AGE DIFFERENCES IN RISKY DECISION MAKING:

THE EFFECTS OF EXPLICITNESS, PERSONALITY

AND WORKING MEMORY

by

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ABSTRACT

In the current study, I examined the effects of age, explicitness of instructional materials, and personality differences on risky decision making while playing the Game of Dice Task (GDT). Participants were randomly assigned to one of two instruction conditions: Explicit vs. Standard. In the explicit condition, the instructions were very straightforward, with respect to risk, while the instructions in the standard condition were not. To describe this game in more detail, in the GDT, participants decide how risky they wish to be on each trial. To optimize performance, participants should make "safe" rather than risky choices. Overall, older adults were riskier than younger adults on the GDT even though they self-report being more risk averse than younger adults in several different risk domains except for social. In regards to the instruction condition, there were no significant age differences in the standard condition. Younger and older adults perform similarly. However, there were age differences in the explicit condition. Older adults were riskier in the explicit condition than younger adults were. In addition, a 3-way interaction between age, instruction, and conscientiousness was discovered. Older adults who are low in conscientiousness perform similar to regular older adults in the standard and explicit conditions. However, the effect of instruction condition disappears for those who are high in conscientiousness.

DEDICATION

To Patti Gilmore, my mother, who sacrificed so much and served the role of two parents. I love you all the way up to the sky. To Norma Jean Jones, my grandmother, who was my first best friend and partner in crime. Thank you for always making life fun and teaching me to be strong. To Jack Jones, my grandfather, who always been the best buddy a girl could ask for. Thank you for always taking care of me. I cannot even begin to describe how much I love you. Without your constant support this would not have been possible. This dissertation is dedicated to you.

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 ratio 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
p	Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value
PAG	Probability Associated Gambling Task
r	Pearson product-moment correlation
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), as baby boomers (cohort 51-69) continue to age, the adult population is becoming increasingly older. In the near future, the population of older adults will be larger than those who are 18 or younger. 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 study 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 that working memory is especially important with respect to 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 declines 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 (Hedden & Gabrieli, 2004).

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" (pg. 2). 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 spatial information and imagery), 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 visualospatial 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. In the current study, I predict that working memory will determine the degree to which participants make advantageous decisions on the gambling task used for this study, the Game of Dice Task (GDT).

Risky Decision Making

Studying how age affects risky decision making and the processes involved is important because the decisions that older adults make can sometimes result in negative consequences. Poor decision-making with respect to healthcare, for example, could lead to unfavorable outcomes and ultimately death. In addition to poor decisions leading to poor health outcomes, poor decision making can lead to financial ruin. A number of unscrupulous salespeople target older adults and as a result older adults are often victims of scams.

In addition, in some instances older adults believe that they are making good financial investments only to find out that they did not fully understand the risks associated with their decision. They can also be financially exploited in instances in which they are not fully aware of how family members or significant others are managing their money. According to the National Center on Elder Abuse, one in ten adults 60 and older reports being a victim of elder abuse. Of those individuals, twelve percent report falling victim to some form of financial abuse (National Center on Elder Abuse, 2000). Thus, it is important to examine the area of aging and risk taking to observe the effects of the aging process on risky decision making. With research in this area, we can attempt to understand the processes that are affected by normal aging and what we can do to improve decision making.

One popular way to examine risky behavior is via gambling paradigms. 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 of cards (some are more advantageous than others) 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 (Edwards, 1954), participants try to maximize their gains and minimize their losses when playing the IGT. Several studies have found age differences in the IGT. The age differences have been attributed to differences in the ability to implicitly and explicitly notice the strategies associated with maximal performance (Zamarian et. al, 2008). 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, it is possible that older adults made risky decisions while playing the IGT because they had

not figured out that risky decisions lead to poorer outcomes than "safe decisions" on the IGT. Thus, 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. Thus, a more straightforward gambling task may do a better job in assessing risk taking than the IGT.

One example of a gambling task that is more straightforward than the IGT is the GDT. The 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 of possible outcomes. 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 selected number 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 (top row) and win more money (i.e., $1,000.) or the participant can decide to be safer and place the bet on the bottom row (4 numbers) and he/she will win less money ($100.00),

if any of four numbers comes up when the dice are thrown. The participants' 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 need to realize that risky choices would result in more losses than gains. This realization of the appropriate strategy would involve the player "reading between the lines" upon receiving the instruction because the instructions do not explicitly state that making less risky choices will maximize performance. It is up to the player to implicitly "pick up" on this. In my review of the GDT, I have concluded that there are two explanations for age differences in the risk taking and overall performance scores on the GDT. The first explanation centers on the aforementioned age difference in executive processing (EP) and the ability to monitor performance and benefit from feedback (Cohen, 1979; Hasher & Zacks, 1988; Hamm & Hasher, 1992). The second explanation centers around a topic that has not been examined heretofore: age differences in comprehension of the instructions.

Aging, Inferencing, and Decision Memory

It has been well documented that due to age-related changes in working memory resources (Cohen, 1979; Hasher & Zacks, 1988), there are age differences in the ability to make appropriate inferences (Hamm & Hasher, 1992). Inferencing refers to the ability to comprehend information that is not explicitly stated but is implied based on context or general world knowledge. In many instances, in addition to understanding the surface meaning of a message, the listener/reader needs to elaborate on implied information to fully comprehend the message and the consequences of a particular decision (Cohen, 1979). Inferencing is highly related to working memory capacity (Cohen, 1979; Daneman & Carpenter, 1980; Daneman & Carpenter,

1983; Daneman, Carpenter, & Just, 1982) because it involves integrating current information with information already stored in long term memory, and working memory resources are inherent in the integration process.

There are several theoretical accounts that explain age differences in the ability to make inferences and understand text. These theoretical accounts are based on the finding that there are age differences in working memory. Just and Carpenter (1992) argue that it takes working capacity to make inferences, because the reader often has to integrate incoming information with antecedents. For example, Light and Capps (1986) found that when an anaphor (e.g., a pronoun) was separated from an antecedent by more than two sentences, older adults had more difficulty than younger adults making appropriate pronoun assignments. The age-related differences in pronoun assignment were attributed to age-related differences in the storage and processing components of working memory.

Hasher and colleagues (Hamm & Hasher, 1992; Hasher & Zacks, 1988) have also found age-related changes in the ability to make inferences. They have argued that older adults have more clutter in working memory due to age-related changes in the ability to inhibit irrelevant information. This "clutter" results in older adults having less working memory capacity to engage in the necessary linguistic computations to make appropriate inferences when information is implied rather than explicitly stated. For example, Hasher and Zacks (1988) found that when participants received passages that activated a particular interpretation that was later disconfirmed, older participants had more difficulty than younger participants, using contextual information to dampen the disconfirmed interpretation when inferencing was required.

How would the ability to make inferences affect performance on the GDT? In a recent study examining performance on the GDT as a function of age, the authors argued that the

standard instructions of the GDT are not explicit in explaining to participants the degree of risk associated with each option (Wood, Black, Gilpin, 2016). The standard instructions are as follows:

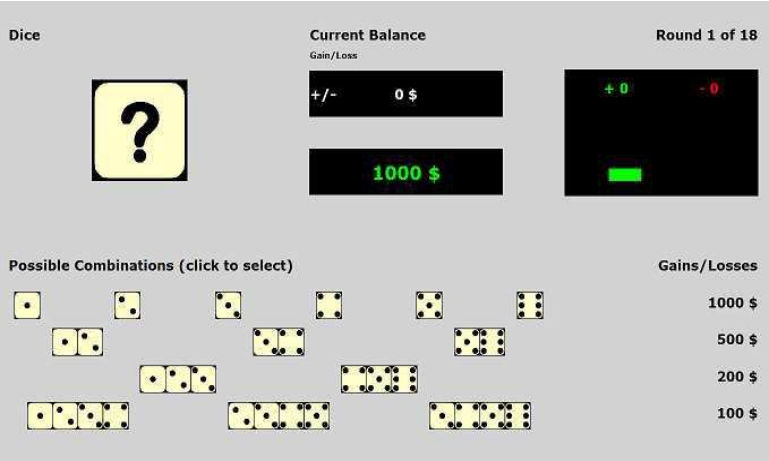
> Welcome to the Game of Dice Task. In this task, you are going to throw a virtual dice 18 times. Before each throw, you will be able to bet on the outcome by selecting a single number (e.g., '3') or combinations of two to four numbers (e.g., '1-2-3'). You are given a starting capital of $1000. Your job is to maximize this capital within 18 throws of the dice. Good luck"!

