dynamic decision-making task in which optimal performance requires exploring a novel decision environment and learning reward contingencies of the task. Prior to the experimental manipulation, participants also completed self-report measures of trait anxiety and emotional intelligence. Independent sample t tests were employed to measure differences between the experimental and control conditions in decision-making performance, and moderation analyses investigated the influence of trait anxiety and emotional intelligence on this relationship. Unexpectedly, results of this study revealed better decision-making performance among participants in the state-anxious condition (but only marginally significant), with no significant moderating effects of trait anxiety or emotional intelligence. These findings can be helpful in elucidating the impact of state anxiety on decision outcomes, highlighting both positive and negative contributions to decision making performance.

Keywords: dynamic decision making, state anxiety, trait anxiety, emotional intelligence

MONTCLAIR STATE UNIVERSITY

Decisions, Decisions: The Influence of Anxiety on Decision Making

By

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Whether it is consciously or not, people make decisions nearly every minute of every day. These daily decisions range in importance; some are made subconsciously, or are as simple as choosing to get out of bed, while others may dictate a major career change. No matter if a decision is big or small, it is crucial to acknowledge the many possible influences behind how and why it is made. Much like decision making, anxiety is commonly experienced by the general population, and even an everyday part of life for some (Clark, 1999). In fact, one in three people are likely to be diagnosed with any one anxiety disorder, with specific phobias and social anxiety being among the most prevalent (Kasper, 2006). The relationship between anxiety and decision making is not unexplored, but much of the literature has focused on emotional decision making, risky decision making, and performance under pressure (Buelow & Blaine, 2015, Myeong-Gu & Barret, 2007, Russell & Hatfield, 2013). As exemplified by the work led by researchers like Leal et al. (2017) and Cheng and McCarthy (2018), it is imperative to consider state and trait anxiety as separate units, each of which may pose different effects on decision-making outcomes. Moreover, with the understanding that anxiety involves an emotional component, it is also worthwhile to consider how one's emotional intelligence in regard to the emotions of themselves and others may moderate such outcomes.

Although some research has recognized anxiety as beneficial to decision-making in terms of performance under pressure (Mendl, 1999), it is typically considered good practice not to make big or important decisions while experiencing intense or overbearing emotions. Sometimes, however, high-pressure circumstances present themselves that force such decisions to be made. Therefore, it is crucial to understand how in-the-moment state anxiety may impact peoples' abilities to make decisions advantageously or without struggle. The present research

sought to gain not only this understanding, but also how trait anxiety and emotional intelligence may also play moderating roles. Sometimes conditions arise that force decisions to be made under anxious circumstances. Perhaps by establishing this knowledge and gathering an understanding of how trait anxiety and emotional intelligence may buffer the impact of state anxiety on decision making, a better approach can be taken to best navigate these types of situations. With this, people can become better suited to face challenging choices that life is bound to present, and in turn, make decisions that are advantageous and well-informed.

Anxiety

In order to understand the relationship between anxiety and decision making, it is imperative to first understand anxiety itself. Anxiety is defined as an emotion characterized by feelings of distress, fear, uneasiness, and/or physiological arousal in the face of stressful or unfamiliar stimuli (Kouchaki & Desai, 2015). While over 30% of American adults are diagnosed with some type of anxiety disorder in their lifetime, and an even larger percentage have reported suffering from feelings of anxiety, not all experiences are the same (Merikangas et al., 2010). Anxiety comes in many different forms, and for some what may be regarded as a minor annoyance, for others could be a debilitating state. Although there are many ways to categorize anxiety, it is often looked at as one of two types: state anxiety and trait anxiety.

According to Pacheco-Unguetti et al. (2010), state anxiety is specific to a present, threatening stimulus. For instance, one might experience state anxiety when walking through a haunted house, or running late to an important work meeting. Conversely, trait anxiety is associated with regular, or even constant, attention that is given to a perceived threatening stimulus or the possibility of a threatening stimulus (Reiss, 1997). An example of trait anxiety, which tends to be more generalized than state anxiety, may be regular feelings of worry over

school, work, finances, social situations, or other feared circumstances. Oftentimes, people with trait anxiety would consider anxious feelings as a part of their personality. No matter the intensity or type of anxiety, though, it is well known that its presence can have biological, physical, and psychological effects, capable of impacting day-to-day wellbeing and overall quality of life (Cramer et al., 2005).

In the face of anxious stimuli or stressful situations, people tend to enter into default behaviors known as 'fight or flight' mode, meaning that they will either address the anxious stimuli head-on (fight), or remove themselves from the situation in fear (flight). This biological response, sometimes referred to as a survival mechanism, happens within the body's sympathetic nervous system, during which neurons in the hypothalamus and brain stem are activated (Goligorsky, 2001). Work by McLeod et al. (1986) highlights other possible somatic symptoms when experiencing anxiety, such as sweating, muscular tension, increased heart rate, headaches, stomachaches, and jitteriness. Symptoms of anxiety may present in other, less noticeable forms as well, such as mental effects. In fact, anxiety is very commonly diagnosed with other mental disorders, with some of the most frequent being depression, post-traumatic stress disorder, and social phobias such as agoraphobia (Kaufman & Charney, 2000). According to the social-function theory of emotions, anxiety can even be considered as a natural human emotion, which in some ways individuals need to function (Keltner & Haidt, 1999). Given the many different ways in which anxiety can affect people's lives and dictate mental and physiological behaviors and responses, it is clear just how powerful the impact can be on important psychological and behavioral outcomes.

Anxiety and Decision Making

Humans make decisions throughout the day, ranging from low to high risk and reward. There are many different decision-making models that can be followed, such as choice elimination (Tversky, 1972) or mental shortcuts (Tversky & Kahneman, 1973). Generally, when making decisions, though, people weigh different factors and circumstances that contribute toward the final decision they choose, in the hopes that they are making the best choice (i.e., maximizing utility). However, there are some situations in which decisions must be made under pressure or in uncertain conditions, which can invoke stress and anxious feelings due to the fear of making sub-optimal decisions. For someone with an anxious disposition, it may not be uncommon for them to have to make decisions under the influence of stress and anxiety. Now, whether or not this regular experience of anxiety is helpful or harmful in making decisions under state anxiety is up for debate. Research conducted by Pajkossy et al. (2009) established trait anxiety as more likely to trigger negative decision-making performance than state anxiety among participants completing the Iowa Gambling Task. However, it was not considered how the two types of anxiety interacted to affect performance. Other research has demonstrated that state anxiety is the more impactful of the two on decision making, with experimentally instilled anxiety having a significant negative effect on intuitive decision performance as compared to neutral and positive mood conditions (Remmers & Zander, 2017).

