AGE DIFFERENCES IN RISKY DECISION MAKING:

THE EFFECTS OF PRIMING, PERSONALITY,

AND WORKING MEMORY

by

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ABSTRACT

In the current study, we examined the effects of priming and personality on risky decision making while playing the Game of Dice Task (GDT). Participants were randomly assigned to one of three priming conditions: Risk Aversive, Risk-Seeking, or Control. In the Risk Seeking condition, a fictional character benefited from risky behavior while in the Risk Aversive condition, a fictional character benefited from exercising caution. In the GDT, participants decide how risky they wish to be on each trial. To optimize performance, one should make "safe" rather than risky choices. Although older adults self-reported being more cautious than younger adults, older adults made riskier decisions than younger adults on the GDT. However, there were no longer significant age differences on the GDT after controlling for working memory. More than likely, the aforementioned age differences were due to age-related changes in effective strategy usage, rather than age-related changes in the propensity to take risks. In addition, for young adults, certain personality traits significantly predicted risky decision making on the GDT. The findings from this study have implications for older adults' decision making in everyday situations. Older adults may make risky decisions and thereby jeopardize their financial and other resources, not because they intentionally want "to roll the dice," but because of an inability to strategize and fully comprehend the consequences of their decisions.

DEDICATION

This thesis is dedicated to everyone who helped me during this entire process. In particular, I want to dedicate this to my mother, Patti Gilmore, and my grandparents, Norma Jean and Jack Jones. Without your constant support this would not have been possible.

LIST OF ABBREVIATIONS AND SYMBOLS

β Beta: probability of producing a false-negative error; Type II error

BFI   Big Five Personality Inventory

DOSPERT   Domain Specific Risk Taking Scale

F   Fisher's *F* ratio: A ration of two variances

GDT   Game of Dice Task

IGT   Iowa Gambling Task

M   Mean: the sum of a set of measurements divided by the number of measurements in the set

MMSE   Mini-Mental Status Examination

NFA   Need for Arousal

p   Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value

r   Pearson product-moment correlation

RA   Risk aversive scenario

RS   Risk seeking scenario

SD   Standard deviation

t   Computed value of *t* test

$<$ Less than

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INTRODUCTION

In America, improvement in healthcare and modern medicine has led to an overall healthier and longer life. According to the 2010 U.S. Census data (2011), the baby boomer cohort (ages 45 to 64) is growing faster than for any other age group. This means that there will be an eventual explosion in individuals who are 65 or older. Importantly, this group of older adults will be confronted with a number of important decisions ranging from choosing the best insurance policy to choosing the best medical treatment. Thus, it is important to know the degree to which there are age differences in decision making. This proposal focuses on age differences in a particular type of decision making-specifically-risky decisions.

 Fletcher, Marks, and Hine (2011) argue that decision making is directly related to working memory capacity, and this is particularly true in the case of risky decisions.   To make the appropriate decisions when risk is involved, individuals have to weigh all of their options and decide if circumstances warrant taking a particular risk. This ability to weigh these options is tied to working memory and in particular, executive processes. Unfortunately, working memory, and executive processing ability in particular, decline with age. Because there is documented evidence that working memory declines as a function of age and that working memory is important for decision making, the following section will discuss working memory in much greater detail.

Working Memory

Baddeley (2000) defines working memory as "a multicomponent system that utilizes storage as part of its function of facilitating complex cognitive activities such as learning, comprehending, and reasoning". This model subdivides working memory into three

components: the phonological loop, which maintains and refreshes verbal information, the visuospatial sketchpad that allows one to maintain and manipulate, and the central executive.

The central executive plays a supervisory role in Baddeley's working memory model and is responsible for allocating attentional resources to the phonological loop and the visual spatial sketchpad. More importantly, the central executive is the part of working memory responsible for executive processing. Executive processes include those processes associated with higher order reasoning skills (Baddeley, 1998) (e.g., planning, inhibiting irrelevant information, prioritizing, etc). These are the very processes that are important for risky decision making and unfortunately, these are the very processes most vulnerable to the effects of aging.

Decision Making Theories

In the area of decision making, experts have taken two approaches in developing theories. Some experts have developed normative theories, which focus on how one ought to make decisions under ideal circumstances. Other experts have developed descriptive theories, which focus on how people actually make decisions.

An example of a normative theory is expected utility theory. Expected utility theory maintains that when outcomes are uncertain and one is considering one of two actions, it is important to consider the subjective value of the desired outcome associated with each action and the probability of success (i.e., the probability that taking the action will result in the desired outcome). A person's ultimate challenge according to utility theory is obviously to maximize profit. Although utility theory describes the way in which people ought to make decisions, people are influenced by variables other than cost/benefit analyses. That is, people are often illogical and do not accurately consider probability. As indicated earlier, descriptive theories

describe how people actually make decisions. One such descriptive theory is prospect theory, developed by Kahneman and Tversky (1979).

Prospect Theory

Kahneman and Tversky's (1979)'s prospect theory maintains that individuals make decisions based on gains and losses and not probabilities as suggested by the expected utility theory. Whether an outcome is considered a gain or loss depends on the starting point or the way in which an outcome was framed.

Kahneman and Tversky illustrated how prospect theory predicts decision making through their famous Asian disease problem. Participants are told that there might be a breakout of a deadly Asian disease in the United States that is expected to kill 600 people. In order to combat the disease, two programs have been developed. Participants are told to choose one of the two programs. Half of the participants received Scenario 1 and half of the participants received Scenario 2. In Scenario 1, participants are required to choose from the following two choices: Program A - 200 people will be saved or Program B - 1/3 probability that 600 people will be saved and 2/3 probability that no one will be saved. In the aforementioned scenario, in which participants were presented with options A and B, 72% of the participants chose Program A while 28% chose Program B.

Other participants were presented with a second scenario (Scenario 2) in which they were presented with the following choices: Program C - 400 people will die or Program D - 1/3 probability that no one will die and 2/3 probability that 600 people will die. When presented with Scenario 2 in which participants received options C and D, 22% of participants chose Program C while 78% chose Program D. As one can see, upon carefully reading the scenarios and evaluating the options associated with each of them, choice A and choice C are actually the

same—the wording is just different. Likewise, choices B and D are the same. Thus, Kahneman and Tversky concluded that people do not carefully calculate costs and benefits as normative utility models would suggest. Instead, people are influenced by a number of extraneous factors such as the context in which a choice is presented or the way in which an option is framed.

Evidently, something as simple as wording can influence individuals in the decisions that they make. When the previous scenarios were presented in a positive way or in a frame that emphasized gains (Scenario 1), individuals were more likely to be risk aversive; they appeared to gravitate toward the certain or "sure" choice. When the scenarios were presented in a negative way or in a loss frame, individuals were more risk-seeking, which refers to a willingness to take risks. The prospect theory would explain that this phenomenon occurs because of the value individuals put on losses. To explain further, individuals find losses to be particularly noxious. In Scenario 1, the participant perceives that he/she has the potential to lose something very important (i.e., human life) if a risk is taken and thus, participants opt for the safe choice. Although the probabilities are the same, in Scenario 2, participants perceive that they might be able to stop something noxious if a risk is taken (i.e., once again loss of life). Thus, individuals chose to take risks to minimize loss.

Risky Decision Making

Most of the research examining the relation between age and risky decision making evaluated these two phenomena through framing paradigms such as the ones used in Kahnneman and Tversky's work or they examined risk through the Iowa Gambling Task developed by Bachera. The proposed study uses both of these methodologies to examine risky decision making among older adults. In the following sections, I will address each of these paradigms with respect to older adults. I will initially examine the work that focuses on age differences in

framing effects and then I will discuss the work that focuses on age differences in various gambling tasks.

Framing Effects

There are multiple studies that focus on age differences in susceptibility to framing effects (Sugnhan, Goldstein, Hasher, & Zacks, 2005; Thomas & Millar, n.d.) and the results of these studies have been mixed. People are most likely to be influenced by framing under conditions in which they are not motivated to engage in careful analyses before making a decision, because if individuals really analyzed their choices, they would realize that each option is of equal value. The options are just presented in different ways.

On the surface, it would seem that older adults would be more susceptible to framing effects than younger adults. It would take working memory resources to realize that the options presented in a decision problem were basically the same but were just presented within a different context. Not only do older adults have less working memory resources than younger adults, older adults are also cognitive misers. However, some of the studies have found no age differences (Rönnlund, Karlsson, Laggnäs, Larsson, and Lindström, 2005), while other studies have found significant age differences (Kim, Goldstein, Hasher, and Zacks, 2005). Moreover, still others have found that age differences were dependent upon the degree to which older adults were motivated to engage in careful analyses and ignore the way in which the decision options were framed (Kim, Goldstein, Hasher, & Zacks, 2005). For example, Kim and colleagues found that younger adults were less susceptible to framing effects than older adults when no incentives were provided for careful analyses of decision options, but found no age differences in susceptibility to framing effects when individuals were forced to justify their decisions.

In addition to Experiment 2 of the Kim et al. study, another study conducted by Rönnlund, Karlsson, Laggnäs, Larsson, and Lindström (2005) suggests that there are no age differences with respect to framing effects. In this study, young and older adults were placed into one of three scenarios in which either human lives, paintings, or money were at stake. In keeping with Kahnneman and Tversky's study, the researchers found that if the life-death scenario was negatively framed, participants preferred the risky options. As indicated earlier, participants were willing to take a risk if it meant minimizing losses. Most importantly, overall, younger and older adults produced similar patterns of data and were equally susceptible to the framing effect.

On the other hand, Kim et al. (2005) found that older adults were more susceptible to framing effects than younger adults when making decisions about health. Moreover, Mikels and Reed (2009) found that older adults were less risk seeking than younger adults when decisions were framed in terms of losses. Finally, Finucane and colleagues (Finucane, Mertz, Slovic, & Schmidt, 2005) found that older adults were less likely than younger adults to evaluate a product consistently regardless of context. That is, older adults were more influenced by the way in which products were framed than younger adults. Thus, the probability of finding age differences in framing effects varies depending on a number of factors including the motivation of older adults to engage in deliberative processing, and the nature of the gains and losses in a particular study, etc.

Gambling Paradigms

As indicated earlier, another paradigm used to examine risky behavior is the gambling paradigm. The majority of studies that have examined age differences in risky behavior have used a gambling task known as the Iowa Gambling Task (IGT). In the IGT, participants are

presented with four decks (some are more advantageous than others are) and are told to try to gain as much money as possible. In this task, participants are not told any rules and must implicitly learn them from experience. Presumably, and in keeping with the tenets of utility theory, participants try to maximize their gains and minimize their losses when participating in the IGT. Several studies have found age differences in the IGT. The age differences can be attributed to age differences in the ability to implicitly and explicitly notice the strategies associated with maximal performance. Undoubtedly, part of the problem for older adults revolves around the age-related decline in working memory resources. It would take working memory resources to determine which strategies would lead to the best long-term outcomes.