It may seem that the sentences associated with the instructions are fairly easy to understand. However, fully understanding the probabilities associated with each option is a multistep process. Participants would have to retrieve probability-related information from long–term memory (probability of winning would increase as the number of possibilities associated with each option increases). They would then have to calculate or at least estimate the probabilities associated with each option. The calculation of probabilities requires working memory and the ability to calculate probabilities declines with age (Fuller, Dudley, & Blacktop, 2001).

Figure 1.0 provides a screenshot of the display that participants view as they complete the GDT. As one can see from Figure 1.0, participants would have to apply their probability calculations to the rows of dice displayed on the computer screen to fully understand the instructions. In addition to participants' being able to estimate probability associated with certain options by making appropriate inferences when processing the instructions, participants in the GDT can also become aware of the probabilities associated with certain choices by monitoring feedback as they play the game.

Figure 1.0

Screenshot of Game of Dice Task



Unfortunately, for older adults, in addition to the age differences in the ability to comprehend risk-related instructional material in which inferencing is required, there are age differences in the ability to learn and benefit from feedback, due to age differences in executive processing (McCabe, Roediger, McDaniel, Balota, & Hambrick, 2010).

Executive Functioning & Risky Decisions

Executive processes involve the ability to inhibit information, shift attention, and prioritize information. Zamarian and colleagues (2008) found older adults did not benefit from feedback as much as younger adults, probably because they were less likely to shift strategies after receiving negative feedback for choosing a disadvantageous option.

In fact, research conducted by Brand and Schiebener (2013) indicated that age-related differences in performance on the GDT were moderated by executive functioning. That is, older adults with high levels of executive functioning engaged in less risk taking than older adults with lower levels of executive functioning. As indicated earlier, the reason individuals with poor executive processing may have performed poorer than individuals with better

executive processing is that executive processing is probably related to players' ability to monitor performance and switch strategies when necessary.

Although Brad and Schiebener (2013) found that cognitive resources moderated risk taking on the GDT, they did not examine specific components of the GDT (e.g., the ability to comprehend instructions), to determine their association with cognitive resources. Thus, the current study examined one of the possible explanations for age differences on the GDT—age differences in the ability to understand instructions on the GDT. My study examined the possibility that age differences on the GDT are attenuated to the extent that older adults receive explicit, straightforward instructions versus the standard instructions in which probability information is implied rather than explicitly stated.

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, conscientiousness, and agreeableness predict risky decision making (Nicholson, Soane, Fenton-O'Creevy, & Willman, 2005).

The effect of personality on decision-making among older adults has not 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 found that certain personality traits such as impulsivity and sensation-seeking are correlated with risk taking in older adults (Lauriola & Levin, 1999; Schwebel, Ball, Severson, Barton, Rizzo, & Viamonte,

2007). For example, in one study (Schwebel, et al., 2007) individual personality differences were examined to see if they had any relation to risky driving in older adults. All participants completed a virtual simulation that assessed their risky driving behaviors. 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.

Additional research supports the notion that personality is related to the propensity to take risks. For example, Denburg and colleagues (2009) found that personality characteristics were associated with risk taking, but only in older adults. Specifically, older adults high in neuroticism had poorer performance on the IGT than others. In contrast, a study conducted by Wood, Black, & Gilpin (2015), yielded evidence that extraversion and neuroticism were significant predictors of risk taking on the GDT for younger adults. For older adults, there were no personality traits that significantly predicted risk taking; however, extraversion, conscientiousness, and openness correlations approached significance. I suspect that in future research with more participants, these variables will become significantly correlated with risk taking.

Researchers have found that personality affects attitudes about risk. For example, Weller and Tikir (2011), found that individuals who scored high in conscientiousness perceived fewer benefits from engaging in risky behavior. In addition, participants high in openness self-reported taking more risks and perceiving more benefits in the areas of social and recreational risks. Because studies have shown an association between attitudes about risk and risky behavior, the current study will examine the way in which attitudes toward risk affect risk taking on the GDT.

DOSPERT

Personality has also been linked to risk taking through a self-report measure known as the DOSPERT. The DOSPERT is a self-report measure that assesses an individual's risk taking, risk

perception, and expected benefits of risk taking through five different domains of risk taking (ethical, social, financial, health, and recreational). Intuitively, one would predict that attitude towards risk would result in more risky behavior on the GDT. However, my past research indicates that in some instances there is no relation between attitudes about risk and actual risky behavior on the GDT. In past research (Wood, Black, & Gilpin, 2015), older adults self-reported being more cautious than younger adults in all domains except for social risk taking, but older adults made more risky choices on the GDT than younger adults. My research found that older adults' performance is not consistent with their self-reported attitudes. This may indicate a lack of understanding about the GDT.

Current Study

Heretofore, there has not been much research (to my knowledge) that has focused on the way in which age differences in comprehension affect decision making on the GDT. As indicated earlier, there is an overabundance of evidence indicating that older adults have more difficulty comprehending written and oral messages than younger adults (Hannon & Dannon, 2009), especially when those messages contain implied information. In the current study, I followed up that research using the GDT. Specifically, I manipulated the explicitness of instructions for the GDT across conditions. I predicted that age differences in decision making would be attenuated when participants receive explicit rather than implicit instructions. In addition to focusing on the way in which language comprehension affects performance on a gambling task, I focused on the way in which individual differences in personality (e.g., openness to experience) and preexisting attitudes affected risk taking on the GDT.

There were two independent variables: Instructions and age. The dependent variable was risk propensity (the extent to which participants make risky decisions). The GDT also calculates total money earned. However, I am not including this measure in my analyses, because I am

specifically interested in risk-taking. Also, noted researchers who have used the GDT to examine risk-taking in various special populations have argued that risk-taking should be the primary dependent variable for the GDT (Brand & Schiebener, 2013).

In addition, working memory and personality were examined. Overall, I predicted that personality, specifically extraversion and neuroticism, would predict decision making for both young and older adults. However, I also predicted an Age (Young vs. Old) x Instruction (Standard vs. Explicit) x Personality (High Extraversion vs. Low Extraversion) 3-way interaction with respect to personality and decision making. I predicted that impact of personality would vary as a function of instructional conditions for older but not young adults. I surmised that in the standard instructional condition, older adults might not fully appreciate the consequences of risky decisions and this ambiguity might mask the role of personality in the standard condition for them. For example in the standard condition, an older person who was risk avoidant would not know which of the options was risky and thus his/her risk avoidant tendencies would not be manifested in the choices (s)he makes. However, in the explicit condition, I believed that older adults would appreciate the risk associated with their choices. Thus the risk avoidant older adult could make a concerted effort to avoid risky choices in playing the GDT.

Hypotheses

In reviewing these hypotheses, it is important to keep in mind that the GDT is designed such that consistently making risky choices (i.e., choosing from the top two rows) will lead to poorer outcomes than consistently making safe choices (i.e., choosing from the bottom two rows).

