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INVESTIGATING RISKY DECISION-MAKING WITH CURIOSITY AND OUTCOME EXPECTATIONS IN A SIMULATED EXPERIENCE

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Abstract
Researchers have established an association between curiosity and decision-making, in that curiosity can influence subsequent cognitions and actions either positively or negatively. The authors developed the present study to better understand how various facets of curiosity can predict decision-making. Additionally, we were interested in how decision-making could predict one's outcome expectations (i.e., expectation of escape versus capture in a simulated experience). As experts have understood curiosity to be understood in multiple facets, the initial hypothesis of the present study was to determine which facet of curiosity (e.g., diversive, intolerance, competency, problem-solving) was most appropriate in understanding its effects on risky decision-making. Additionally, the authors hypothesized that participants inclined to make more risk-taking decisions would be more likely to anticipate their escape from the simulation rather than their capture. Results found that people with high diversive curiosity made more risk-averse choices. Additionally, results suggest that participants with higher risk-taking decisions were significantly more likely to predict their escape rather than capture in a simulated experience. The authors provide implications for future research.

Keywords
curiosity, decision-making, risk, simulation

Peer Review
This work has undergone a double-blind review by a minimum of two faculty members from institutions of higher learning from around the world. The faculty reviewers have expertise in disciplines closely related to those represented by this work. If possible, the work was also reviewed by undergraduates in collaboration with the faculty reviewers.

Every day, humans are tasked to make thousands of decisions, and each choice leads to a separate outcome, down a different path. Research exploring these various aspects of decision-making are often in the realm of risk-taking behavior. Humans are naturally inclined to risk aversion (Berlyne, 1954; March, 1996), however when positioned in certain situations, researchers have identified that individuals chose risky behaviors (Steingrover et al., 2013). When decisions must be made, many factors can influence risk attitudes and consequences (Denrell, 2007), which may include curiosity.

Researchers are called to identify additional individual factors that may predict one's motivation to make risk-taking or risk-aversive decisions. Curiosity is an individual factor often associated with discovery of knowledge but also has the ability to impact one's decision making process and lead them to make risky decisions (Lindgren et al., 2010). Thus, the authors posit that curiosity may help researchers better understand how one makes certain risky decisions and their expectations of whether or not they would escape or be captured in a simulated experience.

Decision-Making

Critically evaluating environments, circumstances, and consequences are at the core of decision-making. Generally, decision-making can be defined as an inclination to overcome the current problem when more than one way exists to lead us to an object that is thought to be the satisfier of a requirement (Renn et al., 2011). Ultimately, decision-making can be understood as a motivation and means to overcome a problem, and the direction one takes when making that decision is typically to benefit the self rather than harm them.

Decision-making is a dynamic process that has been understood in different ways depending on the situational-, social-, and culturally-driven contexts (Fox & Tannenbaum, 2011; van Kleef et al., 2021). To best protect their well-being and avoid harm, people may appraise the risk involved with decision-making differently, depending on the context of which they are exposed. Further, people may be more motivated to make either risk-taking or risk-aversive decisions depending on their subjective evaluation of risk.

Risk and Risk Perception. As people make decisions, they may gauge the amount of risk associated with the choices ahead of them. Risk has been defined as a behavior that could result in loss or harm to oneself. These losses can be in many dimensions such as monetary, physical, emotional, or social (Furby & Beyth-Marom, 1992; March & Shapira, 1987). Scholars and researchers have identified many ways to understand risk and risk perception (Figner & Weber, 2011; Fox & Tannenbaum, 2011; Renn et al., 2011). For example, the theory of rational choice states that humans are motivated to make choices that maximize well-being and minimize harm under whatever circumstances they face (Herrstein, 1997). Additionally, researchers have identified personal factors that influence the level of risk a person may take when making decisions. For instance, risk taking in itself is understood as having to make a choice with greater outcome variability, therefore individuals who are concerned with the long-term outcomes associated with their risky decisions may gravitate more toward risk-aversion rather than risk-taking (Figner & Weber, 2011). Further, researchers have posited that risk can be both a challenge and a threat, depending on perception (Furby & Beyth-Marom, 1992). Depending on the situation, as well as other contextual factors, people must engage with or avoid risk-related decisions for their own challenge or threat.

Risk can also be conceptualized on a spectrum, ranging from more threatening decisions with risk involved (i.e., risk-taking) to safer decisions with less risk involved (i.e., risk-aversive; Bechara et al., 1994; Furby & Beyth-Marom, 1992). This understanding of risk on a spectrum follows the ideology of the theory of rational choice, in that people may make decisions to assure their safety (i.e., risk-aversive). However, people may also stray from

the logic of the theory of rational choice, in that certain characteristics that people possess have been linked with an increased likelihood of risk-taking behaviors (Weber et al., 2002; Fox & Tannenbaum, 2011). There is variability in an individual's perception of risk, as what might be appraised as a risk-taking decision to one person might not seem risky to another.