Because the IGT is associated with problem-solving skills and other higher order reasoning skills, other gambling tasks may provide better assessments of age-related changes in risky decision-making. In fact, Henniger, Madden, and Huettel (2010) conducted work comparing young and older adults' performance on various gambling tasks and found that when processing speed and memory were controlled, there were no age differences in performance on the gambling tasks. Thus, the researchers argued that age differences observed in risky decision research may not be a result of age itself, but it may be the result of age-related changes in underlying cognitive abilities. Those older adults who do not experience this type of decline in cognitive processes should perform as well as younger adults on gambling tasks.

One example of a gambling task that is more straightforward than the IGT is the Game of Dice (GDT). The Game of Dice Task (GDT) is a probability based gambling task that requires participants to guess what number(s) will come up when he/she rolls the dice.

On each trial, the participant is presented with four rows. Each row is associated with a certain level of risk. The top row is the riskiest and the bottom row is the safest. To explain

further, in the bottom row, the dice are presented in groups of four. If the participant decides

he/she wants to choose one of the options presented in the bottom and safest row, the participant

will win money as long as one of the numbers among the four dice comes up when he/she "rolls

the dice." On the other hand, in the top row, each option consists of one dice. If the participant

chooses an option from this row, he/she will only win money if the one numbers comes up when

the dice is rolled. As one might expect, the amount of money that can be gained varies as a

function of risk. Thus, the participant can choose to hinge his/her bets on just one number and

win more money (i.e., $1,000.) or the participant can decide to be safer and place the bet so that

he/she will win less money ($100.00), if any of four numbers comes up when the dice are

thrown. The participant's wins and losses are displayed throughout the game. The game is

designed so that making risky choices on a consistent basis will result in participants losing

money.

Although information is presented in a more explicit way in the GDT than in the IGT, it

still requires the engagement of higher order reasoning skills to maximize profit and minimize

risk. A player winning the optimal amount of money would realize that risky choices would

result in more losses than gains. The instructions do not explicitly state that making risky choices

is not wise in the end. It is up to the player to implicitly "pick up" on this. Some studies have

examined age differences on the GDT. Although the GDT does not require as much executive

functioning as the IGT, Brand and Markowitsch (2010) found that the GDT is dependent on

executive processing and that age differences (albeit extremely small) in performance do exist.

Personality Differences

In addition to cognitive processes affecting risky decision-making, personality variables

may affect risky decision-making. For example, various dimensions of the Big Five Personality

Test have been shown to be correlated with risky decision making. Specifically, high scores in the dimensions of extraversion and openness and low scores in neuroticism are correlated with risky decision making.

The influence of personality factors on an older adult's decision-making is not an area that has been examined in detail. Most of the research that has been conducted has focused on the personality characteristics of unhealthy older adults and their decisions to partake in risk (Chapman, Lynch, Rosenthal, Cheavens, Smoski, & Krishnan, 2007).

The few studies that have been conducted on healthy older adults have examined the effects of personality on risk taking (Lauriola & Levin, 1999; Schwebel, Ball, Severson, Barton, Rizzo, & Viamonte, 2007) and have found that certain personality traits that are correlated with risk taking in older adults. For example, in one study (Schwebel, Ball, Severson, Barton, Rizzo, & Viamonte, 2007), individual personality differences were examined to see if they had any effect on risky driving in older adults. All participants completed a virtual simulation that assessed their risky driving behaviors. The personality characteristics of sensation-seeking and impulsivity were related to older adults' risky driving. Sensation-seeking was directly related to the individual's history of tickets and violations while impulsivity was directly related to a wide range of measures assessing risky driving.

These results might help to support the findings of recent research. Denburg and colleagues (2009) found that personality characteristics were associated with risk taking, but only in older adults. Explicitly, older adults high in neuroticism had poorer performance on the IGT than others.

Current Study

The area of aging and risky decision making is still in its infancy stages. The purpose of the current study was to examine the effects of framing (through a priming paradigm) and personality on younger and older adults' risky decision making. Decision making was examined through the GDT. I will address the way in which framing affects, personality, and attitudes about risk affect GDT overall performance and the propensity to take risk on the GDT.

Priming and GDT

To explain the priming paradigm in more detail, each participant was given one of two vignettes; across the two vignettes, the main character's risk seeking tendencies varied. Specifically, subjects participated in risky or risk seeking behaviors that resulted in positive consequences or the subject was risk aversive and thereby avoided negative consequences. After being primed with one of these scenarios, participants were given a gambling task to examine the possibility that the priming scenario influenced their propensity to take risk.

This study addressed the possibility that a prime (in this case a vignette that tells a story) can actually influence subsequent behavior. Why would primes influence subsequent behavior or judgments? According to Higgins, Rholes, and Jones (1977), the answer may lie in category accessibility. In a study conducted by Higgins, Rholes, and Jones (1977), participants were primed with either positive or negative adjectives. Unbeknownst to the participants, these adjectives were semantically related to personality traits of a fictional individual who would be later depicted in a scenario used for a social judgment task. The description of the fictional individual was such that he could be evaluated positively or negatively, depending on one's frame of reference. The researchers found that participants' judgments of the fictional individual were consistent with the valence of the prime presented earlier. For example, one of

the scenarios depicted a main character that enjoyed a number of exciting but risky activities. This person could be viewed as reckless or adventurous depending on one's perspective. The researchers found that participants rated the character differently depending on the priming task that preceded their evaluations of the character. Thus, if participants were involved in a priming task that activated the word "adventurous" then those participants rated the fictional character's antics more favorably than those participants exposed to a task that activated a word such as "reckless." Interestingly, there have also been studies indicating that older adults are more likely to be inappropriately influenced by a prime that activates a personality characteristic than younger adults when making social judgments (Hess, McGee, Woodburn, & Bolstad, 1998).

The results of the aforementioned studies imply that category accessibility will affect how individuals make social judgments, because individuals will subconsciously succumb to whatever ideas or concepts that are readily available when making decisions. There have also been studies that have shown that primes affect behavior (Bargh, Chen, & Burrows, 1996). Bargh and colleagues found that when young adults were primed with the concept "elderly," they walked slower than when they were not primed with this concept.

In the current study if the participants received either risk seeking or risk aversive scenarios, the prime should activate the categories "risk seeking" or "risk aversive" and make concepts associated with each of those categories more accessible for participants and thereby influence them as they played the game of dice. I am interested in determining whether increased accessibility of words related to risk seeking or risk aversive behaviors would also influence participants' behavior while playing the GDT.

The design of the current study in some respects is similar to the study conducted by Giliad and Kliger (2008) study. Giliad and Kliger conducted two experiments. In their second

experiment, participants were assigned into either a risk seeking (RS) or a risk aversive (RA) group. Participants were either investment advisors or economic undergraduates. Participants in the RS read a scenario about a risky individual. Those in the RA group read a scenario of an individual with risk aversive behaviors. After this, participants completed several questionnaires about stocks and investments. The researchers found that those in the RS group invested more money than individuals in the RA group. The current study used priming vignettes similar to the Gilad and Kliger (2008) study. The baseline condition in this study was the control condition. Thus, both the RA and the RS conditions were compared to the control condition.

The Impact of Personality on the GDT

As previously stated, certain personality traits have been linked to risk seeking behavior. For example, Nicholoson and colleagues (2005) found that risk taking behavior was associated with high scores in extraversion and openness and low scores in neuroticism, agreeableness, and conscientiousness. Researchers Lauriola and Levin (2001) found similar results. They found that individuals with high scores in openness tended to be riskier while individuals who scored low in neuroticism tended to be less risky.

Earlier I predicted earlier that the priming scenarios could have an impact on category accessibility, which in turn could have an effect on decision making during the GDT. Bargh (2003) has conducted work that suggests that social priming manipulations activate schemas. These activated schemata are brought to bear in context-appropriate situations that occur later in the experimental session. With regard to the current study, I predicted that the priming scenario would activate a risk taking or risk aversive schema. Furthermore, I predicted that these activated schemata would be more accessible than schemata not activated earlier and thereby might influence behavior on the gambling task. I predicted that personality traits would serve as

moderator variables in that they will strengthen or weaken the effects of the priming manipulations. For example, the research indicates that openness to experience is positively correlated with the propensity to take risks. Thus, individuals who sore high on openness to experience might be more influenced by a risk seeking prime than individuals who score low on that dimension.

As indicated earlier, in addition to examining the effect of priming, the extent to which personality factors and working memory affect performance on these tasks were examined. Will specific personality factors interact with the priming manipulation to predict risk propensity among participants? That is, will openness to experience and extraversion affect the degree to which risk seeking primes influence participants' risky choices. Moreover, will neuroticism affect the degree to which individuals are influenced by the risk aversive prime (Lauriola & Levin, 1999)?   To summarize, in the current study, participants received a vignette, which served as a priming task. After the priming task, participants answered questions about the vignette and then receive a filler task. Following the filler task, they received the working memory task. Scores on a test that measures working memory were collected from all participants. Listed below are my hypotheses concerning age, working memory, priming effects, and GDT performance.

Hypotheses

Hypothesis 1*:* Both young and older adults will make decisions in the gambling task that are consistent with the priming scenario that precedes the task. It was predicted that overall younger and older adults will be more prone to make risky decisions on the gambling tasks when the gambling task is preceded by a risky prime versus when the gambling task is preceded by a

neutral prime. Moreover, both groups of participants will be more cautious relative to the neutral condition when the gambling task is preceded by a risk aversive prime.

The risky adjectives and character actions within the story in the risk seeking condition will make concepts associated with those words more accessible. This increase in the accessibility of risky concepts should result in participants taking more risks in the gambling task. On the other hand, the risk aversive scenario should activate concepts associated with caution and this should therefore make concepts associated with risk aversion more accessible.

Hypothesis 2: It was predicted that older adults will produce larger priming effects than younger adults. That is, the difference between the risk seeking condition and the neutral condition will be larger for older adults than for younger adults. Likewise, the difference between the risk aversive condition and the neutral condition will be larger for older adults than for younger adults. This prediction was based on the work by Hess et al. (1998) that indicates that older adults are more susceptible to primes in social judgment tasks than younger adults are.