Despite various findings across the literature in regard to the individual and comparative effects of both state and trait anxiety on decision making, the following is suggested from the literature: anxiety, in general, tends to have a negative impact on peoples' ability to make advantageous or optimal decisions. A large part of this literature focuses on anxiety-based decision making specifically in relation to risks and rewards. Many studies have demonstrated a preference for lower risk (lower reward) options amongst participants placed in anxiety

conditions (Raghunathan & Pham, 1999). This indicates the preference for those experiencing feelings of anxiety to go with the safer option when making decisions, indicating a possible need for a feeling of security and assurance. In some situations, reduced risk can prove to be just as beneficial. However, without the willingness or ability to make advantageous risky or high-pressure decisions, it can be difficult to create opportunities for high reward, which is why many deem it as inadvisable to make decisions under anxious conditions (Wray & Stone, 2005, Zhao et al., 2015).

Many of these studies that focus on state anxiety and decision making do not consider trait anxiety as a moderating factor. Outside of the social psychology realm, the relationship between anxiety, decision making, and performance has been studied in various branches of the discipline, such as sports psychology and industrial-organizational psychology. Some research completed in these areas has demonstrated the positive effect of trait anxiety on performance. For instance, a study completed by Mughal et al. (1996) on stress and work performance identified employees with higher levels of trait anxiety as better performing than those with lower levels, due to their tendency to exert greater work effort. Similarly, there is something in sports known as ‘clutch performance,’ which describes an athlete’s ability to use the anxiety and nervousness they are feeling to perform exceptionally in their sport (Swann et al., 2016). Given the implications of work such as this, it must be considered whether or not trait anxiety can be used to one’s advantage when making decisions under the influence of state anxiety and stressful circumstances. Although it typically starts out as debilitating, people with trait anxiety often find ways to cope with their day-to-day anxiety, and have even demonstrated the likelihood to perform better as a result of negative feedback and circumstances (Jones et al., 2020). This leaves room to believe that perhaps this regular management of anxiety in daily life can help

individuals navigate state anxiety decision making better than those who are unfamiliar with such feelings.

Emotional Intelligence

Emotional intelligence is another construct that plays a role in thought processes and decision making. Emotional intelligence (EI) describes one's ability to understand and use their own emotions to understand and respond appropriately to the emotions, decisions, and circumstances of others (Abouhasera et al., 2023). Emotional intelligence is generally regarded as a desirable trait, for there is abundance of research that has demonstrated the positive relationship between EI and real-world success (Cherniss et al., 2006). At its core, anxiety is an emotion, and although it may not be one that is always easy to regulate, heightened emotional intelligence may be helpful in doing so. Fernandez-Berrocal et al. (2006) were able to depict emotional intelligence and mood regulation as positively related to self-esteem and negatively related to anxiety. In fact, there is an overwhelming amount of existing literature on the significant, negative relationship between emotional intelligence and anxiety (Cejudo et al., 2018, Connor & Slear, 2009, Taylor et al., 2017).

With this knowledge, it is possible that emotional intelligence and regulation training could be used as a means of coping not only with trait anxiety, but with the governing of state anxiety as well. Moreover, with the ability to maturely regulate emotions, even if they are of a stressful or upsetting nature, it is possible that the presence of state anxiety could be less detrimental to the making of advantageous decisions. Typically, decisions "made with the heart and not with the brain" are not regarded as smart decisions. Heightened emotions can influence people to act, speak, and behave in certain ways that are unfavorable or ill-advised, known as emotionally-driven decisions (Lerner et al., 2015). For this reason, it is critical for one to be able

to make emotionally-intelligent decisions in high-pressure or anxious situations. Yip and Côté (2012) completed a study on the role of emotion-understanding in decision making while under the influence of incidental anxiety. Results confirmed the powerful role of EI in decision making facilitation, such that individuals with higher emotion-understanding ability were able to better perform under incidental anxiety and make less risky, disadvantageous decisions. These results suggest that emotional intelligence is a relevant construct when making decisions that are anxious, upsetting, or apprehensive. By considering emotional intelligence when looking at the role of anxiety in decision making, it can be better understood why such awareness can be used as an aid in anxious situations where risky or difficult decisions must be made.

Overview of Present Research

Within the field of cognitive psychology, there has been a sizable amount of research completed on the topics of anxiety, decision making, and emotional intelligence, each in their own respect (Butler & Mathews, 1983, Checa & Fernández-Berrocal, 2015, Eysenck et al., 2007, Hunt et al., 1989). It has been found that anxiety and decision making share a relationship, but it still remains unclear in what decision contexts advantageous or disadvantageous outcomes occur. Moreover, emotional intelligence has been identified as a means of better dealing with anxiety, but how EI can be used to manage the impact of state anxiety while making decisions is less explored. Although serving as a solid foundation from which to start, much of the past research does not take into consideration some important factors. For instance, the difference between trait and state anxiety and how each may differently influence advantageous decision making is often overlooked. Even within the research that does successfully separate the two, usually only one is the primary focus in its relation to decision making. Moreover, it is not well understood the way in which implemented state anxiety influences decision making as moderated by both

trait anxiety and emotional intelligence, which have both been identified individually as influences on decision making outcomes.

The present research aimed to fill such gaps by studying all of these variables together in order to better understand the relationship between state anxiety and decision making and how the presence of trait anxiety and emotional intelligence levels moderate this relationship. Participants completed a computerized dynamic decision-making task in which optimal performance required exploring the reward space and learning the strategy that maximizes long-term reward outcomes. Importantly, participants completed this decision-making task after either being assigned to an anxiety or control condition. Measures of trait anxiety and EI were also collected prior to the experimental manipulation. It was hypothesized that participants in the state anxiety condition would perform significantly worse on the decision-making task than would participants in the control condition (H1). It was also predicted that both emotional intelligence (H2) and trait anxiety (H3) would moderate the impact of the state anxiety manipulation on decision-making performance, such that higher emotional intelligence and regular experiencers of anxiety would buffer the negative impact of state anxiety on decision making performance.

Method

Participants

The present study consisted of 89 participants (47 in control condition, 42 in experimental condition) enrolled in undergraduate psychology courses at a large, public university located in northern New Jersey (22 males, 63 females, 4 unspecified). Students ranged in age from 18-50 (M = 19.96, SD = 3.86). As for ethnicity, 42.7% were White, 21.4% were Black or African American, 5.6% were Asian, 1.1 % were American Indian or Alaska Native,

20.2% fell into an unlisted category, and 9% preferred not to disclose. Participants were recruited through SONA, an online scheduling system through which students can participate in research for course credit. As compensation for their time, participants were awarded with 3 SONA credits. The target sample size is 100. As a result, the results presented below are preliminary. However, no decisions are being made to alter the study guidelines based on these preliminary analyses, so data collection will continue until the sample size of 100 is met.

Materials

Materials used for this study included the State-Trait Anxiety Inventory, the Schutte Self Report Emotional Intelligence Test, an anxiety-induction video or a control condition video, a manipulation check, a dynamic decision-making task, and a demographics questionnaire.