Hypothesis 1. It was predicted that risk propensity on the GDT would be predicted by working memory. That is, individuals with high working memory capacity across age groups would perform better on the GDT than individuals with low working memory capacity.

However, although overall performance would be determined by working memory capacity, I also predicted an interaction. I predicted that working memory would significantly predict performance in the standard instructions conditions, but that it would not predict performance in the explicit instructions condition.

Hypothesis 2. I predicted significant age differences in the standard instructional condition. However, age differences in risk taking and overall performance would be attenuated in the explicit condition. I predicted an Age x Instruction interaction, because of age-related changes in working memory.

Hypothesis 3. I predicted that overall personality would predict the propensity to take risk. My past research found that extraversion and neuroticism were significant predictors of risk taking for younger adults only. Increased extraversion and neuroticism led participants to making fewer safe choices and more risky choices. No factors were significant for older adults, but extraversion, conscientiousness, and openness approached significance (Wood, Black, Gilpin, 2016).

Hypothesis 4. I predicted an Age x Instruction x Personality interaction. For young adults, personality would affect the propensity to take risk across instructional conditions. For older adults, personality would have a bigger impact on the propensity to take risk in the explicit instructional condition than in the standard instructional condition. In the standard condition, older participants might not fully understand the consequences of their choices. For older adults in the standard condition, this ambiguity about the consequences of their choices might mask the effects of personality on their decision making. However, older individuals in the explicit condition should understand the consequences of their decisions. Thus, individual differences in personality should have a greater impact on decision making for older adults in the explicit condition than in the standard condition.

Hypothesis 5. I predicted that Age differences in overall performance and in risk propensity (calculated via risk score) would be attenuated after controlling for the effects of working memory. Past research supports this prediction. In Brand & Schiebener's (2013) study, researchers found that executive functioning moderated the effects of age on risk taking in the GDT. In addition, my past study found that age differences in risk taking were almost completely mediated by working memory.

Hypothesis 6. It was predicted that I would replicate the findings from my previous study (Wood, Black, & Gilpin, 2016) in that older adults would self-report being more risk-averse than younger adults in all domains except the social domain. I predicted that risk taking on the DOSPERT would match performance on the GDT for older adults in the Explicit Instruction condition, but would not match performance on the GDT for older adults in the Standard Instruction condition.

METHODOLOGY

Participants

A total of 134 participants consisting of younger and older adults were analyzed (*Mean age* = 44.06, *SD* = 27.37). Seventy-one younger adults (*Mean age* = 18.83, *SD* = 1.35, *Range* = 18-22) were recruited from the University of Alabama psychology subject pool. For younger adults, there were 25 males and 46 females. Sixty-three older adults (*Mean age* = 72.49, *SD* = 7.42, *Range* = 60-87) were recruited from Tuscaloosa, Alabama through appeals to senior citizen community centers, the Alabama Research Institute on Aging database, and the Osher Lifelong Learning Institute. For older adults, there were 14 males and 49 females. All older adults were given 10 dollars for compensation. All older adults in the study completed the Mini Mental Status Examination (MMSE) to screen for dementia. None of the older adult participants scored below a 24 (*M* = 28.84, *SD* = 1.35). A score of 24 or above indicates that the individual is cognitively healthy.

Table 1.0

Demographics Grouped by Age Group

Demographics						
	Younger Adults			**Older Adults**		
Age	*M* = 18.83	*SD* = 1.12	*Range* = 18-22	*M* = 72.49	*SD* = 7.42	*Range* = 60-87
Males	*N* = 25			*N* = 14		
Females	*N* = 46			*N* = 49		
Caucasian	68.1%			88.9%		
Black	18.1%			10.6%		
Hispanic	6.9%			0%		
Asian	2.8%			0%		
Other	1.4%			1.6%		

Design

The independent variables were the instruction conditions (explicit vs. inexplicit) and age group. The dependent variable was propensity to take risk (based on the risk score calculation). The design was a 2 Explicitness of Instructions (Explicit vs. Standard) x 2 Age (Young vs. Old) between subjects design. Other variables examined were the moderator variables: personality and preexisting attitudes. Working memory was examined as a mediating variable (i.e, mediating the relation between Age and Decision Making).

Materials

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 completed on the computer. Only a subject code identified the participant. Demographics were asked in order to look at age differences and to control for other variables if needed.

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). The vocabulary test was used to make sure differences are not due to higher vocabulary ability.

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 in the study scored below a 24. The test-retest reliability of the MMSE has a Pearson r value of .89 (Folstein, Folstein, & McHugh, 1975).

Daneman & Carpenter Reading Span Task (RSPAN). The Daneman and Carpenter Reading Span task was used to measure verbal 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 internal consistency reliability for this task has a Cornbach's alpha of .67 for the all or nothing scoring (Kane, Hambrick, Tuholski, Wilhelm, Payne, & Engle, 2004). 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 in between. After all the sentences are presented, they were required to recall the letters in the order in which they were presented on 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 in the standard instruction group received instructions that did not explicitly talk about which options were safe or risky. On the other hand, the explicit instruction group received very explicit instructions in which risk associated with various options is presented in a very straightforward way. The standard instructions were edited to be lengthier than normal. This was in order to make the two instruction conditions closer to the same length to avoid a length confound. See Appendix A for the exact wording and format of the instructions. See the Appendix for the instructions and GDT screenshot.

In the GDT, participants were presented with four rows of dice. The probability of winning money decreases from the first to the fourth row. One way to conceptualize this is to remember that a single dice has six sides. Thus, there is a 1/6 probability that one single number will match the "roll of the dice;" however, there is a 1/3 probability that two single numbers will match the "roll of the dice," and so on.

To recap the probabilities associated with each row, if the participant selects an option from the top, (i.e, this involves a selection of a single number), they have a 1/6 chance of winning money and obviously a 5/6 chance of losing money. On the second row each option consists of a pair of dice; if participants choose an option from the second row, they have a 1/3 chance of winning and a 2/3 chance of losing. On row three, each option consists of a group of three dice. If participants choose any of the options from the second row, they have a 1/2 chance

of winning money. Finally, on Row 4, groups of four dice are presented in various combinations and thus participants have a 2/3 chance of winning and a 1/3 chance of losing.

Admittedly, an observant participant might realize that the riskier the choice (i.e., betting on “1” number vs. “3” numbers) the greater the opportunity to win a great deal of money ($1000). However, the potential losses are also greater with riskier choices (e.g., lose $1000 on each trial) than with safer choices. Thus, the GDT is designed such that in the long run, the best strategy is 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 wins.

A "riskiness" score is calculated by taking the total number of risky choices (defined as rows 1 and 2) and subtracting it from the total number of non-risky choices (defined as rows 3 and 4). With 30 trials, the score goes from -30 to 30. The more positive the number is the more conservative or less risky the participant was (Brand, Pawlikowski, Labudda, Laier, Von Rothkirch, & Markowitsch, 2009). The following information is visually presented to the participants on a running basis: a) amount of total wins and losses, b) current number of trials, c) their current gain/loss for that specific trial, and d) the total amount of money they have in their possession.

The Big Five Personality Inventory. The Big Five Inventory (BFI) (Benet-Martinez & John, 1998; John, Donahue, & Kentle, 1991; John, Nauman, & Soto, 2008) 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 agreed 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 test-retest reliability score for the BFI is $\alpha = 0.80$. For extraversion it is $r = 0.82$, agreeableness is $r = 0.76$, conscientiousness is $r = 0.76$, neuroticism (emotional stability) is $r = 0.83$, and openness is $r = 0.80$. The BFI has high scores of convergent validity when compared to the Five-Item Personality Inventory (FIPI). When comparing the BFI and the FIPI the convergent correlation was r = .65 (Gosling, Rentfrow, & Swann, 2003).