Hypothesis 3: It was predicted that overall older adults would not perform as well as younger adults on the GDT. That is, older adults would have a significantly lower amount of net money earned in the game than younger adults would. This prediction was based on the work of Brand and Markowitsch (2010). They found that older adults take risks in this task even when it was not in their best interest to do so. I predicted that the age difference would be greatest in the risk seeking priming conditions. In the end, choosing risky choices in the GDT is not beneficial and would result in large losses (Brand & Markowitsch, 2010).

Hypothesis 4: It was hypothesized that personality differences would determine the degree to which participants are susceptible to the primes. It was predicted that participants higher in neuroticism would demonstrate poorer judgment than individuals not high in

neuroticism when they are required to take risks (Denburg et al., 2009; Lauriola & Levin, 1999). It was also predicted that overall risk propensity will be related to high extraversion and openness and low agreeableness and conscientiousness scores (Nicholson, Soane, Fenton-O'Creevy, & Willman, 2005). Specifically, I predicted that individuals who score high in extraversion, openness, and neuroticism on the BFI will be more susceptible to the risk seeking primes than individuals who score low on the dimensions of the BFI. Thus, individuals who score high on the three aforementioned personality traits will take more risks when the GDT is preceded by the risk seeking scenario than when the GDT task is preceded by a completely unrelated task.

Hypothesis 5: Individuals who score higher on the various subscales (Health, Financial, Social, Ethical, and Recreational) of the DOSPERT will be more susceptible to the effects of the risk seeking primes and will make more risky choices on the GDT than individuals who do not score as high on the subscales of the DOSPERT.

Hypothesis 6: Age differences in overall performance and in risk propensity (calculated via risk score) will be attenuated after controlling for the effects of working memory. This prediction was based on the Brand and Markowtisch (2010) study in which researchers found that age differences in performance was mediated through working memory.

METHODOLOGY

Pilot Study

A pilot study was conducted to decide which priming scenarios to use in the main study. 30 younger adults and 14 older adults were given a survey that included risk seeking (RS) and risk aversive (RA) scenarios. In each scenario, an individual named Jamie is traveling to a Greek island. Depending on the type of the scenario, Jamie performed different types of behaviors (RS or RA). Each scenario ends with Jamie being satisfied by his decisions. Every participant circled which word they felt best described the scenario (Risk seeking, risk aversive/risk avoidant, and risk neutral). Frequencies were conducted to examine each scenario. Risk taking Scenario 2 was chosen over Scenario 1, because 25 participants rated it as being risk seeking compared to 19. Risk Aversive Scenario 1 was chosen over Scenario 2, because 33 participants rated it as aversive compared to 32.

Participants

A total of 131 participants consisting of younger and older adults were analyzed in this study. 73 younger adults (*Mean age* = 19.55, *SD* = 2.45, *Range*=18-36) were recruited from the University of Alabama psychology subject pool. There were 38 males and 35 females. All younger adults were given research credit for their introductory psychology course as compensation. Fifty-eight older adults (*Mean age* = 68.31, *SD* = 6.78, *Range* = 60-83) were recruited from the surrounding communities in Tuscaloosa, Alabama and Thomasville, Georgia through appeals to senior citizen community centers, independent living facilities, local businesses, and the Center of Mental Health and Aging database. There were 24 males and 34

females. Older adults were given 10 dollars for compensation. All older adults in the study had

at least a score of 24 on the dementia screen test that was used, the Mini Mental State

Examination (MMSE). Any score above 24 indicates that the individual is cognitive healthy and

does not have dementia. The study took approximately one hour for younger adults and 1 hour

and 30 minutes for older adults to complete.

Design

The independent variables were the two priming conditions and age. The dependent

variables were performance on the gambling task and propensity to take risk (based on the risk

calculation). Again, the gambling task is designed in such a way that risky choices ultimately

will result in more losses. Thus, the two dependent variables will undoubtedly be highly

correlated. The design will be 3 Character's propensity to take risk (Risk-taking vs. Risk-

aversive vs. Neutral) x 2 Age (Young vs. Old) between subjects design.

Materials

Priming Scenarios*:* There were two priming scenarios: risk seeking and risk aversive. In the

risk-seeking scenario, the main character engaged in risk-seeking behavior and was rewarded for

doing so. In the risk aversive scenario, the main character avoided risk and was rewarded for his

actions. Finally, in the control condition, participants did extra math problems instead of reading

a scenario. Thus, participants in the control condition were not exposed to any primes that should

influence performance. Participants in either the RS or RA group were presented with one

scenario toward the beginning of the experiment.

Demographic questionnaire*:* A questionnaire was used to collect demographic information

from participants. General questions about age, sex, health, and education were asked. The

demographic questionnaire was complete on the computer. Only a subject code identified the participant.

WAIS-R*:* The vocabulary subtest of the Wechsler Adult Intelligence Scale-Revised (WAIS-R) was used to test the vocabulary ability of each participant. This test was given to both younger and older adults to ensure that all participants have similar vocabulary abilities. The average internal consistency for the WAIS-R vocabulary subtest has a Cronbach's coefficient alpha of .94. The subtest also has an average standard error measurement (SEM) of .73. The subtest's test-retest reliability has a Pearson r value of .90 and after correcting for the variability of the normative sample a corrected r of .89 (Wechsler, 2008).

Mini-Mental State Examination*:* The Mini-Mental State Examination (MMSE) was given to the older adults participating in the experiment. The MMSE is a cognitive test that is used to test for dementia. The MMSE was used to screen older adults for dementia. Older adults scoring less than 24 on the MMSE were not included in data analysis. No participants scored lower than a 24. This experiment included only cognitively healthy older adults.

Daneman & Carpenter Reading Span Task*:* The Daneman and Carpenter Reading Span task was used to measure working memory. The automated reading span task that was used was created by Randy Engle and was accessed from the Inquisit Software website (Unsworth, Heitz, Schrock, & Engle, 2005). The reliability for this task is .78 (Conway, Kane, Bunting, Hambrick, Wilhelm, & Engle, 2005). Participants were presented with sentences and then letters in between the sentences. The participants were instructed to determine if the sentence made sense or not and to remember the letters that were presented to them. After all the sentences were presented, they were required to recall the letters that were presented to them in that trial.

Game of Dice task*:* The Game of Dice Task was given to all participants on the computer to assess their willingness to take risk and make advantageous decisions. Participants were given the following directions: "Welcome to the Game of Dice Task. In this task, you are going to throw a virtual dice 18 times. Before each throw, you will be able to bet on the outcome by selecting a single number (e.g. '3') or combinations of 2 to 4 numbers (e.g. '1-2-3'). You are given a starting capital of 1000$. Your job is to maximize this capital within 18 throws of the dice. Good luck!" If the participants just selects a single number, they have a 16.67% chance of winning and obviously an 83.33 % chance of losing, for two numbers they have a 33.33% chance of winning and a 2/3 chance of losing, for three numbers they have a 50% chance, and for the 4 numbers they have a 66.67% chance of winning and a 1/3 chance of losing. Before starting, the experimenter made sure the participant fully understood the game and repeated or expanded upon instructions as needed. Participants were shown all possible combinations from which they could choose.

Admittedly, an observant participant might have realized that the riskier the choice (i.e. betting on "1" number vs. "3") the greater the opportunity to win a great deal of money ($1000). However, the potential losses were also greater with riskier choices (e.g., $1000). The reverse was also true. For example, with the safest choice, participants had the potential to win or lose $100.00. One-hundred dollars may not seem like much compared to a thousand dollars, but in the long run, the best strategy was for participants to choose the least risky option. If a participant consistently chooses the risky option, he/she will lose more money than he/she won.

A "riskiness" score was calculated by taking the total number of risky choices and subtracting it from the total number of non-risky choices. The more positive the number was the more non-risky the participant was (Brand, Pawlikowski, Labudda, Laier, Von Rothkirch, &

Markowitsch, 2009). All information was visually presented to participants on each trial, including the following information: a) amount of wins and losses, b) current trials, c) their current gain/loss for a specific trial, and d) the total amount of money they have in their possession. See Figure 1 for a screenshot of the task.

The Big Five Personality Inventory*:* The Big Five Inventory (BFI) (John, Nauman, & Soto, 2008; John, Donahue, & Kentle, 1991; Benet-Martinez & John, 1998) is a 44 item inventory that measures an individual's personality according to five major factors: 1.) Extraversion, 2.) Agreeableness, 3.) Conscientiousness, 4.)Neuroticism, and 5.) Openness. Participants answered how much they agree with different personality statements on a five point likert scale. One is "disagree strongly", 3 is "neither agree or disagree" and 5 is "agree strongly".

The BFI is both a reliable and valid personality measure. The mean reliability score for the BFI is 0.83. For extraversion it is 0.88, agreeableness is 0.79, conscientiousness is 0.82, neuroticism is 0.84, and openness is 0.81. The BFI has high scores of convergent validity when compared to Trait Descriptive Adjectives (TDA) and the Neuroticism-Extraversion-Openness Personality Inventory (NEO-PI). When comparing the BFI and the TDA the mean corrected pairwise convergent validity is 0.95. For the BFI and the NEO-PI it is 0.92 (John & Sirvastava, 1999).

Domain Specific Risk Attitude*:* The Domain Specific Risk Attitude (DOSPERT) was given to all participants to assess how risky they were in five different domains (ethical, financial, health/safety, recreational, and social) and how they perceived risk. For both subscales (risk-taking and risk perception), there were 30 questions with six questions in each domain. For the risk-taking subscale participants were required to rate how likely they were to participate in such a risk. For the risk perception, participants were required to rate how risky they perceived each

item to be. For the risk benefits, participants were required to rate the amount of benefits they thought they would obtain from those risks. The internal consistencies for the risk-taking subscale scores ranged from .71 to .86 and the risk perception subscale scores ranges from .74 to .83 (Blais & Weber, 2006).

Need for Arousal Questionnaire: All participants also completed a need for arousal scale developed by Figner, Mackinlay, Wilkening, and Weber (2009). The Need for Arousal questionnaire consists of eight general items that include statement such as "I like a lot of variety" and participants are required to rate how much these items apply to them (does not apply at all to strongly applies). This questionnaire was used to assess participants' overall need for arousal.

Procedure

Participants were tested independently in a quiet room. In the beginning, the experimenter gave participants a consent statement to read over. The experimenter went over the consent statement and answered any questions that the participant had. Once the participant signed the consent statement and agreed to continue with the experiment, they were given a general demographic questionnaire to complete. Next, participants were presented with either a risk seeking or a risk aversive priming scenario if they were in the risk seeking or risk aversive group. Participants in the neutral group did not receive a priming scenario. Participants in the risk seeking and risk aversive groups were told before reading the scenarios to make sure that they pay close attention to the scenarios because they will be asked questions about them later. After the priming task, participants received several filler tasks. In the first filler task, participants received the questionnaire alluded to earlier. It asked them to rate how likable the individual in the scenario was and instructed them to write down as many adjectives they could

remember. The second filler task was math problems from a second grade workbook. Participants in the control group received an extra set of math problems instead of a priming scenario.