State-Trait Anxiety Inventory. Form Y-2 of the State-Trait Anxiety Inventory was used to assess participants' level of trait anxiety (Spielberger et al., 1970). It consists of 20 statements pertaining to trait anxiety, such as, "I am a steady person" and "I am content." Participants were asked to self-report their feelings of trait anxiety by scoring statements on a Likert scale ranging from 1 (not at all) to 4 (very much so). The internal consistency in the present data was excellent (Cronbach's $\alpha = .913$).

Schutte Self Report Emotional Intelligence Test. The Schutte Self Report Emotional Intelligence Test, developed by Schutte et al. (1997), was used to assess participants' level of emotional intelligence. It consists of 33 statements pertaining to emotional intelligence, such as, "I expect good things to happen" and "I know why my emotions change." Participants were asked to self-report their levels of emotional intelligence by scoring statements on a Likert scale

ranging from 1 (strongly disagree) to 5 (strongly agree). The internal consistency in the present data was excellent (Cronbach's $\alpha = .905$).

Anxiety Induction Video. The anxiety induction video was shown only to participants assigned to the experimental group. The video lasted for a total of five minutes and depicted multiple clipped scenes from various horror films (Bosse et al., 2014).

Control Condition Video. The control video was administered only to participants assigned to the control condition. The video was a three-minute clip from a nature documentary (Bosse et al., 2014).

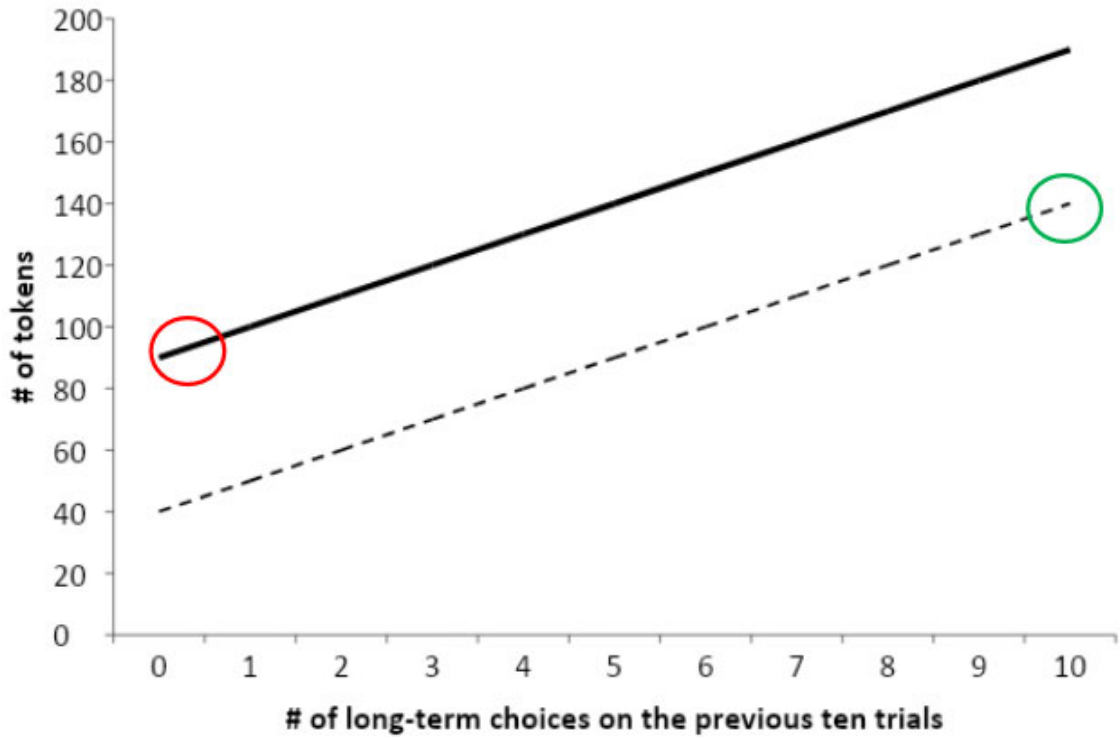
State-Trait Anxiety Inventory (Manipulation Check). Two items from Form Y-1 of the State-Trait Anxiety Inventory, and an additional third item, were used to assess participants' level of state anxiety, and thus the effectiveness of the study's manipulation (Spielberger et al., 1970). Participants were asked to score these statements, which read "I feel nervous," "I am tense," and "I feel anxious," on a Likert scale ranging from 1 (not at all) to 4 (very much so). The internal consistency in the present data for these three items was very good (Cronbach's $\alpha = .892$).

Dynamic Decision-Making Task. A variation of a decision-making task used in prior research was used to assess participants' ability to make long-term advantageous decisions (Byrne et al., 2019; Gureckis & Love, 2009; Otto et al., 2012; Worthy et al., 2012). It was administered to participants electronically after the experimental manipulation via the PsychoPy software package in Python. The task required participants to make a series of binary choices between two reward options using the left and right arrow keys to work an electronic slot machine. One option always returned greater reward on a given trial (more slot machine tokens).

However, the selection of this reward option over successive trials depreciated the reward amount. The second reward option always returned less reward than the other option on a given trial, but the selection of this second reward over successive trials increased the reward amount. The long-term maximizing slot machine was on the left side of the screen for half of the participants and the right of the screen for the other half of the participants. Because the reward amount after ten selections of the increasing option is greater than the reward amount after ten selections of the decreasing option, optimal performance in this task is to repeatedly select the long-term increasing option (see Figure 1). As a result, optimal decision performance is achieved by inhibiting the desire for the immediate higher rewards of the first option for the long-term gains of the second option. Participants completed 100 trials of the task.

Figure 1

Dynamic Decision-Making Task



Note. Optimal payoff stems from repeated selection of the long-term increasing option.

Demographics Questionnaire. The demographics questionnaire posed questions to participants regarding their age, ethnicity/race, and gender.

Design

The present study applied an experimental design. The induction video accomplished the manipulation of state anxiety among participants in the experimental group, whereas those in the control condition watched a neutral video. The participants in the study were randomly assigned to one of these two conditions (the independent variable). The dependent variable was measured by performance on the dynamic decision-making task. Performance can be operationalized in two ways. One metric is the proportion of long-term maximizing choices made throughout the entire task. The second metric is the proportion of long-term maximizing choices broken down by block (e.g., five blocks of 20 trials), since achieving optimal performance requires exploring the reward space and learning the reward contingencies of the task over time. The study also sought to explore the influence of two moderating variables on the relationship between state anxiety and decision making, which are trait anxiety and emotional intelligence. These two moderating variables were assessed through quantitative self-report measures prior to the experimental manipulation.