Domain Specific Risk Attitude. The Domain Specific Risk Attitude (DOSPERT) was given to all participants as a self-reported measure to assess attitudes toward risk in five different domains (ethical, financial, health/safety, recreational, and social). For each subscale (risk taking and risk perception), there are 30 questions with six questions in each domain (total of 60 questions). For the risk taking subscale, participants were required to rate how likely they are to participate in such a risk. For the risk perception subscale, participants were required to rate how risky they perceive each item to be. According to Blais and Weber (2006), the internal consistencies for the risk taking subscale scores range from .71 to .86 and the risk perception subscale scores range from .74 to .83.

Mouse Training Task. A mouse training task was created in order to make sure all participants were familiar with how to use a computer mouse. All participants were instructed to use the mouse to click on a picture of a cartoon elephant. Afterward the elephant disappeared and then reappeared in different places on the computer screen. In each instance, the participant was instructed to click on the elephant at the new location. Thus, participants had a chance to practice and become comfortable using the mouse.

Procedure

Participants were tested independently in a quiet room (either in their home or in the lab). In the beginning, the experimenter gave participants a consent statement to read. The

experimenter highlighted the consent statement and answered any questions that the participant had.

Following the consent statement, participants completed the GDT. Before starting, participants received either explicit instructions for the GDT or received the standard instructions. Following the instructions, participants completed practice trials to become familiar with the task. The practice trials looked exactly like the experimental trials, but participants were only given 15 throws of the dice instead of the 30 they had in the experimental trials. After the practice trials were completed, participants were allowed to ask any questions that they may have about the task. Once all questions had been answered, participants proceeded with the experimental GDT session. After completion of the GDT, participants were encouraged to take a break. After the break, participants received the reading span task. Immediately following the reading span task, the BFI and DOSPERT surveys and the WAIS-R/vocabulary test were completed. At the end, participants completed a general demographic survey on the computer. For older adults, the MMSE was given to all older adult participants at the end of the experiment immediately after the demographics. The experiment took approximately one hour for younger adults to complete and 1.5 hours for older adults.

Debriefing

Once the experiment was completed, the experimenter explained to participants the purpose of the study. In accordance with IRB practices, participants were allowed to ask any questions and were given the opportunity to withdraw from the experiment if they chose to. Participants were reminded that they could contact the University of Alabama's Research Compliance Officer if they had any questions or concerns about the experiment.

RESULTS

In interpreting the results it is important to remember the instructions and the experimental procedures associated with the GDT in this study. Recall that in this study participants were presented with rows and are told to pick one of the options available across four rows. They were told that they would win money if their choice corresponded to the die generated by the computer. Probabilities of winning money would vary across the four rows ranging from 1/6 on the riskiest row to 2/3 on the safest row. Risk taking was operationalized in this study as choosing options from the two rows associated with the highest risk, (i.e. Rows one and two). The propensity to take risk was calculated by subtracting risky choices (options from the first two rows) from safe choices (i.e., options from the two lower rows). The lower the number, the greater the propensity to take risk was. The GDT was designed such that performance would be optimized by making “safe" choices.

This study was conducted to determine if risk taking among older adults would be influenced by the degree to which risk associated with each choice was clearly delineated. Thus, in this study participants were assigned to one of two instructional conditions: the standard condition in which the risk associated with choices was implied but not explicitly stated and the explicit condition in which risk associated with choices was explicitly stated. I predicted that older adults would choose safer options in the explicit than in the standard condition. I initially predicted that younger adults would understand the risks associated with choices in both the standard and explicit instructional conditions. Thus, younger adults’ propensity to take risk

would not be influenced by instructional condition. In my first analysis, I conducted an ANOVA to determine if my hypotheses were confirmed.

Age Group and Instruction Condition as Predictors of Risk Propensity

To reiterate, I predicted that there would be an interaction between age group and instruction condition. In addition, I predicted that there would be significant age differences in the standard instruction condition, but not in the explicit condition. Table 2.0 presents the risk propensity data as a function of Age and Instructional Condition. As one can see, overall older adults were riskier than younger adults were. A second point is that the two age groups produced very different patterns with respect to risk propensity in the explicit but not in the standard conditions. That is, in the explicit condition, older adults were riskier than younger adults. This pattern of results was surprising because I actually predicted the reverse—that younger adults' results would not vary as a function of condition, but that older adults' risk taking would vary across conditions. Specifically, I predicted that older adults would exhibit less risk-taking in the Explicit than in the Standard Condition. However, that clearly was not the case as older adults were riskier in the Explicit than in the Standard Condition.

Table 2.0

Mean and Standard Deviations of Younger and Older Adult's Propensity to Take Risks on the GDT in each instruction condition

	Standard		Explicit		Total	
	Mean	SD	Mean	SD	Mean	SD
Young	12.09	17.89	17.53	11.12	14.85	14.98
Old	11.00	17.48	2.39	18.86	6.76	18.54
Total	11.55	17.56	10.31	16.99	10.93	17.22

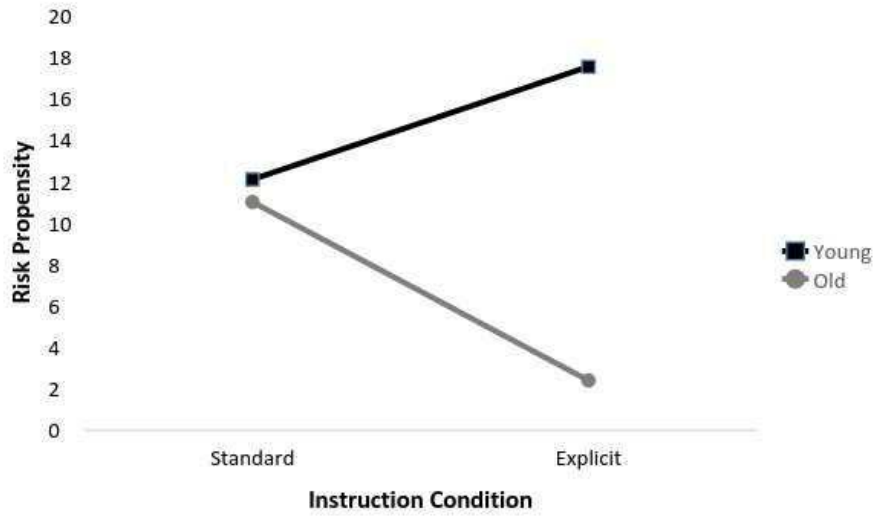
Note. Remember that the lower the score is the riskier the individual was on the GDT.

The aforementioned observations about risk propensity, instructional conditions and age were supported by a 2 (Young vs. Old) x 2 (Standard vs. Explicit) ANOVA that was conducted to examine the effects of age group and instruction condition on risk propensity while playing the GDT. The ANOVA yielded a significant effect of age, in that older adults were significantly more risky than younger adults, $F(1,126) = 7.819$, $p = .006$. As predicted, there was a significant interaction between age group and instruction condition with respect to risk propensity, $F(1,126) = 5.859$, $p = .017$.

To better understand what was occurring in each of the two instructional conditions, I examined each instructional condition separately. I found that there were no significant age differences in the standard condition (younger adults [M =12.09, SD =17.89] and older adults [M =11.00, SD = 17.48]) but that there were significant age differences in the explicit condition in that older adults (M =2.39, SD = 18.86) were riskier than younger adults (M = 17.53, SD = 11.12).

Figure 2.0

Risk Propensity as a Function of Instructional Type and Age



Note. Recall that lower scores indicate a greater propensity for risk.