Following the filler task, participants completed the GDT. Once the GDT was completed, participants were encouraged to take a break. After the break, participants received a reading span task, a test that measured working memory. Immediately following the reading span task the Need for Arousal scale, the BFI, DOSPERT, and the WAIS-R vocabulary test were completed. In addition, the MMSE was given to all older adult participants.

Debriefing

Once the experiment was completed, the experimenter debriefed the participants and told them the true purpose of the experiment. Participants were allowed to ask any questions and were given the opportunity to withdraw from the experiment if they chose to. All participants were given some form of compensation for their participation in the study. Younger adults received course credit and older adults were given monetary compensation for their participation. Participants were also reminded that they could contact the University of Alabama's Research Compliance Officer if they had any questions or concerns about the experiment.

RESULTS

Treatment of Outliers

As indicated earlier, my two primary dependent measures are the risk taking and performance scores from the GDT. In my initial overall analyses, I discovered that there were two older adults who produced GDT risk scores approximately three standard deviations above the mean. However, there was no evidence that these two older participants did not understand the task or did not take the task seriously. Thus, their results were not removed from the data set. However, because their risk scores were so extreme relative to the other scores, I analyzed the data with and without those two participants' data included. Throughout the results section, I have indicated when my analyses have produced different patterns of results based on the inclusion/exclusion of the two participants' data.

Psychometric Tests

Verbal ability for all participants was assessed by administering the vocabulary section of the Wechsler Adult Intelligence Test Scale-Revised (WAIS-R). Age differences in vocabulary ability were examined by conducting an independent t-test. There was a significant age difference for vocabulary scores, $t(128) = -2.31$, $p = .023$. Older adults ($M = 33.68$, $SD = 10.06$) had significantly higher vocabulary scores than younger adults ($M = 29.82$, $SD = 9.00$). This is congruent with other research studies that have found similar age differences (Borella, Ludwig, Dirk, & de Ribaupierre, 2011).

Working memory was also measured using an Automated Reading Span task. An independent t-test was conducted to examine age differences in working memory. There was a

significant age difference in working memory, $t(113.183)=11.61$, $p < .001$. Older adults ($M = 9.24$, $SD = 9.86$) had significantly lower scores on the reading span task than younger adults ($M = 38.93$, $SD = 18.84$).

Age and Priming Scenarios

There were two dependent measures in the current experiment: overall performance and propensity to take risk. In this study, as indicated earlier, participants were given either a risk seeking scenario, risk aversive scenario, or no scenario at all (control) prior to receiving the GDT. I hypothesized that overall the priming scenarios would influence participants' behaviors and that older adults would be more affected by these primes than younger adults. Mean calculated risk scores and mean performance scores are displayed in Tables 1 and 2 respectively.

GDT Risk Taking

As one can see, Table 1 displays propensity to take risk as a function of age and prime conditions. As indicated earlier, I hypothesized that prime condition would influence performance. Specifically, I predicted that risk taking would be greater in instances in which the GDT was preceded by a risk-taking prime than when the GDT was preceded by a neutral or control task. Furthermore, I predicted less risk taking in the GDT in the risk aversive prime condition than in the neutral prime condition. However, as one can see upon viewing Table 1, the prime had very little effect on the risk taking performance (given the size of the standard deviation of younger or older adults). As predicted, older adults (independent of prime condition) engaged in risk taking to a greater degree than younger adults, in that older adults had higher risk taking scores than younger adults. (Note that lower scores indicate greater risk taking).

The aforementioned observations were confirmed by the following data analyses. A 2 (age group i.e., Old vs. Young) x 3 (Scenario i.e., Risk Seeking, Risk Aversive, Control) analysis of variance (ANOVA) was conducted to determine the degree to which age and priming scenarios affected risk taking on the GDT. This analysis did not yield a significant main effect for scenario, $F(1,125) = .39$, $p = .677$. However, there was a significant main effect for age, $F(1,125) = 4.50$, $p = .036$. Older adults ($M = 13.69$, $SD = 15.16$) were significantly more likely to take risks than younger adults ($M = 18.77$, $SD = 12.45$). In addition, there was no significant interaction between age and scenario, $F(2,125) = .678$, $p = .510$.

I also conducted the same analysis excluding the data that were three standard deviations above the mean. When these data were excluded, there was no longer a significant main effect for age, $F(1,123) = 2.303$, $p = .132$. However, the correlation between age and risk taking without the outliers was approaching significance, $r = -.149$, $p = .091$. Although age was not a significant predictor of risk taking when the outliers were excluded, the means were still in the predicted direction in that older adults engaged in more risk-taking ($M = 15.25$, $SD = 12.90$) than younger adults ($M = 18.77$, $SD = 12.45$). The means and standard deviations for risk taking in the GDT, when the outliers are excluded are displayed in Table 3. As would be expected, there was no significant effect for priming scenario when the outliers were excluded.

GDT and Overall Performance

Recall that another dependent variable in this study was overall performance. This is different from the risk taking dependent variable in that it refers to how much money a participant earned. Because the GDT is designed in such a way as to reward safe choices, there should be a high correlation between the two. However, it is conceivable that there would be age

differences with respect to the risk score measure but no age differences with respect to the overall performance measure.

As indicated earlier, Table 2 displays the mean overall performance on the GDT as a function of age. A 2 (Age Group i.e., Old vs. Young) x 3 (Scenario i.e., Risk Seeking, Risk Aversive, Control) analysis of variance (ANOVA) was conducted to determine the degree to which age and priming scenarios affected overall performance (money total) on the GDT. There were no significant main effects for priming scenario or age. However, older adults (M = -1182.76, SD = 3916.64) had a lower overall performance mean than younger adults (M = -424.66, SD = 3562.29), indicating that they did not perform as well as younger adults on the GDT. In addition, there was no significant interaction between age and scneario, $F(2,125)$ = 1.592, p = .208.

Age and Working Memory

In addition to hypothesizing that there would be age differences in risk taking propensity and overall performance on the GDT, I also predicted that there would be age differences in working memory. Moreover, I predicted that the age differences in working memory would mediate the relation between age and risk taking. My prediction was based on the notion that participants would have to engage in problem-solving to ascertain that the optimal strategy to use in the GDT was one that emphasizes caution. That is, in the long run, the participant would earn more money by making "safe" rather than "risky" choices.

I first conducted a simple linear regression analysis to determine the extent to which there was a relation between age and working memory. The hypothesis that there was a relationship between age and working memory was supported, r = -.703, p < .001. Initial analyses indicated that there was a significant correlation between age and risk taking scores, r =

-.195, p = .013. In fact, age explained 3.1% of the variance in risk taking scores, $F(1, 129)$ = 5.095, p = .026.

Analyses were conducted to examine if working memory was a mediator for the relationship between age and risk taking scores on the GDT. I predicted that working memory mediated the relation between age and the risk taking scores in the GDT. Thus, in conducting hierarchical multiple regression analyses, I predicted that the relation between age and risk taking in the GDT would be reduced after controlling for working memory. Using Baron and Kenny (1986) analysis, first I used regression analyses to indicate that age was a significant predictor of risk taking, $F(1,129)$ = 5.095, p = .026, β = -.109, p = .026. Next, I demonstrated that the mediator variable, working memory, was a significant predictor of risk taking, $F(1, 129)$ = 9.65, p = .002, β = .171, p = .002. Next, to test for a partial mediation, both age and working memory were included in the analysis to predict risk taking. This analysis demonstrated that if age were entered first into the equation first, and working memory was entered second, working memory was a significant predictor, $F(2,128)$ = 4.80, p = .01 β = .163, p = .038 of risk taking. However if working memory were entered first into the equation, age was no longer significant in explaining the variance after controlling for working memory, β = -.01, p = .876. According to Baron and Kenny (1986), this demonstrates that working memory is at least a partial mediator. In fact, given that for age, β = -.01, and p = .876 when age follows working memory, one could argue that working memory is a complete mediator of the relation between age and risk taking in the game of dice (Baron & Kenny, 1986). Age no longer contributed to the model and the beta was not significant, p = .876.

Working Memory as a Function of Age

Separate analyses were conducted to examine if young and older adults would produce similar patterns of results for working memory. I wanted to examine the possibility that there was a significant correlation between working memory and risk taking in each age group. There was a significant correlation between working memory and risk taking for young adults but not for older adults. Upon analysis of young adults the correlation between working memory and risk taking scores was significant, $r = .279$, $p = .017$. Individuals with more working memory made safer choices. This pattern of results was similar to our overall findings. However, when older adults were analyzed the correlation between working memory and risk taking scores was not significant, $r = .073$, $p = .588$. This finding may be due to the lack of variance among working memory scores in older adults. For young adults the range for working memory scores was 3 - 75. For older adults the range was 0 - 37. Overall, there may have not been enough high scorers in older adults to find the same correlation.

Working Memory with Outliers Excluded

I was interested in finding out if working memory still mediated the relation between age and the GDT risk score after removing the data that were three standard deviations above the mean. However, I could not conduct a mediational analysis, because the relation between age and the risk taking score was no longer significant, once the data (considered outliers) were removed. However, as mentioned earlier the correlation between age and risk taking approached significance, $r = -.149$, $p = .09$. Moreover, age was still a significant predictor of working memory, $F(1,127) = 122.42$, $p = .001$. In addition, working memory significantly predicts risk taking scores on the GDT, $F(127) = 8.312$, $p = .005$.

My second series of analyses focused on the possibility that the propensity to take risk in the GDT varied as a function of personality and current risky behavior in everyday life.

Risky Behavior as Measured by the DOSPERT and Risky Choices on the GDT

In addition to being interested in examining the extent to which working memory mediated the relation between age and working memory, I was interested in examining the extent to which attitudes, need for arousal, and personality affect risk taking. I originally conceptualized attitude and personality as variables, which would serve as moderators with respect to the strength of the prime. That is, I predicted that individuals, already possessing characteristics associated with risk taking, would be more susceptible to the effects of the prime than individuals not possessing those characteristics. Thus, I was predicting that individuals who enjoyed "thrill seeking" would be more affected by the risk-seeking scenario, relative to the neutral condition, than someone with a low need for arousal.