Procedure

Participants signed up for a one hour in-person study ahead of time through SONA. Before beginning participation, they read over and signed a consent form. The consent form described the purpose of the study as to examine the decision-making abilities of college students. Those who consented were led through multiple items involved in the study, including separate measures of trait anxiety and emotional intelligence on Qualtrics, the anxiety or control

condition induction videos watched on a computer (with headphones for sound), a measure of state anxiety, the dynamic decision-making task completed on a lab computer, and a demographics questionnaire (also completed on Qualtrics). Participants were debriefed at the end of the study and provided with a physical list of psychological support resources on campus that they could use if necessary following the state anxiety manipulation.

Data Analysis Plan

SPSS was used to organize the study data and run a variety of statistical analyses based on the study hypotheses. First, a manipulation check was performed to ensure that the anxiety manipulation did significantly increase levels of state anxiety compared to the control condition. An independent samples t-test was used to show this contrast. An independent samples t-test was also used to test H1 by measuring the difference in overall decision-making task performance between the experimental and control conditions. This was followed up with a mixed-ANOVA to analyze change in decision-making performance over time between the two conditions. The PROCESS macro in SPSS was used to test the two moderation hypotheses (H2 and H3). Specifically, trait anxiety and emotional intelligence were entered as separate moderators of the anxiety manipulation (the IV) and decision performance (the DV). The moderators were mean-centered prior to the moderation analysis to reduce issues of multicollinearity. Other assumptions of the above statistical tests were also tested prior to the hypothesis analyses, such as the normality of the DV and the equal variance assumption. The study was pre-registered with the Open Science Framework (OSF) prior to data collection (https://osf.io/n7svd). Included in the preregistration was a description of the study, hypotheses, sample size rationale, study materials, and a data analytic plan. Furthermore, upon study completion, all de-identified data and analysis syntax was uploaded to OSF (https://osf.io/xmqdr/).

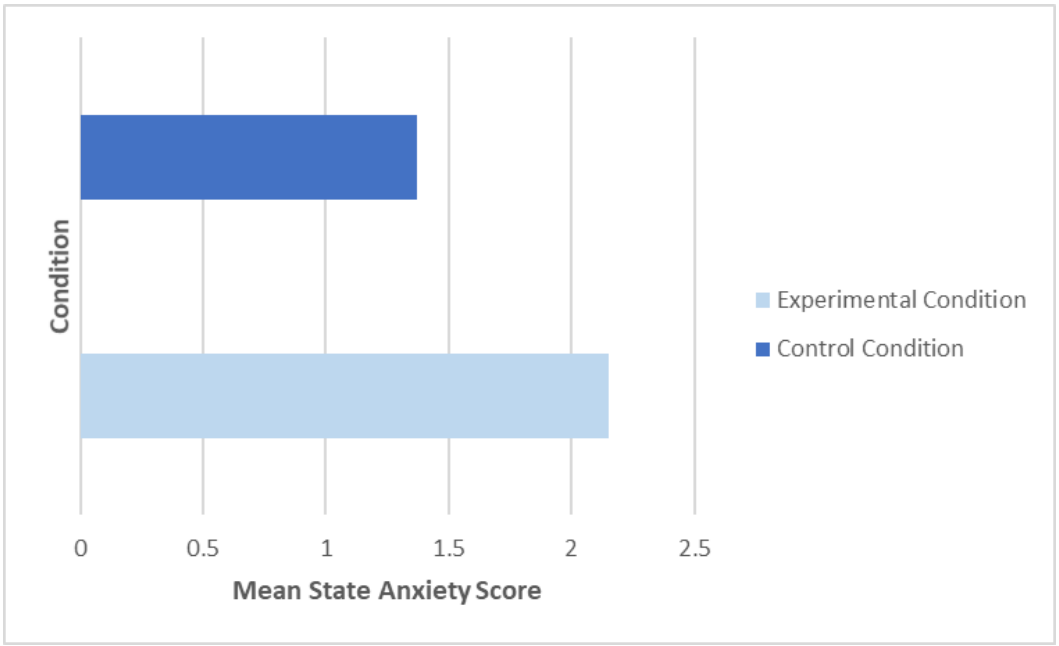
Results

Manipulation Check

This study consisted of manipulation to state anxiety. In order to ensure that the anxiety manipulation did significantly increase levels of state anxiety compared to the control condition, an independent samples t-test was performed on mean scale scores of the three state anxiety items (which were administered immediately after the experimental manipulation). The test revealed a significant difference between the levels of state anxiety among the two groups, such that participants in the experimental condition demonstrated significantly higher levels of state anxiety (M = 2.15, SD = .95) than participants in the control condition (M = 1.37, SD = .63), t (85) = -4.54, $p < .001$., Cohen's d = -.97, (see Figure 2). This demonstrates that the manipulation of state anxiety on participants was effective.

Figure 2

Mean State Anxiety Score by Condition (Manipulation Check)



Note. Mean state anxiety manipulation check between experimental (M = 2.15) and control (M = 1.37) conditions.

Decision-Making Task Performance

Bivariate Pearson Correlations were first performed among the continuous study variables. There was a negative and significant correlation between trait anxiety and emotional intelligence (r = -.50, p < .001). However, overall performance on the decision-making task did not correlate with either trait anxiety (r = .08, p = .478) or emotional intelligence (r = -.16, p = .134).

An independent samples t-test was performed to analyze overall performance on the decision-making task between the experimental and control conditions. Means and standard deviations are depicted in Table 1. Contrary to what was hypothesized, the test revealed no significant difference between groups on decision-making task performance; t (86) = -1.78, p = .079. Although there was no significant difference, it is worth noting that participants in the experimental condition actually performed marginally significantly better, on average, than participants in the control condition. This demonstrates that the hypothesis that participants whose state anxiety was manipulated would perform worse on the decision-making task (H1) was not supported.

Table 1

Descriptive Statistics

Overall Decision-Making Task Performance	Condition	N	Mean	Standard Deviation
	Experimental	42	.35	0.2
	Control	46	.28	.18

Note. Means and standard deviations of overall decision-making task performance are compared between participants in the experimental and control conditions, revealing no significant difference between groups.

Additionally, a 5x2 mixed-ANOVA was run with condition as the independent variable and the five blocks of decision-making task performance as the within-subjects factor. Cell and marginal means and standard deviations are shared in Table 2. Results revealed a strong overall significant main effect of block on decision-making task performance, such that performance increased across the task, F (4, 344) = 9.21, $p < .001$, partial $\eta^2 = .1$ (see Figure 3). The overall main effect of condition, as described above, was not significant, F (1, 86) = 3.17, $p = .079$, partial $\eta^2 = .04$. Finally, the mixed-ANOVA revealed no significant interaction effect between the two factors, F (4, 344) = .04, $p = .997$, partial $\eta^2 = 0$. This demonstrates that participants' performance on the decision-making task in each block did not depend on the condition they were assigned to.