In addition, each age group was examined separately across each instruction condition. For younger adults, an independent sample t-test was conducted to examine if there was a significant difference in risk taking between the standard and the explicit condition. According to analyses, there was not a significant difference for younger adults only, $t(53.24) = 53.24$, $p = .142$. Younger adults in the standard condition ($M = 12.09$, $SD = 17.89$) were not significantly riskier than those in the explicit condition ($M = 17.53$, $SD = 11.12$). For older adults, an independent sample t-test was conducted to examine if there was a significant difference in risk taking between each instruction condition. According to analyses, there was no significant difference; however, it was approaching significance, $t(61) = 1.88$, $p = .065$. Older adults in the standard condition ($M = 11.00$, $SD = 17.48$) were not significantly safer than those in the explicit condition ($M = 2.39$, $SD = 18.86$).

After conducting the ANOVA to find out if there was an interaction between the variables, Age and Instruction condition, I conducted regression analyses to determine the extent to which working memory predicted risk propensity in the explicit and standard conditions.

Working Memory as a Predictor of Risk Propensity

I hypothesized that risk propensity on the GDT would be predicted by working memory in that individuals with higher working memory would be less risky on the GDT especially in the standard condition. I also predicted that working memory would not affect risk taking in the explicit condition. Table 3.0 presents a correlational matrix depicting the extent to which working memory and Age were correlated with risk propensity. If one reviews Table 2.0, one can see that working memory is significantly correlated with overall risk propensity.

Table 3.0

Bivariate Correlations between Risk Propensity, Age, Working Memory (WM), and the BFI personality characteristics

Measure	1	2	3	4	5	6	7	8
1. Risk Propensity	---							
2. Age	-.309**	---						
3. WM	.183*	-.670**	---					
4. Extraversion	.055	.049	-.017	---				
5. Agreeableness	.019	.195*	-.230**	.141	---			
6. Conscientiousness	.043	.300**	-.192	.107	.326**	---		
7. Neuroticism	-.059	-.109	.012	-.086	-.184	-.105	---	
8. Openness	-.058	.129	.049	.141	-.176	.099	-.090	---

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

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

Note. Remember that the lower the score is the riskier the individual was on the GDT

Regression analyses determined that working memory was a significant predictor of risk propensity, $F(1,120) = 4.168$, $p = .043$ and accounted for 3.4% of the unexplained variance in risk propensity . Although significant results were found when both instruction groups were examined together, I proceeded to examine the two instructional conditions separately to determine if working memory had differing effects on risk taking within each condition.

Table 3.0 presents a correlational matrix depicting the extent to which working memory and Age were correlated with risk propensity as a function of Instructional Group.

Table 4.0

Bivariate Correlations between Working Memory, Age, and Risk Propensity as a Function of Instruction Group

	Standard Condition			Explicit Condition		
Measure	1	2	3	1	2	3
1. Risk Propensity	---			---		
2. Age	-.103	---		.509**	---	
3. WM	.012	-.691***	---	.360**	-.653**	---

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

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

Note. Remember the lower the score is the riskier the individual was on the GDT.

Explicit Condition Only. The explicit condition is displayed in the right half of Table 3. There is a strong correlation between working memory and risk taking in this condition even though it was predicted that working memory would not be a predictor of risk propensity on the GDT in the explicit condition. This observation was supported by regression analyses which revealed that there was a significant correlation between working memory and risk propensity, $r = .360$, $p = .002$ and that working memory was a significant predictor of risk propensity on the GDT, $F(1,58) = 8.619$, $p = .005$, $\beta = .360$, $p = .005$. Working memory accounted for 12.9% of the variance in risk propensity scores on the GDT.

Standard Condition Only. The standard condition is displayed in the left half of Table 3. There is not a strong correlation between working memory and risk taking in this condition - which was inconsistent with my predictions. In fact the simple r correlation showing the association between risk taking and working memory in the standard condition did not even approach significance, $r = .012$, $p = .463$ in this condition, which was inconsistent with predictions.

Working Memory as a Mediator

In my previous research, I found that working memory mediated the relation between age and risk taking. Thus, I predicted that age differences in risk propensity would be mediated by working memory. Specifically, it was predicted that age differences in risk propensity would be attenuated after controlling for the effects of working memory.

In conducting meditational analyses, the goal is to find out if the relation between an independent and dependent variable is due to the indirect effect of a third variable—the mediator. Thus, when the independent variable and the mediator are included in the regression equation together, the mediator remains significant while the effect of the independent variable is reduced. Using a Baron and Kenny (1986) analysis, first I used regression analyses to determine if age was a significant predictor of risk taking. The analysis indicated that it was, $F(1,127) = 13.363$, $p = .001$, $\beta = -.194$, $p = .001$. Next, I used regression analyses to determine if working memory was a significant predictor of risk taking, $F(1,120) = 4.168$, $p = .043$, $\beta = .171$, $p = .043$. To test for mediation, both age and working memory were included in the analysis to predict risk taking. The analysis indicated that working memory was not a significant predictor of risk taking, $F(2,118) = 6.130$, $p = .003$. When the two variables were entered into the analyses together, age was a significant predictor, $\beta = -.215$, $p = .006$, but working memory was not, $\beta = -.045$, $p = .690$. According to Baron and Kenny (1986), evidence of mediation when the mediator and the IV are in the regression equation together after controlling for the IV would be for the IV to no longer be significant and for the mediator to remain significant. Additional analyses were conducted across instructional conditions. In each of these analyses, there was no evidence of working memory mediating the relation between age and risk taking.

The mediational analysis raises an interesting issue. It appears that age is clearly correlated with risk-taking. However, in this particular paradigm, it appears that working memory is associated with risk-taking due to its correlation with age. Working memory does not appear to make a contribution in explaining the variance in risk-taking on the GDT above the contribution of age.

In addition to predicting that working memory would mediate the relation between age and propensity to engage in risk taking on the GDT, I also predicted that other factors would yield age differences in risk taking on the GDT. I predicted that answers to the risk taking questions on the DOSPERT would match performance on the GDT for adults in the Explicit Instruction condition, but would not match performance on the GDT for older adults in the Standard Instruction condition. In the next section, I will turn to the impact of preexisting attitudes on risk propensity in the GDT.

Age Differences in Attitudes towards Risk

Due to previous findings in other research, I was interested in seeing if there would be age differences in individuals' attitudes toward risk. A MANOVA was conducted to examine if there were significant age differences between younger and older adults' attitudes towards risk as measured by the DOSPERT. Participants indicated the likelihood that they would engage in certain behaviors across various domains (e.g. financial, ethical, social…) that varied in terms of riskiness. In addition, they rated the degree of risk associated with behaviors across a variety of domains. Tables 5.0 and 6.0 present the data for younger and older adults. Analyses revealed that older adults were less likely to take risks in all of the risk taking domains except for the social risk taking domain, *Pillai's Trace* = 22.54, $p < .001$. There were significant age differences for ethical risk taking $F(1,127) = 42.47$, $p < .001$, financial risk taking, $F(1,127) = 17.17$, $p < .001$, health risk taking, $F(1,127) = 75.22$, $p < .001$, and recreational risk taking,

$F(1,127) = 65.72$, $p < .005$. However, there were no significant age differences in social risk taking $F(1,127) = .081$, $p = .777$. In addition, older adults perceived all of the domains to involve more risk than younger adults did except for the social domain. There were significant age differences in ethical risk perceptions, $F(1,127) = 19.83$, $p < .001$, financial risk perceptions, $F(1,127) = 5.73$, $p = .018$, health risk perceptions, $F(1,127) = 34.59$, $p < .001$, and recreational risk perceptions, $F(1,127) = 23.76$, $p < .001$. There were no significant age differences in social risk perceptions $F(1,127) = 3.77$, $p = .054$. Interestingly, despite the fact that older adults self-reported being less risky than younger adults, older adults made more risky choices than younger adults, at least in the Explicit Condition. This was opposite of what I predicted. I predicted that older adults would self-report being less risky than younger adults and that their predictions would match their performance in the Explicit Condition.