I will initially focus on the impact of attitude, as measured by the DOSPERT, on risk-taking in the GDT. Recall that the DOSPERT assesses risk-taking, risk perception, and expected benefits in five different domains (ethical, financial, health/safety, recreational, and social). For each of the three primary subscales of the DOSPERT (e.g., risk taking, risk perception, and expected benefits) there are 30 questions with six questions in each domain. I will first conduct analyses focusing on the risk taking subscale, then conduct analyses focusing on the risk-perception subscale, and finally analyses on the expected benefits scale.

Risk Taking Subscale

For the risk-taking subscale, participants were required to rate how likely they were to participate in such a risk. Based on work by Rolison, Hanoch, Wood, & Liu (2013), I initially predicted age differences in risk taking with older adults being more cautious than young adults.

A one-way between-groups multivariate analysis of variance was performed to investigate age differences in the DOSPERT. The five domains from the DOSPERT were used as dependent variables. The independent variable was age group. As one can see from Table 4, age was significantly correlated with all domains except for the social domain. For the risk taking portion, there was a significant difference between young and older adults on the dependent variables, $F(5,125) = 24.05$, $p < .001$. Young adults were riskier than older adults in all domains except for social risk taking. Prior to conducting additional analyses on each of the subscales of the DOSPERT, I conducted a Levene's Test of Equality of Error Variances. The analysis yielded group differences in variability within the following domains: ethical, health/safety, and recreational. As a result, an alpha of .025 was used instead of the traditional alpha of .05; Pillai's Trace = .49. All variables were significant at $p < .001$ except for the social risk taking variable.

Regression analyses were conducted to examine if risk taking scores on the DOSPERT were a significant predictor of risk propensity on the GDT and overall performance on the GDT. All regression analyses determined that risk taking was not a significant predictor of risk propensity or overall performance. Although I did not find evidence that the DOSPERT explained a significant portion of the variance related to risk propensity when young and older adults were analyzed together, I proceeded to analyze each group separately. I thought that young and older adults might have produced a different pattern of results with respect to the DOSPET risk-taking scale as it relates to gambling performance, and these differences might have masked any overall significant results.

DOSPERT Risk Taking & GDT Risk Taking as a Function of Age

Younger adults. Regression analyses were conducted to determine if the risk taking subscale of the DOSPERT was a significant predictor of risk taking gambling scores in younger

adults. There was a significant correlation between financial risk taking and the gambling risk taking scores, $r = -.321$, $p = .006$. Regression analyses revealed that financial risk taking was a significant predictor of risk taking scores, $F(1, 71) = 8.14$, $p = .006$. Financial risk taking accounted for 9.0% of the variance in GDT risk taking scores in younger adults.

Older adults. There was also a significant correlation between the ethical risk taking subscale of the DOSPERT, $r = -.327$, $p = .012$ and GDT risk taking scores in older adults. Regression analyses indicated that the ethical risk taking score on the DOSPERT was a significant predictor of the gambling risk-taking scores $F(1,56) = 6.71$, $p = .012$. Ethical risk taking explained 9.1% of the variance in risk taking scores.

Without the outliers included, ethical risk taking and recreational risk taking were significant predictors of risk-taking on the GDT, $F(2,53) = 6.106$, $p = .004$. Together, the two variables accounted for 15.7% of the variance in risk taking scores on the GDT. Interestingly, with the outliers excluded, recreational risk taking was only a significant predictor after controlling for ethical risk taking.

DOSPERT Risk Perception Subscale

After focusing on the risk-taking portion of the DOSPERT, I will turn my attention to the risk perception subscale of the DOSPERT. For the risk perception subscale of the DOSPERT, participants were required to rate how risky they perceived each item to be. For example, rating the amount of perceived risk for "betting a day's income at the horse races".   Table 5 presents a correlation matrix which depicts the correlations among the subareas of the DOSPERT risk perception subscale and the following variables: age, working memory, and risk score of the GDT.

Regression analyses were conducted to examine if risk perception was a significant predictor of risk propensity on the GDT and overall performance on the gambling task. Regression analyses indicated that risk perception was not a significant predictor of risk propensity or overall performance on the GDT.

As indicated earlier, the risk perception subscale is further divided into subareas. One of the subareas, health and safety, was correlated with one of the dependent variables —overall performance on the GDT, $r = -.181$, $p = .038$. In addition, the correlation between risk taking scores on the GDT and the risk perception subarea, recreational risk perception, approached significance, $r = -.171$, $p = .050$.

I was interested in examining age differences in responses to the risk perception subscale of the DOSPERT. Before proceeding with further analyses, a Levene's Test of Equality of Variances was conducted and there were no significant differences in variability in any risk perception subscales. Thus a MANOVA was conducted comparing risk perception within the two age groups. The pattern of results for the MANOVA examining age differences in the various subareas of risk perception was similar to the same type of analysis conducted from the DOSPERT risk-taking domain. All of the DOSPERT domains had significant age differences with a p-value of .003 or lower except for social risk perception, $p = .540$. Older adults perceived the behaviors as being significantly riskier than younger adults in all domains except for social risk behaviors.

DOSPERT Risk Perception & GDT Risk Taking as a Function of Age

Although risk perception did not predict risk taking in the GDT when the two age groups were included together in analyses, it was possible that risk perception would predict participants' behavior in the GDT when the two age groups were examined separately.

Younger adults. Regression analyses were conducted to examine if the risk perception subscale of the DOSPERT was a significant predictor of GDT risk taking scores in younger adults. The analysis indicated that there were no significant correlations between the risk taking scores on the GDT, and certain subareas of the DOSPERT. However, the social risk perception scores approached significance, $r = -.212$, $p = .072$.

Older adults. Regression analyses were conducted to examine if the risk perception subscale of the DOSPERT was a significant predictor of risk taking scores in older adults. Regression analyses revealed that in fact, there were no significant correlations between the various domains of risk perception and the risk taking scores on the GDT.

DOSPERT Expected Benefits Subscale

The amount of expected benefits obtained from each of the behaviors was the last part of the DOSPERT that was analyzed. Once again, I was interested in age differences with respect to this variable. Before proceeding with further analyses, a Levene's Test of Equality of Variances was conducted and there were significant differences in variability in all expected benefits. The analysis yielded group differences in variability within the following domains: ethical, financial, health/safety, and recreational. As a result, an alpha of .025 was used instead of the traditional alpha of .05; Pillai's Trace = .49. A MANOVA was conducted comparing the expected benefits subscale within the two age groups. The analysis yielded significant age differences in all domains with a p-value of .005 or lower. Older adults expected fewer benefits from engaging in the behaviors than younger adults.

Regression analyses revealed that in the expected benefits scale was not a significant predictor of risk propensity and overall performance. Regression analyses determined that expected benefits scale did not predict risk propensity or overall performance on the GDT.

There was a significant difference between perceived amount of benefits and age, $F(5,125) =$ 23.73, $p < .001$; Pillai's Trace = .49. Correlations between expected benefits and other variables are presented in Table 6. All domains were significantly different with a p-value of .01 or lower. Older adults perceived the behaviors as having fewer benefits than younger adults did.

DOSPERT Expected Benefits & GDT Risk Taking as a Function of Age

      Younger adults. Regression analyses were conducted to examine if the expected benefits subscale of the DOSPERT was a significant predictor of GDT risk taking scores in younger adults. There were no significant correlations between any of the domains and risk taking scores.

      Older adults. Regression analyses were conducted to examine if the expected benefits subscale of the DOSPERT was a significant predictor of GDT risk taking scores in older adults. Analyses indicated that there was a significant correlation between ethical expected benefits and risk taking scores, $r = -.290$, $p = .027$. Further analyses indicated that ethical expected benefits was a significant predictor of GDT risking taking scores, $F(1, 56) = 5.145$, $p = .027$. Ethical expected benefits accounted for 6.8% of the variance in GDT risk taking scores in older adults

Age, Personality, Need for Arousal, & GDT Risk Taking

      Age differences in need for need for arousal. In the earlier sections, I focused on the degree to which the DOSPERT predicted risk-taking on the GDT. In the current section, I will focus on the degree to which need for arousal (NFA) predicts risk propensity on the GDT.

      I initially thought that NFA would be correlated with risky choices on the GDT because many researchers argue that need for arousal is influenced by development. Children start with a low need for arousal and as they enter adolescence and early adulthood it increases. As

individuals age and reach adulthood, need for arousal starts to decline (Bischof, 1975, 1985; Figner, Mackinlay, Wilkening, & Weber, 2009).

Age differences in participants' need for arousal (NFA) were assessed using an independent t-test. There was a significant difference between younger and older adults, $t(129)=6.108$, $p < .001$. Younger adults ($M = 5.31$, $SD = .95$) had significantly higher average NFA scores than older adults ($M = 4.29$, $SD = .95$). As one can see from Table 7, young adults have a higher need for arousal than older adults. See Table 7 for correlations between need for arousal, working memory, age, and risk scores.

Regression analyses were conducted to examine if need for arousal was a significant predictor of risk propensity and overall performance. Regression analyses indicated that need for arousal was not a significant predictor of risk propensity or overall performance on the GDT. In my next set of analyses, I examined the possibility that individuals who were more comfortable with risk as measured by the DOSPERT would be more susceptible to the risk seeking prime than individuals who were less comfortable with risk.

DOSPERT as a Moderator to Prime Susceptibility

To test the hypothesis that individuals who scored higher on the various subscales of the DOSPERT would be susceptible to the prime scenarios, multiple regression analyses were conducted. Overall, none of the DOSPERT subscales were significant moderators when collapsed across age. However, given the hypothesis that older adults would be more susceptible to the prime, age groups were examined independently.

Younger adults. Further analyses indicated that the financial risk taking subscale of the DOSPERT was the only subscale to be a significant moderator. A multiple regression analysis was conducted to examine if financial risk taking as measured by the DOSPERT was a

moderator of the prime and GDT risk scores. In this model, the main effects of financial risk

taking and prime were included in the first two steps. Then a product variable, which was an

interaction between prime and financial risk taking, was included in the last step. In this model,

both the main effects of prime and financial risk taking accounted for 8.3% of the variance in

risk scores, $F(2,70) = 4.24$, $p = .018$. The moderator variable, the interaction between the prime

and financial risk taking, was a significant predictor, $F(3,69) = 3.37$ of risk taking in the GDT, p

$= .02$. This model accounted for 9% of the variance in risk scores. As seen in Figure 2, younger

adults who received the risk seeking prime were riskier when they self-reported higher financial

risk taking. See Figure 2 for the interaction plot.