Table 2

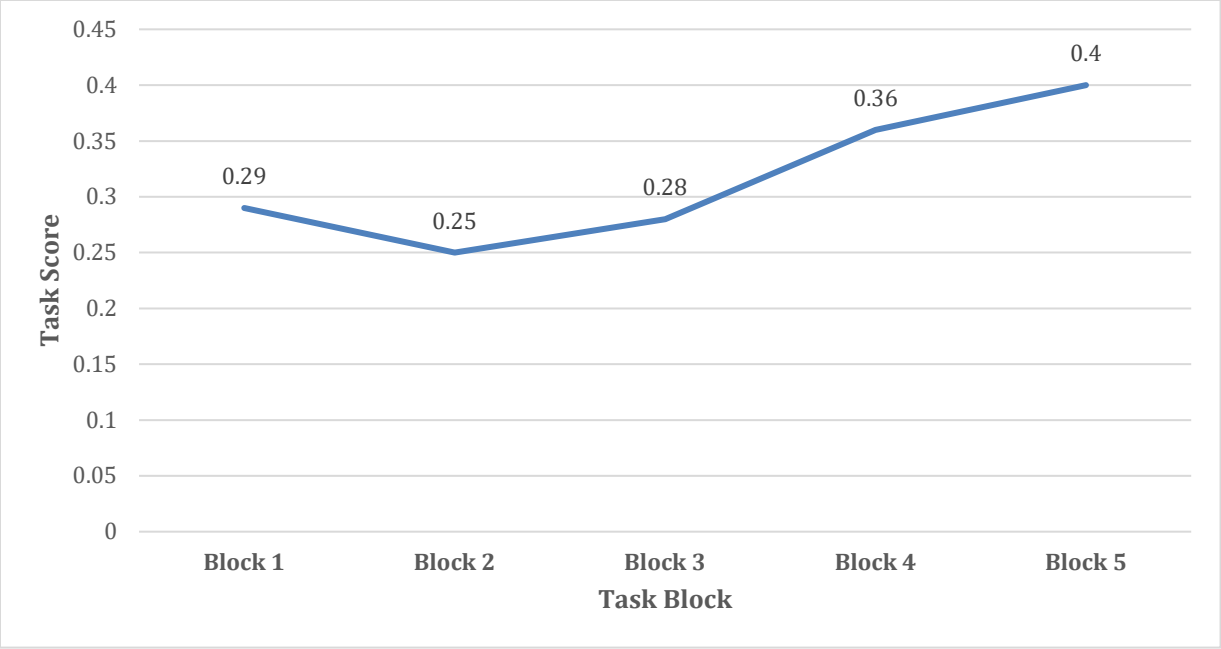
Descriptive Statistics

	Block 1	**Block 2**	**Block 3**	**Block 4**	**Block 5**	**N**
Experimental Condition	.32 (.17)	.28 (28)	.33 (.26)	.4 (.31)	.43 (.31)	42
Control Condition	.26 (.11)	.21 (.21)	.24 (.24)	.32 (.3)	.36 (.31)	46
Total	.29 (.14)	.25 (.24)	.28 (.25)	.36 (.31)	.4 (.31)	88

Note. A mixed-design analysis of variance comparing both conditions, across all five task blocks, on decision making task performance was run. The overall effect of condition was not significant. The overall effect of block was significant. The interaction effect between condition and block was not significant.

Figure 3

Mean Decision-Making Task Performance by Block



Note. Overall mean decision-making task performance by block.

Though the interaction between condition and decision-making block was not significant, exploratory post-hoc tests did reveal that the state-anxiety condition had significantly higher/better performance than the control condition on the first block of trials ($p = .029$), but not for the remaining four blocks of trials. These results could suggest that the manipulation of state anxiety afforded participants the ability to learn the decision-making task environment sooner and achieve significantly higher performance early on. However, because the interaction effect was not significant, and this effect is counter to the hypothesized direction, it must be interpreted with caution.

Trait Anxiety and Emotional Intelligence

The PROCESS macro in SPSS was used to conduct the moderation analyses. Trait anxiety and emotional intelligence were entered as separate moderators of the anxiety manipulation (the IV) and decision-making task performance (the DV). The continuous moderators were mean-centered prior to the moderation analysis to reduce issues of

multicollinearity. Analysis of conditional effects showed that the interaction effect with trait anxiety was insignificant, B = .006, SE = .076, t = .079, p = .94, as well as the interaction effect with emotional intelligence, B = -.017, SE = .089, t = -.190, p = .85. These results go against both H2 and H3 regarding the moderating effects of trait anxiety and emotional intelligence on the impact of the state-anxiety manipulation on decision making task performance.

In the model with trait anxiety entered as the moderator, the main effects for both the anxiety manipulation IV (B = .08, SE = .04, t = 1.85, p = .067) and the trait anxiety moderator (B = .03, SE = .06, t = 0.57, p = .572) were not significant. For the model with emotional intelligence entered as the moderator, the main effect for the anxiety manipulation IV reached statistical significance (B = .08, SE = .04, t = 2.02, p = .047), whereas the main effect for emotional intelligence moderator was not significant (B = -.07, SE = .06, t = -1.09, p = .280).

Discussion

Hypotheses, Implications, and Interpretations

The goal of the present research was to gain a better understanding of the influence of state anxiety on decision making. Moreover, this research sought out to understand how trait anxiety and emotional intelligence may moderate this relationship. Prior to conducting the study, three hypotheses were established. The first was in relation to state anxiety and decision making, predicting that participants in the anxiety condition would perform worse on the decision-making task than participants in the control condition. In opposition to this hypothesis, the findings of this research demonstrated that it was the participants in the state anxiety condition who performed marginally significantly better at the decision-making task. Although not expected, there could be many reasons as to why this is. One possibility is that manipulated state anxiety

has the potential to increase arousal and focus. Pacheco-Unguettiet al. (2019) conducted a study which manipulated participants' state anxiety and then had them complete an attention-dependent task. Results demonstrated that state anxiety was related to heightened attention as a result of the over functioning of alerting and orienting networks. Another study, which employed a very similar decision-making task to its participants, revealed improved long-term reward long-term reward maximization as a result of imposed acute stress (Byrne et al., 2019). Based on these findings, it is possible that in the present study, state-anxiety-induced attention aided the ability to explore and learn the decision environment when completing the decision-making task.