Risk and Outcome Expectation.

The literature on the relationship between risk and outcome expectation is sparse. However, there is preliminary evidence that suggests risk-taking predicts self-confidence (Murad et al., 2016). The fundamental attribution error, attributing success to internal factors and misfortune to bad luck, is also at play as an individuals confidence in their abilities substantially grows when receiving uninformative or positive feedback (Murad & Starmer, 2021). This "snowballing confidence" can contribute to an inflated sense of abilities and expectations that are not based on reality. Additionally, it has also been shown that "confidence comes partly from estimating uncertainty and that estimate is imperfect," (Boundy-Singer et al., 2023). Depending on context, these internal factors influence how one perceives a situation and their abilities.

Researchers would benefit from understanding decision-making as it impacts every action taken that involves risk. It is important to understand factors that precede decisions which could determine naturalistic tendencies toward or away from risk (Fox & Tannenbaum, 2011; Wood & Bandura, 1989), which may include one's curiosity.

Curiosity

The attempts to define curiosity have often resulted in ambiguity, as there are many viable conceptualizations of the trait. A widely accepted definition of curiosity states that it is a "critical motive that influences human behavior in both positive and negative ways at all stages of life" (Loewenstein, 1994, p. 75). Early research considered various ways to understand and define curiosity, including curiosity as a motivating factor to gain information (i.e., epistemic curiosity; Berlyne, 1954). Epistemic curiosity (EC) has claimed the attention of researchers, in that previous studies have focused on how gaps in one's knowledge can be a significant motivator of obtaining missing information (Lowenstein, 1994), thus contributing toward one's curiosity and decision-making process. Consequential to EC is a person's experiencing of positive emotions related to reward from exploration of ideas, asking questions, discovering knowledge and filling information gaps (Berlyne, 1960; Litman & Spielberger, 2003; Lowenstein, 1994; Litman & Mussel, 2013). EC, as motivated by gaining information, is a more recent formation of the concepts, particularly the information gap theory, yet still prescribes to the justification that curiosity can spur from feelings of not knowing. Researchers have expanded upon our knowledge of EC, in that past literature has formed two branches of EC: feelings of interest (I-EC) and feelings of deprivation (D-EC; Litman & Mussel, 2013).

Curiosity as Motivated by Interest.

I-EC states that people are motivated by seeking out pleasurable experiences and situations (Litman et al., 2005; Litman & Mussel, 2013). I-EC is thought to be intrinsically motivated by the anticipation of rewards, the pleasure of discovering new knowledge for self-serving purposes, and not for any extrinsic benefit (Litman & Jimerson, 2004; Litman, 2008). It can also influence school- and work-related performance and goal-setting behaviors (von Stumm et al., 2011; Litman, 2008; Kashdan et al., 2006). Curiosity that is motivated by interest has been shown to guide one's decision-making in several contexts.

I-EC can be further broken down into two separate branches: *diversive* and *specific*. I-EC diversive (I-ECD) curiosity is understood as a curiosity in general and an interest in a broad range of topics, with the intent to learn something new (Day, 1971; Litman & Spielberger, 2004). This type of curiosity is shown in individuals who express a broad range of curiosities across multiple contexts. I-

ECD can aid in the development of intellectual curiosity and predict academic performance (von Stumm et al., 2011). Alternatively, I-EC specific (I-ECS) curiosity is driven by an interest in a particular piece of information regarding a distinct subject or an interest one may hold (Loewenstein, 1994). Having a specific curiosity can motivate students to pursue information on a particular academic topic to help answer questions and further develop their curiosity in a subject area. Regardless of having a broad curiosity (I-ECD) or a motivation for curiosity grounded in a particular stimulus (I-ECS), researchers can better understand how curiosity as a driving factor may inform the decisions people make.

Curiosity as Motivated by Feelings of Deprivation. As discussed earlier, scholars have identified various ways to define curiosity, and curiosity as motivated by feelings of interest (i.e., diversive or specific curiosity) is one of the myriad ways of conceptualizing this trait. Theorists in EC have posited that curiosity is driven by feelings of deprivation (D-EC), or the urge to avoid negative or uncomfortable emotions due to a lack of information (Litman, 2005). Theorists hypothesize that this type of EC is a stronger motivation to seek information, as it is processed as need-to-know information (Litman, 2005). D-EC emphasizes that people are driven by the awareness that they lack information or knowledge, thus resulting in feelings of deprivation or deficiency.