Older adults. Further analyses indicated that the ethical risk taking subscale was the only

significant moderator for older adults. A multiple regression analysis was conducted to examine

if ethical risk taking was a moderator of prime and GDT risk scores. In this model, the main

effects of prime and ethical risk taking were included in the first two steps. Then a product

variable, which was an interaction between prime and ethical risk taking, was included in the last

step. In this model, both the main effects of prime and ethical risk taking accounted for 7.7% of

the variance in risk scores, $F(2,55) = 3.37$, $p = .042$. The moderator variable, the interaction

between the prime and ethical risk taking, was a significant predictor, $F(3,54) = 3.39$, $p = .02$.

The model accounted for 11.2% of the variance in risk scores. As seen in Figure 3, older adults

who were in the control group were riskier when they self-reported higher ethical risk taking.

See Figure 3 for the interaction plot.

Age differences in personality

In addition to overall arousal affecting risk taking and overall performance on the GDT, I

predicted that specific personality traits as measured by the Big Five would affect the degree to

which the prime would influence behavior and would have a direct effect on risk taking in the GDT. Table 8 displays a correlational matrix that includes the Big Five Personality characteristics, age, and propensity to take risk. Age differences in the five domains of the Big Five Personality Inventory were examined through multivariate statistics. There were no significant age differences for agreeableness, $p = .236$, neuroticism, $p = .275$, and openness, $p = .323$. However, there were significant main effects for extraversion, $p = .019$, and conscientiousness, $p = .001$. Younger adults ($M = 3.69$, $SD = .77$) were significantly more extraverted than older adults ($M = 3.36$, $SD = .81$). In addition, older adults ($M = 4.03$, $SD = .59$) were significantly more conscientious than younger adults ($M = 3.59$, $SD = .67$).

Regression analyses were conducted to examine if personality as measured by the BFI was a significant predictor of risk propensity and overall performance on the GDT. All regression analyses determined that personality was not a significant predictor of risk propensity or overall performance. As a result, separate regression analyses were conducted to examine the age groups separately.

Younger adults: Multiple regression analyses were conducted to examine if personality was a significant predictor of risk taking scores in the gambling task in younger adults only. Analyses discovered that extraversion and neuroticism were significant predictors of GDT risk taking scores, $F(2,70) = 5.86$, $p = .004$. Extraversion was a significant coefficient, $t(72) = -2.51$, $p = .014$. In addition, neuroticism was also a significant coefficient, $t(72) = -2.45$, $p = .028$. Together these variables explained 11.9% of the variance in risk taking scores in younger adults.

Older adults: Multiple regression analyses were conducted to examine if personality was a significant predictor of risk taking scores in the gambling task in older adults only. The analyses indicated that none of the personality domains were significant predictors of risk

propensity on the GDT. However, as seen in Table 9, the correlations for extraversion, conscientiousness, and openness were closer to significance than neuroticism and agreeableness.

Extraversion as a Moderator to Prime Susceptibility

Recall that one of my goals in conducting this research was to ascertain the degree to which personality would interact with the prime in affecting risky decisions in the game of dice. Although the prime did not have a direct impact on risk taking, there was still a possibility that personality variable might moderate the strength of the prime. To test the hypothesis that personality differences would determine the degree to which participants would be susceptible to the prime, multiple regression analyses were conducted. I first conducted analyses to determine if any personality variables from the Big Five were correlated with risk taking.

Overall, no personality traits were significant moderators when collapsed across age. However, given the hypothesis that older adults would be more susceptible to the prime, age groups were examined independently. When older adults were examined separately, no personality traits were significant moderators of the relationship between the prime and risk scores. However, in younger adults, extraversion was identified as a marginally significant moderator of the prime and risk scores. A multiple regression analysis was conducted to examine if extraversion was a moderator of the prime and GDT risk scores. In this model, the main effects of prime and extraversion were included in the first two steps. Then a product variable, which was an interaction between extraversion and prime, was included in the last step. In this model, both the main effects of prime and extraversion accounted for a significant amount of variance in risk scores, $R = 5.8\%$, $F(2, 70) = 3.20$, $p = .047$. The moderator variable, the interaction between prime and extraversion, was a marginally significant predictor, $F(3,69) = 2.54$, $p = .06$. This model accounted for 6% of the variance in risk scores. As seen in Figure 4,

younger adults who received the risk seeking prime were riskier when their extraversion scores were higher versus when their extraversion scores were lower. See Figure 4 for the interaction plot.

DISCUSSION

The main purpose of this study was to examine age-related differences in priming and risky decision-making. Based on the work of Hess & colleagues (1998), I predicted that priming would influence younger and older adults; however, it would influence older adults more. It was also predicted that overall older adults would perform worse on the GDT than younger adults. In addition, it was predicted that personality differences would determine the degree to which participants are susceptible to the primes. Finally, I predicted that age differences in overall performance and risk propensity would be attenuated after controlling for working memory. Overall, some of my predictions were supported while others were not. I believe that one of the most exciting findings from this work is that although older adults self-reported being less risky than younger adults, their actual behavior on the game of dice task was more risky than younger adults. Moreover, this age difference in risk taking was eliminated upon controlling for working memory. I believe that this finding has implications for everyday decisions that older adult might make. I will now discuss some of these important issues in depth in the next section.

Game of Dice Task (GDT)

I selected the GDT because it is more straightforward than the IGT. Compared to the IGT, the GDT is very explicit. The rules and options are explicitly shown to participants. As a result, it would make sense that there would be a greater number of older adults performing poorer on the IGT than the GDT (Bayard, Rafford, & Gely-Nargeot 2011). As a result, I chose to use the GDT in my study. Although the GDT is more explicit in nature than the IGT, it is still a complex task. Participants have to choose one option from 14 options for each trial. In

addition, they must learn to use a strategy in order to maximize gains in the game. Not using a

strategy or realizing that probabilities are not in your favor if you choose the top "risky" options

could result in participants performing badly. Consequently, the complexity of the GDT and

older adult's executive functioning may interact, which would make explain the age differences

that are seen.

Age Differences in Risk Performance

One of the interesting aspects of this study is that it measures individuals' propensity to

take risk when risk taking is not rewarded. When participants receive the standard instructions,

the experimenter does not explicitly tell participants that risk-taking will result in suboptimal

performance. It is up to the participant to figure that out. I hypothesized that an individual's

ability to determine that repeated risky choices in the GDT would hinder performance would be

dependent on their working memory capacity. I also hypothesized that older adults would be

less likely to figure out that risky choices in the long run would result in one losing more money

than safe choices. As indicated earlier, older adults were more likely to take risks in the GDT

than younger adults were.   As individuals age, they start to experience cognitive decline in

executive functioning-and processing speed. Executive functioning may play a role in how well

older adults perform on ambiguous or explicit tasks (Brand & Markowitsch, 2010). Research by

Craik (Hasher, Tonev, Lustig, & Zacks, 2001) indicates that older adults are less likely to

successfully engage in behavior requiring self-initiation. That is, they are less likely than

younger adults to think of a strategy that is appropriate to maximize performance in a particular

situation. Thus, in the current situation, older adults may have been more likely than young

adults to passively pay the game without thinking of a strategy to maximize performance. There

are also studies which indicate that older adults are cognitive misers, in that they do not expend

cognitive resources unless they absolutely have to do so. In the current situation, older adults may have just decided to passively play the game without worrying about a strategy. The younger adults, on the other hand, were college students in an environment that rewards problem-solving and strategy usage, and thus might have been more apt to use the appropriate strategy.

Age and Priming Scenarios

Although I initially predicted that individuals' propensity to take risk would be affected by the priming condition, there was no evidence that priming had a direct impact on risk propensity in the GDT in the current study. It is true that there was some evidence that personality might moderate the strength of the prime for young adults, such that in some instances individuals receiving the risk seeking prime were riskier in the GDT than individual receiving the risk averse or neutral primes. However, there was no evidence that the primes had a direct effect on risk taking in the GDT. The lack of priming effects might be due to the strength of the primes. The two scenarios may not have been strong enough to elicit a priming response in the GDT. In a meta-analysis, researchers (Fischer, Greitemeyer, Kastenmüller, & Vogrincic, 2011) found that risk glorifying content like video games, advertisements, and film had greater effects than verbal stimuli glorifying risk. In fact, they found that video games had the greatest effect followed by advertisements and then film and television. These findings imply that individuals may not be easily influenced by written words when making decisions.

Moderation Effects in Prime Susceptibility

I initially predicted that personality traits and individual characteristics, such as scores on the DOSPERT, would moderate how susceptible participants would be to the prime. Based on past research, I hypothesized that participants high in extraversion, openness, and neuroticism

would be more susceptible to the risk seeking primes (Nicholson, Soane, Fenton-O'Creevy, & Willman, 2005; Denburg, et. al, 2009; Lauriola & Levin, 1999). This hypothesis was only partially supported. For younger adults, extraversion was the only personality characteristic that was marginally significant. Participants who were high in extraversion were more susceptible to the risk seeking primes. In addition, I examined the possibility that attitude and prior risk behavior would affect the strength of the prime in predicting risk-taking on the GDT. My analyses yielded interesting findings. Self-reported financial risk taking as measured by the DOSPERT was a significant moderator for younger adults. That is, participants who reported taking more financial risks were more susceptible to the risk seeking prime. For older adults, the only significant moderator, with respect to the prime manipulation, was ethical risk taking. In this particular case, older participants who were reported higher ethical risk taking were riskier in the aversive and control groups. As a result of this finding, it is important to keep in mind a limitation of these analyses. Over 20 moderation analyses were conducted examining individual characteristics collapsed across age and individually. This creates a large possibility that some of these findings may be due to type 1 error.

Personality and Risk Propensity

When examining personality across all age groups, I found that there were no personality traits that were significant predictors of risk propensity on the GDT. Taking this at face value, would imply that personality has no effect on an individual's propensity to take risk. However, some personality characteristics did become significant predictors once age groups were examined separately. Extraversion and neuroticism were found to be significant predictors in younger adults. For older adults, none of the personality domains were significant predictors. This might be due to the older adults not fully understanding the instructions of the task or their

lack of working memory playing a role. If an individual does not fully understand the task then their personality will most likely not play a role in their decisions.

Future research must be conducted before any conclusions can be made on personality and its effects on risk propensity. The complexity of the GDT and the possible lack of understanding in older adults might explain some of our inconsistent results. Conducting future research to minimize the confounds brought about the complexity of the task has important implications. Older adults make many risky decisions that involve complex topics such as choosing a medical insurance plan or whether to choose a reversed mortgage. If these plans or mortgages are not explained in enough detail older adults might not fully understand the consequences or implications for choosing that plan. As a result, older adults may potentially make a risky decision without realizing it. Ultimately, more future research must be conducted to examine if varying the complexity of the task with alter older adults' risk taking.