An additional means of heightening attention can be through arousal, which is a matter a large amount of research investigates. It has been found that heightened levels of arousal can cause individuals to perform better at decision making tasks as a result of their attention being captured and more focused (Fernandes et al., 2011). With this in mind, it is important to consider whether or not in addition to promoting feelings of anxiety, the study's manipulation also promoted feelings of arousal in participants, which in turn may have heightened their attention levels, and thus their performance on the decision-making task. Another relevant factor to be considered here is the Fazey and Hardy (1988) Catastrophe Model of Anxiety and Performance. According to this model, when different types of anxiety are at different levels, performance on any given task can benefit or worsen from it. In their own research, Fazey and Hardy compared the relationship between somatic and cognitive anxiety and their effect on performance, finding that increased levels of cognitive anxiety are helpful for performance when somatic anxiety is low (Hardy & Parfitt, 1991). Although an interaction between trait anxiety and state anxiety was not found in the present study, based on this model, there may be situations where low trait anxiety and heightened state anxiety make for better decision-making performance.

Aside from the relationship between state anxiety and decision-making performance alone, it is also important to consider why no significant moderating effects of trait anxiety and emotional intelligence were found as predicted. In regard to trait anxiety, some research has found that its relationship to state anxiety is more harmful than helpful, revealing an interaction effect on decision-making between the two. Meijer (2001) demonstrated that state anxiety increases more rapidly as a function of trait anxiety. This suggests that when presented with a high-tense or anxious situation, people who are generally anxious may be worse off rather than more capable of managing such familiar emotions. In fact, emotions are another factor that may play an important role in anxiety and decision making, which is why the present study measured for emotional intelligence levels as well. In the workplace, for example, higher emotional intelligence scores are oftentimes associated with better stress management and ability to cope with anxiety (Nooryan et al., 2012). Even in social settings, higher levels of emotional intelligence have been shown to better assist young adults in coping with the social stressors of everyday life (Kumar et al., 2021). Unfortunately, the results of this study did not provide support for these research findings, as no significant moderation effects of emotional intelligence on anxiety and decision-making performance were discovered. Perhaps this can be attributed to the fact that just as high emotional intelligence has its benefits, it may also exhibit pitfalls as well. For example, emotional intelligence is oftentimes correlated with personality traits such as empathy and deep consideration/assessment of situations (Elder 1997). In a high-pressure decision-making situation, people with high emotional intelligence may want to take more time to critically think in order to make what they consider to be advantageous and intelligent decisions (Alzoubi & Aziz, 2021). In turn, this may mean that their emotional intelligence may hurt them rather than help them in situations where they are not granted much time for thought or

deliberation. In accordance with this, the present study's decision-making task did not allow much time for critical thinking or evaluation. Therefore, perhaps making the influence of emotional intelligence meaningless to decision-making task performance,

Strengths and Limitations

There are a number of noteworthy strengths that the present research offered. First and foremost, the research was pre-registered with the Open Science Framework, where de-identified data and findings will be uploaded following the conclusion of the study. There are many benefits to uploading to Open Science Framework (OSF). Aside from acting as a project management tool for researchers, OSF has also become a database that largely promotes open and transparent research within the field of psychology and beyond. The pre-registration of the present study ensured that all hypotheses and research methods remained consistent prior and post data collection. Within a discipline that has been so strongly encouraging open and honest research practices in recent times, the act of uploading documentation of the research process from beginning to end is a very imperative step. An additional strength of the present research was the success of the manipulation check. The manipulation check of the study was employed through the measure of state anxiety following exposure to the control or experimental video. Data analysis revealed that participants who watched the anxiety manipulation video reported significantly higher levels of state anxiety than did participants in the control condition, which demonstrates the effectiveness of the study's manipulation. Had the manipulation of state anxiety not been successful, then it would have been difficult to draw proper conclusions regarding whether or not it had actually influenced decision-making task performance. However, it is important to note that the descriptive statistics for the manipulation check items demonstrate that the state anxiety condition produced anxiety levels in the "moderate" range on average. As a

result, it may be the case that the manipulation led participants to be in a “sweet spot” with regards to the relation between anxiety and performance (i.e., enough state anxiety to increase arousal but not enough to exhibit a debilitating effect). It is possible that an even stronger state anxiety manipulation would have led to worse decision-making performance compared to a control condition.

Just as the study has notable strengths, there are limitations to the research worth mentioning as well. Most apparently, the sample size of the research was not ideal. A total of only 89 participants have been collected up to this point, the large majority of whom were female and White. In terms of demographics, the study population was not diverse enough to make findings completely applicable to the general population. The biggest reason as to why the sample size was small and rather uniform is because this study was conducted at one university within the span of a few months, not allowing for researchers to collect participants from more diverse backgrounds. Aside from the population of the study, the decision-making task of the study itself must be considered as a possible weakness. The decision-making task used in this research required participants to take part in a total of 100 trials. As a result, the task may become tiring for the participants to complete. For this reason, it is important to question whether participants in this research who performed poorly on the task did so because of their manipulation, or simply because of the task difficulty.

Future Directions

If researchers were to conduct a similar study in the future, there are a few key directions that they should adhere to based on what was learned from the present study. Firstly, although there was a very successful manipulation of state anxiety via the experimental video, it is hard to tell what other feelings may have arisen out of participants as well. For example, participants

could have been feeling arousal, fear, surprise, uncomfortableness, or even defensiveness as a result of watching the experimental video, which are different emotions that may have consequently affected decision-making task performance by themselves. With this in mind, perhaps it would be worthwhile to explore other anxiety-manipulation routes, or even the concept of manipulating anxiety at different levels, in order to assess how that manipulation is influencing an outcome variable like decision making. Furthermore, future researchers should consider other possible moderators of the relationship between state anxiety and decision making. Although state and trait anxiety are objectively different concepts, it can be difficult to distinguish between the two. For this reason, it may be wise of future researchers to consider more blatantly different concepts to compare when studying a relationship such as this one. On the same topic of moderators, emotional intelligence is a very in-depth and thorough concept to cover, and perhaps if researchers were going to consider it in the future as a moderator of state anxiety, they would want to develop a less surface-level measure for it. While the present study used a self-report measure to assess emotional intelligence levels of participants, perhaps employing a behavioral measure, where emotional intelligence is actually demonstrated, would make for a more accurate gauge, and consequently, a better assessment of moderating effects.

Importance and Conclusion

The purpose of the present research was to evaluate the influence of state anxiety on decision making, as well as the moderating effects of both trait anxiety and emotional intelligence. Going into the study, it was hypothesized that state anxiety would hurt decision-making performance, and high levels of both trait anxiety and emotional intelligence would moderate this effect in a beneficial way. The findings of this research demonstrated the opposite, and above all highlighted state anxiety as potentially better for decision-making situations.

Overall, despite unsupported hypotheses and findings in opposite directions, there is still something valuable to be taken from the results of this study. Anxiety as a whole is a very complicated and layered issue, which is why definitions exist for both state and trait anxiety. In a variety of settings and disciplines, decisions are required to be made in moments of anxiety or high-pressure. Depending on the circumstances, some of these decisions can be very high-stake, or even a matter of life and death. For this reason, it is important to understand how well individuals are able to make advantageous decisions while anxious, as well as what effects may moderate the anxiety and thus influence decision-making performance. Although the present research did not highlight emotional intelligence and trait anxiety as key contributors to better decision making in anxious situations as hypothesized, it did reveal marginally significant results that state anxiety is associated with better decision making. However, because this effect was counter to the hypothesis, this effect would need to be replicated.