D-EC can be conceptualized into three separate perspectives: *intolerance*, *competency*, and *problem-solving*. D-EC as intolerance (D-ECI) is mainly motivated by the avoidance of feelings regarding information that is inaccessible or inadequate (Litman & Jimerson, 2004). An example of D-ECI could be an extreme uneasiness when one is not able to attain all information to complete a knowledge set. D-EC as a need to feel competent (D-ECC) is another significant motive as an avoidance tactic to uncomfortable feelings. It is the need to invest time and energy into obtaining knowledge to become well-informed (Loewenstein, 1994). D-ECC may be present when one spends copious amounts of time gathering information in order to feel competent regarding a certain subject. Finally, D-EC as motivated by the need to problem-solve (D-ECP) is characterized by the persistence to solve a puzzle or task (Litman & Jimerson, 2004). This type is relevant to and a primary reason for scientific discovery, development, and learning. All three of these subtypes of curiosity offer varying explanations and definitions as to why people are motivated in differing ways, and researchers have found support for each definition's viability.

All in all, these varying understandings of what drives curiosity further validate the theory that curiosity is a complex topic with not one universal definition. Depending on the context, researchers may see that certain understandings of curiosity better describe and explain the association between variables. Researchers have yet to determine the best-fit conceptualization of curiosity in the context of decision-making and risk. Thus, the present study seeks to determine how curiosity may influence one's risky decision-making when placed in a situation where they must make decisions.

Present Study

The purpose of the present research was to examine how risky decision-making is associated with curiosity and outcome expectations. As such, the present study assessed different motivations of curiosity (e.g., I-ECD, D-ECI, D-ECC, D-ECP) to determine which best predicted risky decision-making. The present study operationalized risky decision-making on a spectrum, ranging from risk-aversive to risk-taking decisions. Additionally, the present study considered decision-making as a predictor variable to determine how risky decision-making could predict outcome expectations (i.e., anticipated escape or capture from the simulation).

An initial question posed in the present study was regarding the various facets of curiosity: Which facet of curiosity explains the

most amount of variance in risky decision-making? Once this facet of curiosity was identified, we posed two main questions. First, how does curiosity predict risky decision-making? Secondly, using decision-making as a predictor variable, how does risky decision-making predict one's outcome expectations (i.e., escape or capture). In response to these questions, the following hypotheses were formed:

H1: One of the five conceptualizations of curiosity would best explain the variance in risky decision-making, in that the best-fit conceptualization of curiosity would result in participants' increased risk-taking decisions compared to those with low curiosity.

H2: Risky decision-making would predict a participant's outcome expectation, in that participants who indicated increased risk-taking decisions would suggest that they were able to escape the simulation more likely than getting caught.

Method

Participants. The sample of participants included undergraduate students currently attending a small Midwest liberal arts college. It was determined through a power analysis that 64 participants would be needed to detect moderate significance (Erdfelder et al., 1996). The participants (n = 66) primarily identified as white (92%, n = 61) women (78%, n = 52) with an average age of 21.18 years (SD = 5.21) and not in a romantic relationship (58%, n = 26).

Measures. Participants completed a basic demographics form, which included items such as age, race, gender identity, relationship status, religiosity, and spirituality. Additionally, a decision-making simulation and items assessing curiosity were administered to answer the present study's two research questions.

Decision-Making Simulation. Researchers have had success in measuring decision-making behaviors through simulations. These include a simulated go or no-go flight scenario that tested a pilot's ability to address various flight procedures and problems in a time-sensitive environment and then make a go or no-go decision (Irwin et al., 2020.) In another study, individuals were tasked with assigning roles and duties to workers as a manager to increase productivity which involved goal assessment, motivation, high-risk, and multiple feedback procedures (Wood & Bandura, 1989). Additionally, there are measurements of risk via probability and gambling risks, such as the Iowa Gambling Task and the Balloon Analog Risk Task (Bechara & Damasio, 2002; Lejuez et al., 2002). Based on the aforementioned research involving simulations, the present study included an author-created robbery scenario consisting of eight steps (i.e., eight decisions).

At the beginning, participants were told they were a part of a crime ring and had to commit a robbery heist to prove their worth to their boss. A goal was presented at every scene to keep the participant's eyes on the overarching goal of successfully robbing a bank and impressing the boss. Eight scenes were shown in chronological order of preparing for, driving to, and committing the crime. Participants were asked to make decisions and were informed that each decision they made would impact future paths and decisions, even though participants were actually presented with the same question and prompts at each level (Appendix A).