Like other studies, this study also has its limitations. The sample size that I collected was small with only 73 younger adults and 58 older adults. This is especially true if the two older adult outliers are excluded from data analysis. Collecting more participants, especially older adults might help to make a difference. By collecting more participants, factors that were approaching significance might eventually become significant. Also, with more data, age differences might be found again. When we took the outliers out of the data analysis, the main effect of age was not significant. However, those two older adults might be representative of the population. With a larger sample, we might see a greater number of "riskier" older adults thus making the two outliers no longer be considered outliers. Until more data can be collected with a larger sample, readers should keep the outliers in mind when trying to generalize these results.

Future research must be conducted to examine how to minimize these age differences. One way to do this might be to make the instructions as explicit as possible. Older adults may have not fully understood the objective of the game or how to play it well. Future research could be conducted manipulating the explicitness of the instructions that are given to older adults to see if it would result in any or fewer age differences.

In addition, participants were collected from a rural city in southern Georgia and an urban city in Northwest Alabama. Although, data collection was collected in two different states, our findings may not be generalizable to everyone.

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APPENDIX

Risk Seeking Scenario: Jamie is an exciting, bold, and fun-loving person, who is fond of an adrenaline rush and loves adventures. In his last journey, he and his friends chose to visit the Greek islands. During the first evening, Jamie had dinner at a restaurant with people that he just met at the hotel bar. During the second day, Jamie decided to gamble at a casino with the friends he just met. After playing various games during the course of the day, Jamie won a large sum of money. Jamie was pleased with his bold decision to gamble. Afterwards, Jamie went up to his hotel room happy and satisfied.

Risk Aversive Scenario: Jamie is a responsible, reasonable, and reliable person, who is trustworthy and level-headed. In his last journey, he and his friends chose to visit the Greek islands. During the first evening, Jamie ordered room service and had dinner in his room alone. During the second day, Jamie's friends decided to gamble at a casino but Jamie decided to avoid gambling, and went sightseeing instead. Later he reunited with his friends and discovered that they had lost a lot of money. As a result of this, Jamie's friends had to end their vacation sooner than they planned.   Jamie was pleased with his cautious decision not to gamble. Afterwards, Jamie went up to his hotel room happy and satisfied.

Table 1

Age and Scenario Differences in Risk Scores

Age Group	Risk-Seeking	Risk-Aversive	Control	Total
Young Adults	$M = 16.50$ $SD = 12.29$	$M = 20.33$ $SD = 13.02$	$M = 19.44$ $SD = 12.24$	$M = 18.77$ $SD = 12.45$
Older Adults	$M = 14.90$ $SD = 10.87$	$M = 15.00$ $SD = 13.62$	$M = 10.89$ $SD = 20.48$	$M = 13.69$ $SD = 15.16$
Total	$M = 15.77$ $SD = 11.56$	$M = 17.91$ $SD = 13.41$	$M = 15.86$ $SD = 16.54$	

Table 2

Age and Scenario Differences in Overall Performance (Money Total).

Age Group	Risk-Seeking	Risk-Aversive	Control	Total
Young Adults	$M = -795.83$ $SD = 4531.58$	$M = -416.67$ $SD = 3355.42$	$M = -76.00$ $SD = 2708.52$	$M = -424.66$ $SD = 3562.29$
Older Adults	$M = -800.00$ $SD = 3095.67$	$M = -345.00$ $SD = 2832.24$	$M = -2538.89$ $SD = 5367.78$	$M = -1182.76$ $SD = 3916.64$
Total	$M = -797.73$ $SD = 3901.07$	$M = -384.09$ $SD = 3093.20$	$M = -1106.98$ $SD = 4167.24$	

Table 3

Age and Scenario Differences in Risk Scores Without Outliers

Age Group	Risk-Seeking	Risk-Aversive	Control	Total
Young Adults	$M = 16.50$	$M = 20.33$	$M = 19.44$	$M = 18.77$
	$SD = 12.29$	$SD = 13.02$	$SD = 12.24$	$SD = 12.45$
Older Adults	$M = 14.90$	$M = 15.00$	$M = 16.00$	$M = 15.25$
	$SD = 10.87$	$SD = 13.62$	$SD = 14.98$	$SD = 12.90$
Total	$M = 15.77$	$M = 17.91$	$M = 18.10$	
	$SD = 11.56$	$SD = 13.41$	$SD = 13.30$	

Table 4

Correlations between GDT, Money Total, Age, Working Memory, and DOSPERT Risk Taking.

Measure	GDT	Money Total	Age	WM	Ethical	Social	Finan -ical	Health/ Safety	Recre ational
GDT	1	.707**	-.195*	.264**	-.105	.127	-.064	.073	.145
Money Total		1	-.098	.212*	-.080	.110	-.135	.069	.089
Age			1	-.703**	-.483**	-.088	-.373**	-.656**	-.581**
WM				1	.382**	.188*	.259**	.497**	.510**
Ethical					1	.313**	.380**	.623**	.332**
Social						1	.132	.283**	.272**
Financial							1	.387**	.488**
Health/Safety								1	.635**
Recreational									1

Note: Remember lower risk scores indicate riskier behavior

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 5

Correlations between GDT, Money Total, Age, Working Memory, and DOSPERT Risk Perceptions.

Measure	GDT	Money Total	Age	WM	Ethical	Social	Finan-ical	Health/ Safety	Recre ational
GDT	1	.707**	-.195*	.264**	-.103	-.074	-.083	-.141	-.171
Money Total		1	-.098	.212*	-.171	-.114	-.058	-.181*	-.123
Age			1	-.703**	.476**	.060	.272**	.404**	.424**
WM				1	-.434**	-.105	-.208*	-.314*	-.326**
Ethical					1	.464**	.465**	.615**	.559**
Social						1	.317**	.404**	.390**
Financial							1	.496**	.550**
Health/Safety								1	.742**
Recreational									1

Note: Remember lower risk scores indicate riskier behavior

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6

Correlations between GDT, Money Total, Age, Working Memory, and DOSPERT Risk Benefits.

Measure	GDT	Money Total	Age	WM	Ethical	Social	Finan -ical	Health/ Safety	Recre ational
GDT	1	.707**	-.195*	-.264**	.086	-.009	.050	.003	.081
Money Total		1	-.098	.212*	.095	.027	.005	.056	.066
Age			1	-.703**	-.658**	-.225**	-.480**	-.500**	-.535**
WM				1	.519**	.131	.323**	.347**	.443**
Ethical					1	.250**	.560**	.648**	.483**
Social						1	.265**	.357**	.329**
Financial							1	.465**	.372**
Health/Safety								1	.559**
Recreational									1

Note: Remember lower risk scores indicate riskier behavior

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 7

Correlations between GDT, Money Total, Age, Working Memory, and Need For Arousal.

Measure	GDT	Money Total	Age	WM	Need for Arousal
GDT	1	.707**	-.195*	.264**	.095
Money Total		1	-.098	.212**	.053
Age			1	-.703**	-.479**
WM				1	.347**
Need for Arousal					1

Note: Remember lower risk scores indicate riskier behavior

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (1-tailed)

Table 8

Correlations between GDT, Money Total, Age, Working Memory, and Personality.

Measure	GDT	Money Total	Age	WM	Extra-Version	Conscieto-usness	Open-Ness	Agreeabl-eness	Neuro-ticism
GDT	1	.707**	-.195*	.264**	-.013	-.152	-.111	.047	-.093
Money Total		1	-.098	.212*	-.109	-.156	-.106	-.077	-.083
Age			1	-.703**	-.198	.345**	.104	.124	.070
WM				1	.027	-.236**	-.014	-.141	-.030
Extraversion					1	.075	.117	.116	-.252**
Conscientiousness						1	.168	.453**	-.243**
Openness							1	.134	-.124
Agreeable-ness								1	-.464**
Neuroticism									1

Note: Remember lower risk scores indicate riskier behavior

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (1-tailed)

Table 9

Correlations between GDT, Money Total, Working Memory, and Personality in Older Adults.

Measure	GDT	Money Total	WM	Extra-Version	Conscieto-usness	Open-Ness	Agreeabl-eness	Neuro-ticism
GDT	1	.651**	.073	.177	-.204	-.179	.062	-.023
Money Total		1	.154	.016	-.198	-.138	-.176	.048
WM			1	-.051	.020	.212	-.116	-.075
Extraversion				1	.104	.132	.125	-.247
Conscientiousness					1	343**	.480**	-.414**
Openness						1	.156	-.164
Agreeable-ness							1	-.502**
Neuroticism								1

Note: Remember lower risk scores indicate riskier behavior

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (1-tailed)

Table 10

Correlations between GDT, Money Total, Working Memory, and Personality in Young Adults.

Measure	GDT	Money Total	WM	Extra-Version	Conscieto-usness	Open-Ness	Agreeabl-eness	Neuro-ticism
GDT	1	.763**	.279*	-.286*	-.010	-.017	.073	-.176
Money Total		1	.235*	-.269*	-.080	-.063	.026	-.181
WM			1	-.222	-.018	.007	-.093	.106
Extraversion				1	.195	.144	.154	-.232*
Conscientiousness					1	.009	.424**	-.208
Openness						1	.103	-.108
Agreeable-ness							1	-.460**
Neuroticism								1

Note: Remember lower risk scores indicate riskier behavior

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (1-tailed)

Table 11

Correlations between GDT, Money Total, Working Memory, and DOSPERT Risk Taking in Young Adults.

Measure	GDT	Money Total	WM	Ethical	Social	Finan-ical	Health/ Safety	Recre ational
GDT	1	.763**	.279*	-.154	.166	-.321**	-.089	.005
Money Total		1	.235*	-.084	.140	-.290*	-.032	-.042
WM			1	.085	.193	-.026	.095	.176
Ethical				1	.319**	.234*	.532**	.049
Social					1	.023	.278*	.218
Financial						1	.216	.341**
Health/Safety							1	.384**
Recreational								1

Note: Remember lower risk scores indicate riskier behavior

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 12

Correlations between GDT, Money Total, Working Memory, and DOSPERT Risk Taking in Older Adults.

Measure	GDT	Money Total	WM	Ethical	Social	Finan-ical	Health/ Safety	Recreational
GDT	1	.651**	.073	-.327*	.063	.080	-.025	.127
Money Total		1	.154	-.247	.061	-.043	.057	.172
WM			1	.097	.171	.165	.093	.296*
Ethical				1	.305*	.310*	.353**	.186
Social					1	.229	.329*	.370**
Financial						1	.237	.448**
Health/Safety							1	.534**
Recreational								1

Note: Remember lower risk scores indicate riskier behavior

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 13

Correlations between GDT, Money Total, Working Memory, and DOSPERT Risk Perception in Young Adults.