References

Abouhasera, S., Abu-Madi, M., Al-Hamdani, M., & Abdallah, A. M. (2023). Exploring emotional intelligence and sociodemographics in higher education; the imperative for skills and curriculum development. *Behavioral Sciences*, *13*(11), 911. https://doi.org/10.3390/bs13110911

Alzoubi, H. M., & Aziz, R. (2021). Does emotional intelligence contribute to quality of strategic decisions? The mediating role of open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(2), 130. https://www.sciencedirect.com/science/article/pii/S219985312200899X

Bosse, T., Gerritsen, C., de Man, J., & Stam, M. (2014). Inducing anxiety through video material. *HCI International 2014 - Posters' Extended Abstracts*, 301–306. https://doi.org/10.1007/978-3-319-07857-1_53

Buelow, M. T., & Blaine, A. L. (2015). The assessment of risky decision making: A factor analysis of performance on the Iowa Gambling Task, Balloon Analogue Risk Task, and Columbia Card Task. *Psychological Assessment*, *27*(3), 777–785. https://doi.org/10.1037/a0038622

Butler, G., & Mathews, A. (1983). Cognitive processes in anxiety. *Advances in Behaviour Research and Therapy*, *5*(1), 51–62. https://doi.org/10.1016/0146-6402(83)90015-2

Byrne, K. A., Cornwall, A. C., & Worthy, D. A. (2019). Acute stress improves long-term reward maximization in decision-making under uncertainty. *Brain and Cognition*, *133*, 84–93. https://doi.org/10.1016/j.bandc.2019.02.005

Cejudo, J., Rodrigo-Ruiz, D., López-Delgado, M., & Losada, L. (2018). Emotional Intelligence and Its Relationship with Levels of Social Anxiety and Stress in Adolescents.

International Journal of Environmental Research and Public Health, *15*(6), 1073. https://doi.org/10.3390/ijerph15061073

Checa, P., & Fernández-Berrocal, P. (2015). The role of intelligence quotient and emotional intelligence in cognitive control processes. *Frontiers in Psychology*, *6*. https://doi.org/10.3389/fpsyg.2015.01853

Cheng, B. H., & McCarthy, J. M. (2018). Understanding the dark and bright sides of anxiety: A theory of workplace anxiety. *Journal of Applied Psychology*, *103*(5), 537–560. https://doi.org/10.1037/apl0000266

Cherniss, C., Extein, M., Goleman, D., & Weissberg, R. P. (2006). Emotional intelligence: What does the research really indicate? *Educational Psychologist*, *41*(4), 239–245. https://doi.org/10.1207/s15326985ep4104_4

Clark, D. M. (1999). Anxiety disorders: Why they persist and how to treat them. *Behaviour Research and Therapy*, *37*(37), S5–S27. https://doi.org/10.1016/s0005-7967(99)00048-0

Connor, B., & Slear, S. (2009). Emotional intelligence and anxiety; emotional intelligence and resiliency. *The International Journal of Learning: Annual Review*, *16*(1), 249–260. https://doi.org/10.18848/1447-9494/cgp/v16i01/46089

Cramer, V., Torgersen, S., & Kringlen, E. (2005). Quality of life and anxiety disorders: A population study. *Journal of Nervous & Mental Disease*, *193*(3), 196–202. https://doi.org/10.1097/01.nmd.0000154836.22687.13

Elder, L. (1996). Critical thinking and emotional intelligence. *Inquiry: Critical Thinking across the Disciplines*, *16*(2), 35–49. https://doi.org/10.5840/inquiryctnews199616211

Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: Attentional control theory. *Emotion*, *7*(2), 336–353.

https://doi.org/10.1037/1528-3542.7.2.336

Fazey, J., Lew Hardy, British Association Of Sports Sciences, & National Coaching Foundation. (1988). *The inverted-U hypothesis : A catastrophe for sport psychology?* British Association of Sports Sciences.

Fernandes, M. A., Koji, S., Dixon, M. J., & Aquino, J. M. (2011). Changing the focus of attention: The interacting effect of valence and arousal. *Visual Cognition*, *19*(9), 1191–1211. https://doi.org/10.1080/13506285.2011.618151

Fernandez-Berrocal, P., Alcaide, R., Extramera, N., & Pizarro, D. (2006). The role of emotional intelligence in anxiety and depression among adolescents. *Individual Differences Research*, *4*(1), 16–27.

Goligorsky, M. S. (2001). The concept of cellular "fight-or-flight" reaction to stress. *American Journal of Physiology-Renal Physiology*, *280*(4), F551–F561. https://doi.org/10.1152/ajprenal.2001.280.4.f551

Gureckis, T. M., & Love, B. C. (2009). Short-term gains, long-term pains: How cues about state aid learning in dynamic environments. *Cognition*, *113*(3), 293–313. https://doi.org/10.1016/j.cognition.2009.03.013

Hardy, L., & Parfitt, G. (1991). A catastrophe model of anxiety and performance. *British Journal of Psychology*, *82*(2), 163–178. https://doi.org/10.1111/j.2044-8295.1991.tb02391.x

Hunt, R. G., Krzystofiak, F. J., Meindl, J. R., & Yousry, A. M. (1989). Cognitive style and decision making. *Organizational Behavior and Human Decision Processes*, *44*(3), 436–453. https://doi.org/10.1016/0749-5978(89)90018-6

Jones, D. L., Nelson, J. D., & Opitz, B. (2020). Increased anxiety is associated with better learning from negative feedback. *Psychology Learning & Teaching*, *20*(1),

147572572096576. https://doi.org/10.1177/1475725720965761

Kasper, S. (2006). Anxiety disorders: Under-diagnosed and insufficiently treated. *International Journal of Psychiatry in Clinical Practice*, *10*(sup1), 3–9. https://doi.org/10.1080/13651500600552297

Kaufman, J., & Charney, D. (2000). Comorbidity of mood and anxiety disorders. *Depression and Anxiety*, *12*(S1), 69–76. https://doi.org/10.1002/1520-6394(2000)12:1+%3C69::aid-da9%3E3.0.co;2-k

Keltner, D., & Haidt, J. (1999). Social functions of emotions at four levels of analysis. *Cognition & Emotion*, *13*(5), 505–521. https://doi.org/10.1080/026999399379168

Khng, K. H. (2016). A better state-of-mind: Deep breathing reduces state anxiety and enhances test performance through regulating test cognitions in children. *Cognition and Emotion*, *31*(7), 1–9. https://doi.org/10.1080/02699931.2016.1233095