After reading the situation, four options were given, ranging from 1 (*risk-aversive decision alignment*) to 4 (*risk-taking decision alignment*). Risk alignment was not explicitly stated for the participants. The response scale measuring risk followed the theory of rational choice in that there was a spectrum from high to low possibility of an unknown outcome. Therefore, participants had to make their decision based on their perception of risk where high risk, or a high probability of an unknown outcome, was paired with a high payoff, impressing the boss but could also result in a negative outcome. For example, one situation required participants to determine their decision in response to being cornered in a bank vault. Participants were reminded of the

overarching goal of successfully robbing the back and robbing the bank and were also reminded of the negative consequences. The options ranged from unlocking the door unarmed with their hands up, which was the least life-threatening approach (risk-aversive alignment, low possibility of an unknown outcome), to opening the door with weapons drawn, prepared to shoot their way out of the situation (risk-taking alignment, high possibility of an unknown outcome). Furthermore, goals at each step were set in order to eliminate potential ambiguity in the overarching mission. At the end of the simulation, the participants were given the option to explain via open text box how they believed their crime ended and to report their feelings and motivations during the simulation. Participants' final scores were added together, and their score of risky decision-making could range from 8 (most risk-aversive decision-making) to 40 (most risk-taking decision-making).

Curiosity. Curiosity was assessed using two instruments often used in conjunction with each other in order to identify participants' affinities toward various facets of curiosity. The first scale measuring EC was the Epistemic Curiosity Scale (Litman & Spielberger, 2003), which assessed for diversive (e.g., I-ECD) curiosity. The second scale was the Curiosity as a Feeling of Deprivation scale (Litman, 2008), which assessed for curiosity as motivated by feelings of deprivation (e.g., D-ECI, D-ECC, D-ECP).

Epistemic Curiosity Scale. The Epistemic Curiosity Scale (ECS; Litman & Spielberger, 2003) was used to determine participants' curiosity as driven by interest. The ECS consists of two subscales: diversive curiosity and specific curiosity. The present study operationally defined curiosity as motivated by interest as diversive curiosity alone, therefore the one subscale was used from the ECS for the present study. This subscale comprised of five questions all on a 6-point Likert-scale from 1 (*strongly disagree*) to 6 (*strongly agree*). Items on this subscale included "I enjoy learning about subjects that are unfamiliar to me." The original authors of this scale reported high internal consistency (Kline, 2000) on the diversive (α = .80) subscale with a sample of 739 university students (Litman & Speilberger, 2003). The present study identified high internal consistency, as well (α = .87).

Curiosity as a Feeling of Deprivation Scale. The Curiosity as a Feeling of Deprivation Scale (CFDS; Litman, 2008) was used to assess for participants' curiosity as motivated by the feeling of deprivation. The CFDS consists of three subscales that assess one's curiosity as motivated by intolerance (D-ECI), competency (D-ECC), and problem-solving (D-ECP). Each subscale consisted of five items ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). The original authors of this scale reported acceptable internal consistency (Kline, 2000) on the intolerance (α = .68), competency (α = .64), and need to solve problems (α = .78) subscales with a sample of 321 undergraduate students (Litman & Jimerson, 2004). The present study noted similar internal consistency for intolerance (α = .73), competency (α = .71), and need to solve problems (α = .79).

The intolerance subscale focused on intolerant feelings of the unknown. A sample item from this subscale included "it troubles me if there doesn't seem to be a reasonable solution to a problem." The competency subscale measured curiosity driven by the need to expand one's knowledge to be informed and proficient. A sample item from this subscale included "I do not like the feeling of not knowing, which helps motivate me to try to learn about complex topics." The problem-solving subscale assessed for curiosity as motivated by the desire to solve a problem for the purpose of scientific discovery, development, and learning. A sample item from this subscale included "I can become frustrated if I can't figure out a problem, so I work harder to solve it" (D-ECP subscale).

Procedure. A non-experimental, within-subjects design was used to test the hypotheses. For the first research question, the predictor variable was curiosity and the outcome variable was decision-making, which was measured on a bipolar continuum from risk-averse to risk-taking. For the second research question, the predictor variable was decision-making, and the outcome variable was outcome expectations, in that participants reported whether they believed their outcome expectation of the simulation was escape or capture. This study was approved by the institutional review board of the researcher's university, where the research was conducted (#H–26–S2021–RD).

The sample of participants were recruited through convenience sampling via email, college listserv, social media, and classroom recruitment. This study was distributed via an anonymous link to a Qualtrics survey (Qualtrics, 2020). Participants gave informed consent, then filled out the demographics form. After completion of the demographics form, participants completed the simulated robbery experience as a measure of risky decision-making. Once the simulation was finished, participants completed the curiosity items, beginning with the ECS, followed by the CFDS. Finally, participants were debriefed and thanked for their participation.