Table 5.0

Mean and Standard Deviations of Younger and Older Adult's Self-Reported Risk Taking on the DOSPERT Domains.

	Young Adult		Older Adult	
	Mean	SD	Mean	SD
Ethical	12.71	4.29	8.59	2.51
Financial	16.79	6.32	12.83	4.05
Health	19.59	7.17	10.42	4.14
Recreational	24.16	7.95	13.51	6.77
Social	29.23	5.52	28.92	6.99

Note. The higher the value the riskier the participant was in that specific domain.

Table 6.0

Mean and Standard Deviations of Younger and Older Adult's Perceptions of Risk on the DOSPERT Domains

	Young Adult		**Older Adult**	
	Mean	SD	Mean	SD
Ethical	29.90	4.57	34.29	6.58
Financial	31.32	5.03	33.47	5.19
Health	30.81	5.03	35.81	4.53
Recreational	25.41	7.17	31.97	8.09
Social	19.16	5.08	21.20	6.87

Note. The higher the value the riskier the participant perceived the items being.

In addition to examining attitudes towards risk, personality was examined to determine if certain personality characteristics would predict individuals' risk taking performance. Past research has shown that there is a pattern of personality characteristics that predict behavior (Nicholoson, Soane, Fenton-O'Creevy, & Willman, 2005).

Personality and Risk Propensity

It was predicted that personality would moderate individuals' propensity to take risks. When personality was examined across both age groups, no personality characteristics (openness, conscientiousness, extraversion, agreeableness, and neuroticism) were considered to be significant predictors of risk propensity. As a result, age groups were examined separately.

Younger Adults. Personality characteristics were examined to determine if these traits were significant predictors of risk propensity through simultaneous regression analyses. . None of the personality characteristics that were examined reached significance for younger adults. Although previous research supports personality characteristics predicting risk taking performance, our results

indicated otherwise (Nicholson, Soane, Fenton-O'Creevy, & Willman, 2006; Wood, Black, Gilpin, 2016).

Older Adults. All personality characteristics were examined to determine if any of the personality traits were significant predictors for risk propensity using simultaneous regression analyses. Agreeableness was the only significant predictor of risk propensity for older adults, $F(1,62) = 5.458$, $p = .023$. Agreeableness accounted for 8.2% of the unexplained variance in risk propensity for older adults. Higher agreeableness resulted in less risk-taking on the GDT

Thus, there was not much evidence that personality affected risk taking when I examined the impact of personality across the two instructional groups. However, there was a possibility that personality interacted with instructional conditions in predicting risk propensity. Thus, I conducted additional analyses to determine if there was an interaction involving age group, instructional condition, and personality.

Age x Instruction x Personality

It was predicted that there would be a three-way interaction among the three variables age group, instruction group, and personality. Age and personality were examined as moderators of the relation between the instruction group and propensity to take risks. Exploratory regression analyses were originally conducted that included all personality variables. Variables that were not significant were taken out of the regression equation. Analyses revealed that there was a three-way interaction between instruction group, age group, and conscientiousness.

In the first step, the age group, instruction group, and conscientiousness were entered. Overall, these variables accounted for 5.8% of the variance in propensity to take risks, $F(3, 129) = 2.586$, $p = .056$. In the second step, the two-way interaction terms, instruction group x conscientiousness and age group x conscientiousness, were included. These variables accounted for 8.9% of the variance in propensity to take risks, $F(5,129) = 2.436$, $p = .038$. In the third step,

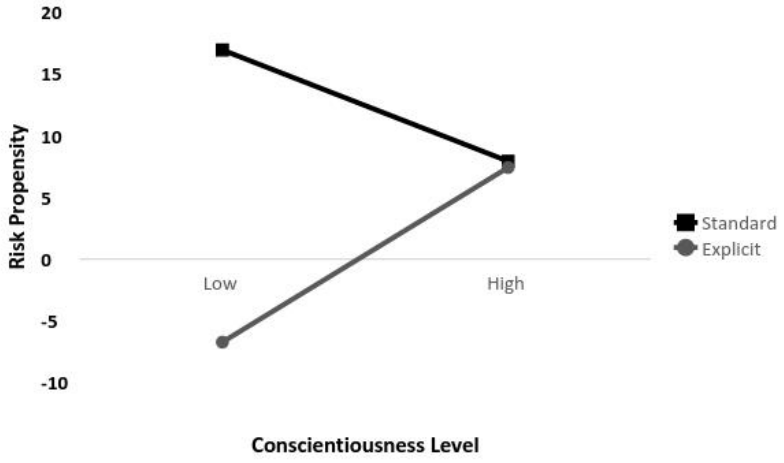
the three-way interaction, age group x instruction group x conscientiousness, was added. These variables accounted for 16.5% of the variance in propensity to take risks, $F(6,129) = 4.04$, $p = .001$. Ultimately, the three-way interaction had a significant standardized beta of -.628, $p = .001$.

In an attempt to get a better understanding of the three-way interaction, each age group was analyzed separately. In each of these separate analyses, conscientiousness was dichotomized into low and high groups for a better visual.

Older Adults. A 2 Instruction Condition (Explicit vs. Standard) x 2 Personality (Low & High Conscientiousness) ANOVA was conducted to see if there was an interaction between instruction condition and conscientiousness in older adults only. Analyses indicated that there was a significant interaction between instruction condition and conscientiousness, $F(1,59) = 6.229$, $p = .015$. Figure 2.0 shows the interaction between instruction condition and the dichotomous conscientiousness variable in older adults only.

Figure 3.0.

Interaction between instruction condition and conscientiousness on risk propensity in older adults only.

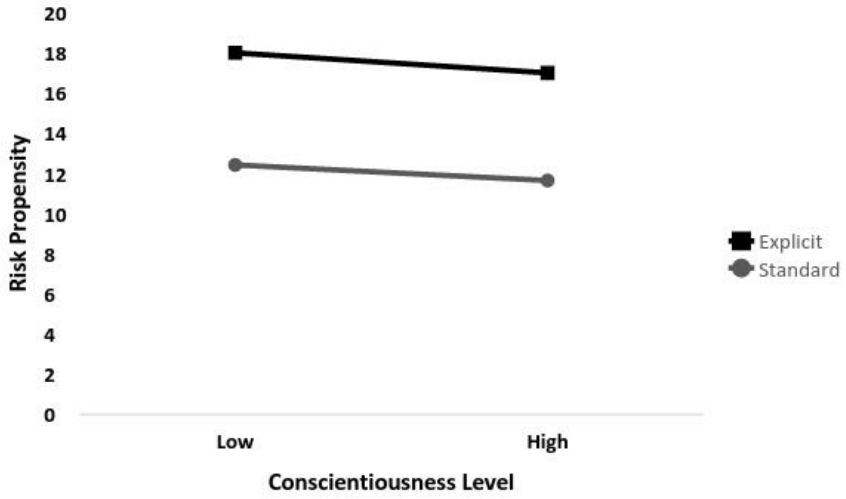


Note: Lower numbers indicate higher risk propensity or higher risk scores/risk taking.

Younger Adults: A 2 Instruction Condition (Explicit vs. Standard) x 2 Personality (Low & High Conscientiousness) ANOVA was conducted to see if there was an interaction between instruction condition and conscientiousness in younger adults only. Analyses indicated that there was not a significant interaction between instruction condition and conscientiousness, $F(1,63) = .001$, $p = .976$.

Figure 4.0.

Interaction between instruction condition and conscientiousness on risk propensity in younger adults only.



Note: Lower numbers indicate higher risk propensity or higher risk scores/risk taking.

As Figures 2.0 and 3.0 reveal, when the two age groups were examined separately, each group yielded very different patterns of data. For young adults, instruction group influenced risk-taking with higher risk-taking in the standard than in the explicit condition; however, conscientiousness did not. For older adults, conscientiousness determined the extent to which instruction had an impact. As one can see, instruction had a large impact for those low in conscientiousness but not for those high with regard to this personality construct.