Kouchaki, M., & Desai, S. D. (2015). Anxious, threatened, and also unethical: How anxiety makes individuals feel threatened and commit unethical acts. *Journal of Applied Psychology*, *100*(2), 360–375. https://doi.org/10.1037/a0037796

Kumar, P., Agarwal, S., Khwairakpam, S., & Modi, D. R. (2021). Relationship between emotional intelligence and anxiety among young adults. *Asian Pacific Journal of Health Sciences*, *8*(4), 150–154. https://doi.org/10.21276/apjhs.2021.8.4.30

Leal, P. C., Goes, T. C., da Silva, L. C. F., & Teixeira-Silva, F. (2017). Trait vs. state anxiety in different threatening situations. *Trends in Psychiatry and Psychotherapy*, *39*(3), 147–157. https://doi.org/10.1590/2237-6089-2016-0044

Lerner, J. S., Li, Y., Valdesolo, P., & Kassam, K. S. (2015). Emotion and decision making. *Annual Review of Psychology*, *66*(1), 799–823. https://doi.org/10.1146/annurev-psych-

010213-115043

McLeod, D. R., Hoehn-Saric, R., & Stefan, R. L. (1986). Somatic symptoms of anxiety: Comparison of self-report and physiological measures. *Biological Psychiatry*, *21*(3), 301–310. https://doi.org/10.1016/0006-3223(86)90051-x

Meijer, J. (2001). Stress in the relation between trait and state anxiety. *Psychological Reports*, *88*(3_suppl), 947–964. https://doi.org/10.2466/pr0.2001.88.3c.947

Mendl, M. (1999). Performing under pressure: Stress and cognitive function. *Applied Animal Behaviour Science*, *65*(3), 221–244. https://doi.org/10.1016/s0168-1591(99)00088-x

Merikangas, K. R., He, J.-P., Burstein, M., Swanson, S. A., Avenevoli, S., Cui, L., Benjet, C., Georgiades, K., & Swendsen, J. (2010). Lifetime prevalence of mental disorders in U.S. adolescents: results from the National Comorbidity Survey Replication--Adolescent Supplement (NCS-A). *Journal of the American Academy of Child and Adolescent Psychiatry*, *49*(10), 980–989. https://doi.org/10.1016/j.jaac.2010.05.017

Mughal, S., Walsh, J., & Wilding, J. (1996). Stress and work performance: The role of trait anxiety. *Personality and Individual Differences*, *20*(6), 685–691. https://doi.org/10.1016/0191-8869(96)00025-6

Nooryan, K., Nooryan, K., & Zoladl, M. (2012). Controlling anxiety in physicians and nurses working in intensive care units using emotional intelligence items as an anxiety management tool in Iran. *International Journal of General Medicine*, 5. https://doi.org/10.2147/ijgm.s25850

Otto, A. R., Markman, A. B., & Love, B. C. (2012). Taking more, now: The optimality of impulsive choice hinges on environment structure. *Social Psychological and Personality Science*, *3*(2), 131–138. https://doi.org/10.1177/1948550611411311

Pacheco-Unguetti, A. P., Acosta, A., Callejas, A., & Lupiáñez, J. (2010). Attention and anxiety. *Psychological Science*, *21*(2), 298–304. https://doi.org/10.1177/0956797609359624

Pajkossy, P., Dezső, L., & Zoltay Paprika, Z. (2009). The opposite effect of trait and state anxiety on Iowa Gambling Task. *Learning & Perception*, *1*(2), 279–295. https://doi.org/10.1556/lp.1.2009.2.110

Raghunathan, R., & Pham, M. T. (1999). All negative moods are not equal: Motivational influences of anxiety and sadness on decision making. *Organizational Behavior and Human Decision Processes*, *79*(1), 56–77. https://doi.org/10.1006/obhd.1999.2838

Reiss, S. (1997). Trait anxiety: It's not what you think it is. *Journal of Anxiety Disorders*, *11*(2), 201–214. https://doi.org/10.1016/s0887-6185(97)00006-6

Remmers, C., & Zander, T. (2017). Why you don't see the forest for the trees when you are anxious: Anxiety impairs intuitive decision making. *Clinical Psychological Science*, *6*(1), 48–62. https://doi.org/10.1177/2167702617728705

Russell, B., & Hatfield, B. D. (2013). Controlling attention in the face of threat: A method for quantifying endogenous attentional control. *Lecture Notes in Computer Science*, *8027*. https://doi.org/10.1007/978-3-642-39454-6_63

Schutte, N. S., Malouff, J. M., Hall, L. E., Haggerty, D. J., Cooper, J. T., Golden, C. J., & Dornheim, L. (1998). Development and validation of a measure of emotional intelligence. *Personality and Individual Differences*, *25*(2), 167–177. https://doi.org/10.1016/s0191-8869(98)00001-4

Seo, M.-G., & Barrett, L. F. (2007). Being emotional during decision making—good or bad? An empirical investigation. *Academy of Management Journal*, *50*(4), 923–940. https://doi.org/10.5465/amj.2007.26279217

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *Manual for the state-trait anxiety inventory (form Y) : "self-evaluation questionnaire."*

Swann, C., Crust, L., Jackman, P., Vella, S. A., Allen, M. S., & Keegan, R. (2016). Performing under pressure: Exploring the psychological state underlying clutch performance in sport. *Journal of Sports Sciences*, *35*(23), 2272–2280. https://doi.org/10.1080/02640414.2016.1265661

Taylor, C. T., Lyubomirsky, S., & Stein, M. B. (2017). Upregulating the positive affect system in anxiety and depression: Outcomes of a positive activity intervention. *Depression and Anxiety*, *34*(3), 267–280. https://doi.org/10.1002/da.22593

Tversky, A. (1972). Elimination by aspects: A theory of choice. *Psychological Review*, *79*(4), 281–299. https://doi.org/10.1037/h0032955

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, *5*(2), 207–232. https://doi.org/10.1016/0010-0285(73)90033-9

Worthy, D. A., Otto, A. R., & Maddox, W. T. (2012). Working-memory load and temporal myopia in dynamic decision making. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *38*(6), 1640–1658. https://doi.org/10.1037/a0028146

Wray, L. D., & Stone, E. R. (2005). The role of self-esteem and anxiety in decision making for self versus others in relationships. *Journal of Behavioral Decision Making*, *18*(2), 125–144. https://doi.org/10.1002/bdm.490

Yip, J. A., & Côté, S. (2012). The emotionally intelligent decision maker. *Psychological Science*, *24*(1), 48–55. https://doi.org/10.1177/0956797612450031

Zhao, J., Cheng, J., Harris, M., & Vigo, R. (2015). Anxiety and intertemporal decision making:

The effect of the behavioral inhibition system and the moderation effects of trait anxiety on both state anxiety and socioeconomic status. *Personality and Individual Differences*, *87*, 236–241. https://doi.org/10.1016/j.paid.2015.08.018