Results

The statistical analysis in this study were completed using the Statistical Package for the Social Sciences (SPSS, Version 27). To answer the present study's first research question, a series of linear regressions were used to determine statistical significance. Linear regressions were used due to the non-experimental design and also allowed the researchers to use the continuous predictor variable of curiosity to explain the variance of risk in the outcome of decision-making. Additionally, to answer the second research question, a binary logistic regression was used to determine statistical significance. A binary logistic regression is used when the outcome variable is categorical (i.e., outcome expectations resulted in one of two possibilities: escape or capture) and is being predicted by a continuous variable (i.e., risky decision-making).

H1: Curiosity Predicted Risky Decision-Making

Four separate linear regressions were used to test H1 (see Table 1). H1 stated that one of the four facets of curiosity would best explain the variance in risky decision-making. Each subscale was entered into four separate linear regressions to determine its unique contribution toward risky decision-making. The best-fit facet of curiosity in the context of risky decision-making was diversive curiosity, $R^2 = .064$, $F(1,63)$ 4.30, $p = .042$, $\beta = -.25$. This result was in the opposite direction hypothesized, in that individuals who reported high levels of diversive curiosity made significantly more risk-averse decisions than participants who reported lower levels of curiosity. The other three facets of curiosity (e.g., D-ECI, D-ECC, D-ECP) were not significant predictors of risky decision making. With this said, curiosity as motivated by interest rather than deprivation was a significant predictor of risky-decision making; no facets of curiosity as motivated by feelings of deprivation significantly predicted risky decision-making.

Variable	Constant	R^2	B	SE
Diversive**	22.417	0.064	-0.125	0.061
Competence	21.439	0.021	-0.083	0.074
Intolerance	19.211	0.001	0.013	0.077
Problem Solving	20.245	0.006	-0.037	0.062

*Table 1. Regression: Curiosity and Risky Decision-Making. **p < .05*

H2: Risky Decision-Making Predicted Outcome Expectations

The second hypothesis from the present study stated that risky decision-making would predict

a participant's outcome expectation, in that participants who indicated increased risk-taking decisions would suggest that they were able to escape the simulation more likely than getting caught. A binary logistic regression was performed to ascertain the effect of risky decision-making on the likelihood that participants would report their escape or capture. The logistic regression model was statistically significant, $\chi^2(1) = 6.881$, $p = .009$. The model explained 16.2% (Nagelkerke pseudo R^2) of the variance in outcome expectations and correctly classified 73.2% of cases. Risky decision-making significantly predicted participants' outcome expectations, $B = (.37)$, $SE = .15$, Wald = 5.97, $p = .015$, $\exp(B) = 1.44$. For every one unit increase in risky decision-making, the odds of someone reporting that they would escape increased by 44.2%. In other words, participants who made more risk-taking decisions in the simulation were significantly more likely to predict their escape from the simulation rather than their capture (see Figure 1).

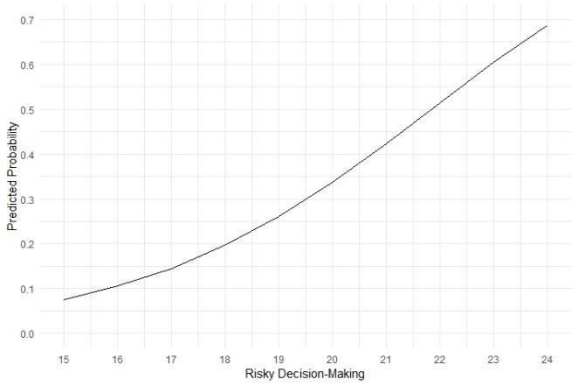

Figure 1. Probability Plot: Risky Decision-Making predicts Outcome Expectations

Discussion

This study tested and found support for two key questions posed by the researchers. Curiosity as motivated by interest was able to predict risk-aversion. Additionally, decision-making predicted the outcome expectation of escaped.

Curiosity Predicted Risky Decision-Making

The results of this study suggest that participants who reported high levels of diversive curiosity made significantly more risk-averse decisions compared to other facets of curiosity or individuals who generally reported lower levels of curiosity. Overall, diverse curiosity, as motivated by interest, significantly predicted risk-aversion whereas the three facets of curiosity motivated by deprivation were not significant predictors of risk-aversion. This finding was contrary to the hypothesis that greater levels of curiosity would result in more risk-taking decisions.

Although the findings of the present study seem contradictory to some past literature, prior research has suggested that certain individual attributes present have been associated with an increased affinity for risk-taking behaviors (Weber et al., 2002; Fox & Tannenbaum, 2011). In this case, diversive curiosity may have actually been a protective factor against risk-taking, in that lower diversive curiosity was associated with the greatest risk-taking decisions. Curiosity may be a protective factor rather than a predictor of risky decision-making. Additionally, research suggests that context matters when people make decisions, in that decisions are driven by social and cultural contexts (Fox & Tannenbaum, 2011; van Kleef et al., 2021). With this said, the present study's sample of college students may have been motivated to make more risk-averse decisions due to their cultural experiences in college. The sample of college students in this sample showed a normal distribution in risky decision-making, but the authors found that these students' mean risky decision-making scores gravitated closer to risk-aversive decisions. College students are subject to many academic policies, such as academic dishonesty and plagiarism policies, with serious consequences if broken. If students are discovered to be violating these policies, they may be subject to punishment such as probation or even dismissal from the university. This frame of reference may have influenced these students' responses to risky decision-making through the simulation.