DISCUSSION

The main purpose of this study was to examine age differences in risk taking on the GDT as a function of the explicitness of the instructions. Specifically, in this study, the risks associated with choices were clearly delineated in the explicit but not in the standard condition. Previous research yielded evidence that older adults were more likely than younger adults to make risky and disadvantageous choices than on the GDT when standard instructions were used.

There are a number of reasons that the GDT might yield age differences in risk taking. One possibility is that older adults did not understand the instructions as well as younger adults. The standard instructions were far from straightforward and older adults might not have made the necessary inferences to understand the probability associated with each of the options displayed in Figure 1. The cognitive aging literature is replete with studies that show there are age-related changes in the ability to understand information that is not explicitly stated. Often, this poor comprehension is attributed to age differences in working memory resources. Based on past research, I was interested in examining the possibility that clearly delineating the risks associated with various options might make older adults less apt to choose risky options. Of course, because of the way that the GDT was designed, consistently choosing risky options would ultimately lead to poor performance. Ultimately, I was also interested in examining the possibility that making the instructions more explicit would help individuals with lower working memory be less risky on the GDT (Wood, Black, & Gilpin, 2015).

I predicted that working memory would predict individuals' risk propensity. To examine risk-taking in young and older adults as a function of instruction explicitness, I designed a study

with two instructional conditions: Standard and Explicit. I predicted that there would be age differences in the standard condition, but not in the explicit condition due to its increased clarity. Moreover, I predicted that age differences in the Standard condition would be mediated by working memory.

I also made predictions involving risk-taking with respect to age and attitude. Given that past research indicated that risk-taking varied as a function of personality and age, I predicted that personality would moderate the effect of age on instruction. That is, older adults with personality characteristics associated with high risk-taking would be riskier across instructional conditions than older adults who did not possess these personality traits. Finally, in addition to exploring the impact of personality on risk-taking, I was interested in both younger and older adults' attitudes about risk. Based on past research, it was predicted that older adults would self-report being less risky than younger adults. However, with respect to actual behavior, they would be riskier than younger adults.

A number of my predictions were confirmed, but not in the way that I originally predicted. For example, the data did yield an Age x Instruction interaction, but that was because there was no evidence of age differences in risk taking in the standard condition, but there were age differences in the explicit condition. I predicted the opposite pattern of data. It was also predicted that working memory would be a mediator of the relationship between age and risk propensity. As it turned out, working memory did not mediate the relation between age and risk taking in either instructional condition. I will discuss the impact of personality, working memory, and Instruction on risk taking as a function of age in this study. I will begin with a discussion of working memory and risk taking as a function of age.

Working Memory and Risk Propensity

As indicated earlier, working memory is important for language comprehension (Daneman & Merikle, 1996; Hasher & Zacks, 1998) and strategy usage (Schibener & Brand, 2015). This study was motivated by my belief that age differences in risk propensity on the GDT in previous studies were due in part to age differences in the ability to comprehend the instructions that accompany the computerized GDT game. There is evidence that comprehension is best for older adults when information is presented in a step by step straightforward way (Morrow, Weiner, Young, Steiner, Deer, & Murray, 2005). In contrast, at least with respect to risk, the GDT presents information in an indirect way in the standard condition. The standard instructions allude to risk without ever explicitly addressing the topic. For example, although the GDT is designed such that risk taking will result in poorer performance in the long run than making safe decisions, the association between risk and performance is never stated.

Thus, an individual will have to make inferences and engage in problem-solving to figure out that the best strategy in the long run is to choose from the bottom two rows rather than from the top two rows. There are two ways for participants to figure this out: 1) Participants can "pick up" on the relation between risk taking and performance based on the computer-generated feedback as they make decisions; 2) Participants can develop a strategy as they play the game based on the instructions, if they make the appropriate inferences while reading the instructions. Namely, the top two rows are associated with high gains but also very high risk; in the long run, selecting options from the top rows will result in players losing more money than they gain. Each of the aforementioned methods would require working memory, and numerous studies have found age differences in working memory (Salthouse & Babcock, 1991; Craik, Morris, & Gick, 1990).

One reason that I speculated that working memory might play a role in explaining the relation between age and risk taking is that there are a plethora of studies indicating that age affects the ability to make inferences (Hasher & Zacks, 1998) due to age-related changes in working memory. Given that the player would have to make inferences to fully understand the instructions that accompany the GDT, I hypothesized that working memory would mediate the relation between age and risk taking on the GDT. Although working memory was a significant predictor of risk propensity, it did not mediate the relation between age and risk taking. In fact, there is evidence that working memory did not have a direct effect on risk-taking in this study. In reality, it was correlated with age and age was correlated with risk-taking.

Thus, the evidence indicated that age differences in risk-taking could not be attributed to working memory. Instead, these age differences may be due to differences in motivation for performing the task. That is, according to Hess (2014), older adults have fewer cognitive resources than younger adults. As a result, older adults are more selective than younger adults and less likely than younger adults to expend cognitive resources on challenging tasks. In comparison with younger adults, older adults are more selective. They only expend resources when the decision making tasks are self-relevant (e.g., decision task involving the allocation of Medicare Benefits), because the topic is of importance to their everyday life or tasks in which their self-presentation will be evaluated by others (e.g., decision making tasks that require older adults to justify their decisions). If older adults considered the task used in this study to be personally irrelevant, their motivation to do well would be low. I also had a number of predictions concerning age, instructions, and working memory. I will turn to those issues next.

Effects of Age and Instruction on Risk Propensity

As indicated earlier, I designed a study in which there were two instructional conditions: the explicit and the standard condition. The two conditions varied in that one of the conditions

required minimal working memory resources (e.g., Explicit condition) and the other condition was highly dependent on working memory resources (e.g., Standard Condition). It was hypothesized that there would be significant age differences on the GDT in the standard instruction condition, but not in the explicit instruction condition. However, my results were the opposite of my predictions. There were no significant age differences in the standard instruction condition. However, there were significant age differences in the explicit instruction condition.

My pattern of results was surprising especially with regard to the standard condition for a number of reasons. Even though the standard condition in the current study was the same in many respects as the previous (Wood, Black, & Gilpin, 2016) study, younger adults yielded a pattern of data that was different from the one in the previous study. That is, they were more risky in the current study than in the previous Wood et al. study.

The standard condition, in the current study, may have yielded a different pattern of results from the previous study because of a change in the way the instructions were administered (Wood, Black, & Gilpin, 2016). In my previous work, experimenters presented the instructions in the standard condition as they were written but let participants know that they could ask questions and provided information as needed. In the current study, participants were told to read the instructions on the screen. Experimenters were told not to answer questions. More than likely, in the earlier Wood et. al. (2016) study, younger participants were more apt to ask questions and interact with the experimenter thereby received clarification before proceeding with the study. By asking more questions, they may have been more apt to figure out the strategy for optimal performance.

A second perplexing issue with respect to the pattern of data is that the explicit rather than the standard condition yielded age differences. Because the instructional manipulation produced unexpected data for both groups of participants, I will discuss each age group

separately. First, turning to younger adults, it appears that younger adults had enough working memory resources and enough motivation in the Explicit condition to figure out the probabilities associated with the various options presented in Figure 1, such that they could make choices associated with optimizing earnings (i.e., choosing less risky options on the GDT).