Measure	GDT	Money Total	WM	Ethical	Social	Finan -ical	Health/ Safety	Recre ational
GDT	1	.763**	.279*	-.147	-.212	.021	-.187	-.087
Money Total		1	.235*	-.175	-.258*	-.051	-.189	.023
WM			1	-.099	-.035	.024	.049	.023
Ethical				1	.461**	.448**	.514**	.420**
Social					1	.368**	.489**	.363**
Financial						1	.371**	.452**
Health/Safety							1	.649**
Recreational								1

Note: Remember lower risk scores indicate riskier behavior

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 14

Correlations between GDT, Money Total, Working Memory, and DOSPERT Risk Perception in Older Adults.

Measure	GDT	Money Total	WM	Ethical	Social	Finan -ical	Health/ Safety	Recre ational
GDT	1	651**	.073	.116	.072	-.115	.028	-.135
Money Total		1	.154	-.101	.048	-.010	-.118	-.222
WM			1	-.359**	-.239	-.256	-.375**	-.337**
Ethical				1	.546**	.339**	.558**	.510**
Social					1	.247	.336**	.448**
Financial						1	.566**	.598**
Health/Safety							1	.754**
Recreational								1

Note: Remember lower risk scores indicate riskier behavior

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 15

Correlations between GDT, Money Total, Working Memory, and DOSPERT Expected Benefits in Young

Adults.

Measure	GDT	Money Total	WM	Ethical	Social	Finan -ical	Health/ Safety	Recre ational
GDT	1	.763**	.279*	.074	-.165	-.149	-.091	-.075
Money Total		1	.235*	.077	-.104	-.099	.003	-.050
WM			1	.081	-.064	-.010	.000	.074
Ethical				1	.183	.420**	.545**	.195
Social					1	.080	.398**	.253*
Financial						1	.264*	.007
Health/Safety							1	.394**
Recreational								1

Note: Remember lower risk scores indicate riskier behavior

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 16

Correlations between GDT, Money Total, Working Memory, and DOSPERT Expected Benefits in Older Adults.

Measure	GDT	Money Total	WM	Ethical	Social	Finan -ical	Health/ Safety	Recre ational
GDT	1	.651**	.073	-.290*	.050	.102	-.123	.076
Money Total		1	.154	-.039	.116	.023	.015	.129
WM			1	.326*	-.038	-.011	.078	.397**
Ethical				1	.016	.243	.356**	.359**
Social					1	.330*	.098	.246
Financial						1	.403**	.572**
Health/Safety							1	.464**
Recreational								1

Note: Remember lower risk scores indicate riskier behavior

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Figure 1

Screenshot of Game of Dice Task (GDT)

Figure 2

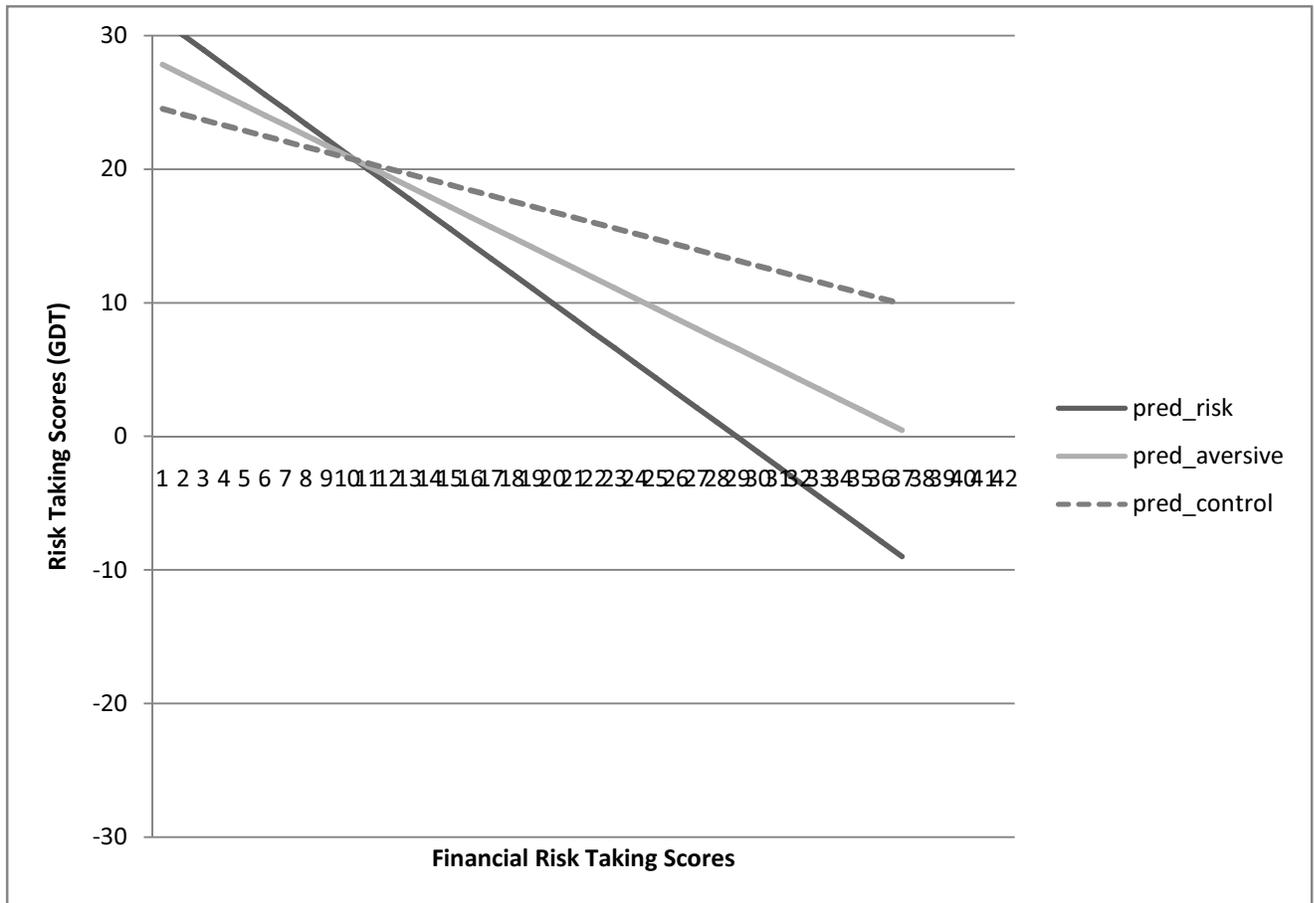*Financial risk taking as a moderator of prime & risk taking scores in younger adults*

Figure 3

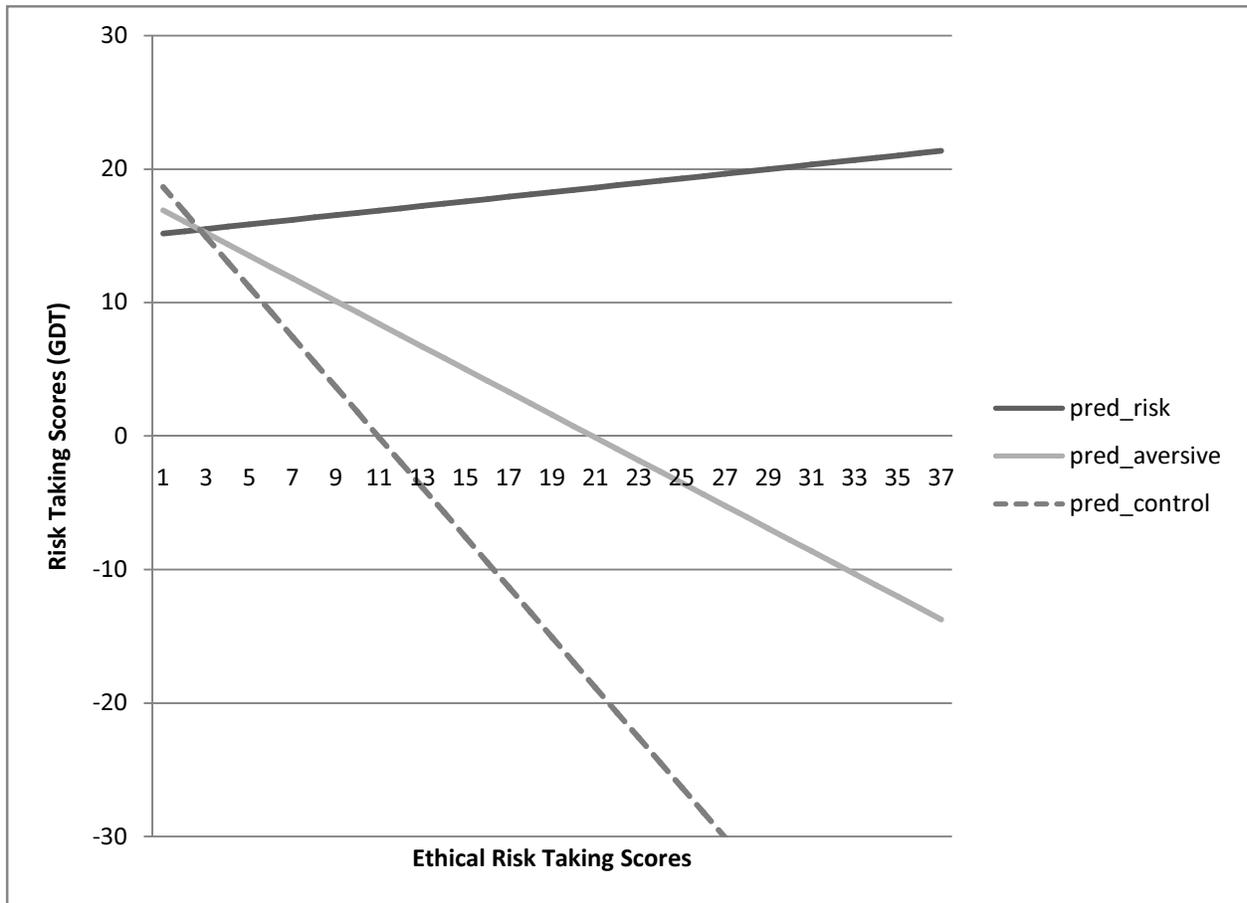*Ethical risk taking as a moderator of prime & risk taking scores in older adults*

Figure 4

Extraversion as a moderator of prime & risk taking scores in younger adults