Additionally, some participants completed the present study for extra credit in their courses, therefore these students may have been primed by an academic context rather than another one (e.g., social, financial). Further, the primary investigator of this study was a student at the time of recruitment, and participants were informed that the study was for partial completion of the primary investigator's coursework and major, therefore an academic frame of reference may have been at the forefront of participants' minds during completion of the survey. The ingrained knowledge that college students have of these policies as well as the priming of this study's relationship with an academic context may have unconsciously motivated students to gravitate toward more risk-aversive decisions.

Further, it has been shown that individuals are more likely to make risky decisions within a context they are confident and familiar with (Heath & Tversky, 1991). With our sample of undergraduate college students, it can be assumed that they were neither confident in nor had prior knowledge of how to rob a bank. That calls into attention the gap in knowledge theory which posits that people may be motivated to acquire information that helps to build upon preexisting data. With the sample having no prior information to build upon, minimal risks were taken because that motivation was not there to acquire useful information. This may also explain why the present study did not yield significant results from the conceptualizations of curiosity that were motivated by deprivation (i.e., D-ECC, D-ECI, D-ECP), in that participants had not experienced the context of a bank robbery, therefore were not motivated by a deprivation in knowledge or competence.

Diversive curiosity was the primary drive of these risk-averse decisions as it is driven by positive feelings associated with discovering novelty. It is motivated by a pure desire to explore and engage. As stated previously, the sample of college students could have been motivated by this type of curiosity due to their lack of knowledge and experience with the context of a robbery heist. If our sample would have consisted of individuals who had experienced a bank robbery previously (e.g., individuals who are incarcerated), we could have expected to see them motivated by a feeling of deprivation, in that they could have been attempting to commit the perfect crime or were caught up in the simulation. Thus, the population sampled had minimal negative feelings of displeasure to mitigate and therefore motivated them to choose the path they did which in this case was in line with the theory of rational choice.

Risky Decision-Making Predicted Outcome Expectations

The second hypothesis of the present study was regarding risky decision-making as a predictor variable. The findings suggest that this sample of college students who were greater risk takers were significantly more likely to predict their escape from the simulation rather than their capture. Research has shown that options that come with greater risk tend to come with a greater return, in that people consider making riskier decisions if they believe the return will be worth the reward (Figner & Weber, 2011). This aligns with the findings of this study, in that college students may have made riskier decisions because they believed the outcome would be in their favor - that of escape. College students who recognized that they made greater risk-taking decisions throughout the simulation may believe that they certainly must have escaped, as their risk-taking should have been worth the reward. Furthermore, as the individuals were led to believe their decisions impacted their experience, it is reasonable to assume without any consequences of risk-taking behavior, the individual's confidence grew as noted by the concept of snowballing confidence (Murad & Starmer, 2021).

This finding also highlights the infallibility that is present within the college student population. Young adults are more likely to engage in risky behaviors such as drug and alcohol use and this could be due to their

clouded judgment of consequences (Shaw et al., 2011). As this was a simulation, participants were removed from the consequences and could have overestimated their ability to escape but believed they would due to their infallibility, inability to see consequences and overconfidence. Regardless, the use of this simulation was used to measure participants' risk in an unlikely and stressful simulation as affinity towards risk is context dependent.

Limitations

While this study did provide statistical support of the associations between risky decision-making, curiosity, and outcome expectations, there are also some limitations to consider when interpreting the conclusions of this study. For instance, the simulated robbery was created by the authors. While prior researchers have used simulations to assess for risk-taking (Bechara, 1994; Gibson, 2014; Steingroever et al., 2013), the researcher wanted to investigate the innate risk of crime. Further, the simulation presented a main goal for the participants with the addition of goals at each level. These goals might not have been in alignment with what the participants were focused on throughout the simulation. For example, the overarching goal was to successfully rob the bank, and participants may have opted to an alternative goal of their own; they could have overlooked the goal and simply wanted to escape without getting injured and disregarded the successful part of the goal. With that, the authors did not assess the individual's personal goals throughout the simulation. Additionally, the specific subscale of the ECS was not included in the present study. As such, curiosity as driven by a specific interest may have significantly predicted risky decision-making in the present study, but it was not assessed.

Implications for Research

Many opportunities for future research have arisen after the succession of the current study. Possible directions include modifying the simulation to capture different aspects of curiosity to elicit different facets of curiosity to better understand the practical aspects of curiosity. Different populations could be sampled as researchers could glean important insights into groups such as individuals experiencing incarceration, school-aged children or older adults and their affinity towards risk in an innately stressful situation. Past research has considered simulation studies in samples that do not consist exclusively of college students, therefore there is a dearth of research ready to be explored that includes college students and simulation experiments. Further, an emphasis can be put on the types of curiosity (e.g., state or trait) that motivates either risk seeking or aversive perceptions to further understand the individual differences present in the decision-making process.

Additionally, future research in curiosity and decision-making can consider including the specific subscale of the ECS in their research. The specific subscale of the ECS was written to assess for specific curiosity of mechanics (Litman & Spielberger, 2003), however it can be interchangeable with topics pertinent to the present study. For instance, the present study could have considered assessing for specific interest in true crime. Future studies can consider what specific curiosity could be a significant predictor of risky decision-making depending on the simulation involved or the other variables included in the study. This could allow for information to be gained on the importance of the context as the specific subscale could be in alignment with the simulation to assess directly what the participants affinity for risk is in that particular situation.

Finally, not only does the context of the situation matter, the context in which the participant is completing the survey matters. As mentioned previously, decisions are influenced by a variety of contexts, such as social and cultural factors (Fox & Tannenbaum, 2011; van Kleef et al., 2021). The present study's participants may have been operating through the lens of an academic context; the present study did not assess for the impact one's context has on curiosity and

decision making. For instance, results may have yielded different findings if students were primed to operate from an academic context versus a social or financial context. Researchers who might be interested in looking at the social factors that drive decision-making through a risk-averse lens could experimentally manipulate the environment in which the participant completes the survey to understand the situational and social factors that impact the decision-making process. In other words, they could have participants complete the study amongst a group of peers in a casual setting versus in a lab amongst researchers. All in all, the findings of the present study present an opportunity for future research so we may better understand the associations between curiosity, decision-making, and outcome expectations.

Conclusion

This study set out to investigate how curiosity impacted participants' willingness to make risky decisions in a simulated experience. The data from this study indicates that our sample of college students who had higher levels of diversive curiosity made significantly more risk-aversive choices. This emphasizes that our sample was motivated by feelings of interest in the situation rather than focusing on mitigating the negative feeling associated with attempting to solve the simulation. Information gained from this research is valuable for researchers as it furthers the understanding of individual differences present within populations when looking at curiosity as a motivating factor in decision-making. Lastly, researchers can gain insight into what motivates their behavior when in a different contexts as self-awareness could have the ability to regulate potentially harmful behaviors that are present amongst developing young adults.

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Robbery Simulation

Instructions: You are about to engage in a simulated robbery where you will be asked to make choices as if you were the criminal. Please keep in mind each level's goal you are presented.

1. You are a member of a regional crime ring and your boss, Dr. Dharma, has tasked you to rob a bank to prove you are a viable member of the crime ring. Dr. Dharma has not given clear instruction on which bank to rob, leaving you with the decision to choose which bank will prove your worth to maintain membership in this group. Your goal is to **successfully rob a bank**, and you also want to impress your boss at the same time. You could go big and choose a larger bank in a city (that'll knock Dr. Dharma's socks off!) or go on a route more guaranteed to get the money you need for the crime ring. What do you do?

A. Rob small nearby bank just to complete the job (minimal bank security, less impressive)
B. Go to a chain bank in a larger town
C. Rob a smaller bank in a city
D. Rob a large chain bank in the city (maximum bank security, more impressive)

2. Now that you've chosen which bank to rob, Dr. Dharma checks back and wants more details. For instance, he wants to know what time you'll rob the bank. He wants an answer right then and there, so you don't have much time to make a choice. Your goal is to **choose a time most likely to conceal your identity**. You do know from past robberies that banks tend to be more crowded on Fridays after work, which could help conceal your identity, but more people could complicate your process. At the same time, banks are least crowded on Tuesday mornings, when fewer people will be around to possibly identify you. What time do you choose?

A. Tuesday morning when the bank opens (least people)
B. Over the lunch hour on Thursday
C. Monday at 5
D. Friday at 5 (most people)

3. Dr. Dharma has approved your location and time for the robbery. It's 3 days out from the heist, you have to get your clothes picked out. Your goal in picking your outfit is **to conceal your identity**. You have a few options, ranging from completely changing your appearance (helping you blend in entirely and eliminate the chance of being identified later, but could attract attention), to not really changing anything about your appearance at all (attracting less attention but more likely to expose your true identity later). Which look do you choose?

A. Dye hair, wear all black, wear ski mask and gloves, bulletproof vest underneath even though it adds more bulk (most concealed identity, but most likely to attract attention)
B. Wear all black with sunglasses and a hat
C. Wear your normal clothes with a hat and gloves
D. Wear your normal clothes to fit in, no gloves etc. (least concealed identity, but less likely to attract attention)

4. You've got your attire picked out (nice choice!), now you have to make your final decision before the big heist – your transportation. Your goal is to choose a mode of transportation that **is the most subtle and least likely to be traced to you**. On the one hand, you can use a fake ID to rent an inconspicuous car from Enterprise (even though you've never driven that kind of car before, which could slow your process and waste precious time during the heist), or you could use your own red Jeep that you're familiar with.

A. Rent a black Honda Civic from Enterprise with a fake ID (least likely to be traced, but unfamiliar car)
B. Stealing a black Honda Civic at night
C. Borrow a friend's blue Ford Mustang
D. Use your own red Jeep (most likely to be traced, but most familiar)

5. The day has come for the heist! You're pulling up to the bank and need to find a place to park your car. Your goal is to choose a place with the **easiest access to enter and exit the building quickly with the cash**. You see that there is parking right in front of the building, which would mean easy access and a quick getaway, but you also see a security camera out front. You drive around a bit and see there's also an alleyway on the back side of the bank that is hidden from pedestrians and security cameras. It'll be more difficult to get in and out of the "Employees Only" locked door, but you'd be well hidden throughout the process. Which do you choose?

A. Park in the front, despite the cameras (quickest getaway, easiest access, but easily tracked on camera)
B. Park on the same side of the street but a block away from the bank
C. Park in a gated parking garage with a gate attendant adjacent to the bank
D. Park in the back alleyway and break in through locked employee door (slower getaway, more complicated access, but not able to be tracked on camera)

6. You get into the building and make your way to the lobby. You have your gun, but you keep it concealed so no one can see you're armed. Your goal is to **get the bank teller to hand over the cash with as little attention as possible**. You know from previous robberies that slipping a note to the teller demanding money is the most effective and guaranteed way to get in and out of the bank with no interruptions. However, the bank teller looks stronger than you, so you want to be sure they know that you mean business, so you think you may have to use some force. What do you choose?

A. Slip the teller a note that reads "You're being robbed. Clear out the drawers or else." (least attention, but least enforcing)
B. Quietly demand the teller, "You're being robbed. Clear out the drawers or else"
C. Show the teller that you're armed, keeping the gun hidden from patrons, and slip them the note that reads "You're being robbed. Clear out the drawers or else"
D. Show the teller that you're armed by removing your jacket, which reveals a shoulder holster, even though your gun is now visible to patrons. Lean over to the teller, and in a hushed tone, demand the money (most attention, but most enforcing)

7. Despite your decision, the teller shouts, "We're being robbed!" which results in shouts and screams from the people in the lobby. You have no choice but to pull out your gun and demand everyone to be quiet and stay in place. You now have to choose how you handle these hostages, and you decide that your goal is to **decrease the likelihood that they escape the building**. Your goal all along was to get in and out of the building, cash in hand, without causing undue harm to others, but you know that by taking someone hostage, especially a child, people will be more compliant to your demands. What do you choose?

A. Taking a child hostage, despite it being against your morals of not hurting others (decreases risk of hostages leaving, least morally acceptable)
B. Taking an adult hostage, despite it being against your morals of not hurting others
C. Take time to tie everyone together with some rope that you packed, leaving them in the lobby
D. Demand everyone to lie face down on the ground while you get the money (increased risk of hostage escape, most morally acceptable)

8. You steal the key from the teller and head to the vault to get the money. You start to hear nearby sirens and panic – your time is limited and you have to act fast. You lock the vault door and start stuffing the bags with cash. Turns out, security was closer than you thought, and you hear them shouting outside the vault and from the lobby. You hear two distinct voices of security guards demanding that you open the door, and you gather that there are only two guards between you and the exit. Your goal is to **get out of the situation alive and with the money** (after all, if you don't have the money, your life might be on the line with Dr. Dharma). You could easily come out with your hands up and be taken into custody, or you could try and take on the two guards with your gun and still get out of the building with the cash. What do you choose?

A. Unlock the door, hands up, unarmed, and be taken into custody (least life threatening)
B. Don't make a quick decision – you wait it out a bit and eventually make a decision
C. Draw your gun, make a run for it with the cash, with the goal to not have to shoot unless necessary
D. Draw your gun, grab the money, ready to shoot at the guards when you open the door -it has to be done (most life threatening)

9. List any specific or general reasons why you chose the path of the robbery you did?

10. What do you think happened after you selected your last decision as a criminal?