With regard to older adults, it is initially difficult to explain why older adults would make riskier decisions in the Explicit than in the Standard Condition. The main difference between the two conditions is the straightforwardness of the instructions and the repetition of the word "risk" (a word not mentioned in the Standard Condition). Past research indicates that older adults have a tendency to assimilate their behavior so that it is consistent with categorically accessible concepts (Higgins, Rholes, & Jones, 1977; Hess, McGee, Woodburn, & Bolstad, 1998), especially under conditions in which they are unaware of the prior exposure and possible influence of the categorically accessible concepts. Given age differences in episodic memory, it is possible that older adults did not remember the details of the explicit instructions. However, the prior instructions may have influenced their behavior through priming (e.g., increasing the accessibility of the concept "risk").

Personality and Propensity to Take Risks

In addition to predicting that instructional condition would influence risk-taking, I predicted that there would be personality characteristics that would predict risk-taking. I also predicted that personality would moderate the effects of Age on risk-taking. My findings indicated that personality overall was not associated with risk. However, when I conducted analysis for each age group separately, I found that personality was a significant predictor of risk-propensity for older but not younger adults. Specifically for older adults, agreeableness was inversely related to risk-taking in that higher agreeableness resulted in less risk-taking on the

GDT, $F(1,61) = 5.458$, $p = .023$., which is consistent with research conducted by Nicholson and colleagues (2005) who also found that agreeableness predicted risk propensity. Nicholson &

colleagues (2005) analyzed a large group of subjects ranging from ages of 20 to 60 years old and found the pattern for overall risk propensity included high agreeableness and high conscientiousness. Nicholson and colleagues (2005) argued that individuals who are lower in agreeableness than the norm are riskier than most individuals because they do not worry about the negative consequences of their actions and don't experience feelings of guilt when other people suffer because of their risk-taking. helps to protect them from the guilt or anxiety they feel from the negative consequences.

Although agreeableness predicted overall risk propensity among older adults, I was interested in examining the possibility that personality interacted with age and instruction in determining risk-propensity on the GDT.

Age, Instruction, and Personality

As indicated earlier, personality should be most influential when older and younger adults would be able to appreciate the consequences of risk. For older adults, in particular, this would be the explicit condition. It was hypothesized that there would be a 3-way interaction among the variables age group, instruction, and personality, and my prediction was confirmed by a significant 3-way interaction among the variables age group, instruction group, and the personality trait-conscientiousness. To unpack this interaction, I analyzed each group separately. Specifically, I was interested in determining if both groups of participants would yield a two-way Instruction X Conscientiousness interaction. When age groups were examined separately, the interaction was not significant for younger adults ($F(1,63) = .001$, $p = .976$). However, it was significant for older adults. For older adults who were high in conscientiousness, the instruction

conditions had no influence on their propensity to take risks. However, older adults who were low in conscientiousness and were in the explicit instruction condition were riskier than older adults who were low in conscientiousness and in the standard instruction condition.

Another interesting aspect of the data was that conscientiousness predicted performance for older adults but not younger adults. This is interesting because one of the characteristics of individuals high in conscientiousness is that they are persistent and work hard even when tasks are challenging (Bakker, Demerouti, & ten Brummelhuis, 2011). One possible explanation for conscientiousness being differentially influential across the two age groups is that older adults would find it more effortful to figure out and use the optimal strategy across the instructional conditions than younger adults would. To explain further, in the standard condition in which the instructions were simply presented on the computer screen, younger adults apparently did not understand the instructions well enough to optimize their performance and thus conscientiousness did not matter. On the other hand, in the explicit condition, the instructions were clear so clear that younger adults did not have to expend much effort to understand them and once again, conscientiousness or the tendency to work hard on challenging tasks did not matter.

Older adults of course have less working memory and would have to work hard in both conditions to optimize their strategy. The pattern of data indicated that older adults who were low in conscientiousness were riskier in the explicit condition than in the standard condition. If individuals who were low in conscientiousness were not as invested in performing their best, they might have used the least effortful strategy in the explicit condition. If the "risk" concept was more accessible due to the instructions in the explicit condition then choosing the riskier options might have been the least effortful strategy. Thus, in the explicit condition, perhaps the instructions primed the older adults low in conscientiousness to select the more risky option. In

addition to age, instruction, and personality I was interested in how younger and older adults' self-reported perceptions of their risk taking might relate to their performance. I wanted to know how older adults' self-reported risk taking in several domains would compare to younger adults' self-reported risk taking.

Attitudes Towards Risk

Based on our previous research, I hypothesized that older adults would self-report being more risk averse than younger adults on the DOSPERT. My hypothesis was supported. Older adults self-report being safer or more risk-averse than younger adults, but performed riskier on the GDT. This same result was found in my past research (Wood, Black, & Gilpin, 2016). This supports the idea that older adults may not be aware of the fact that the choices they are making are risky. As a result, older adults may actively be making risky choices or decisions without realizing the full consequences of these actions.

The current study has important applications to our society. Younger and older adults make important decisions every day. For example, older adults, in particular often make decisions about making investments with their retirement pension funds. The wrong decision could lead to financial ruin. In addition, most older adults have at least one chronic disease and thus they are also frequently confronted with healthcare decisions. All of these decisions are associated with varying amounts of risk. Past and current research (Wood, Black, & Gilpin, 2015) have shown that working memory plays a role in risky decision making. Individuals with lower working memory capacity may be at a disadvantage when making decisions especially when risks are not clearly delineated. Given that age is associated with working memory, older adults might be particularly vulnerable in this respect.

As a result, I would like to follow up on this research to help older adults make the best decisions possible. Finally, another issue that is worth exploring is the role of motivation with

regard to decision making. When older adults are presented with complex information, they often use a sufficing strategy rather than expending working memory resources to carefully examine the details associated with the decision (Chen & Sun, 2003). A sufficing strategy is associated with making a decision that is “good enough” rather than making the optimal strategy. To the extent that older adults pay attention to surface details when entering into contractual agreements without reading the “fine print," they may be on the losing end of contractual agreements and possibly could be swindled out of a great deal of money.

CONCLUSION

The current study was conducted to examine age differences in risk-taking on the GDT as a function of the explicitness of the instructions. In one of the conditions, the explicit condition, I thought that both young and older adults would be equally aware of the risks associated with each option. I predicted that there would be no age differences in the explicit condition but that there would be significant differences in the standard condition.

I predicted age differences in the standard condition because in past research (Wood, Black, Gilpin, 2016), there were significant age differences in the standard condition. The age differences appeared to be due to working memory. That is, working memory mediated the relationship between age and risk taking. However, in this study there was no evidence that working memory mediated this relationship. Instead, age differences on the GDT appeared to be due to cohort differences in motivation. Hess's (2014) research argues that older adults are motivated by self-relevancy and are less likely to expend their limited working memory resources when a task does not appear to be self-relevant. Older adults may not have perceived the task in this study to be particularly self-relevant and thus may not have put forth their best effort in the current study. Ultimately, this could explain why working memory did not mediate the relationship between age and risk taking.

In future research, I would like to follow up on this current study by making several changes to the paradigm. First, in the current study, I reduced working memory load by making the instructions easier to understand in the Explicit condition. In future studies, I would like to go further in reducing working memory load by increasing environmental support. To explain

further, older adults may have been more likely than younger adults to forget the instructions. There are age differences in episodic memory and in goal maintenance (Schiebener & Brand, 2015) and these age-related deficits may have put older adults at a disadvantage in the explicit condition even though the instructions were more straightforward. One way that future research could address this issue is by including visible labels indicating risk levels by each row. The labels should remain visible throughout the experiment thereby minimizing the extent to which participants have to remember the instructions or maintain the goal. In addition, older adult's understanding of the instructions could be tested before they begin playing the GDT.

A second change that I would make to a new study is to increase possible motivation by increasing self-relevancy. To accomplish this, I would inform participants that they would have to discuss strategy usage with their fellow players or that their performance would be reviewed and critiqued by their peers. Another strategy to increase motivation is to make rewards contingent upon performance, such that participants could earn more money with better performance.

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APPENDIX A

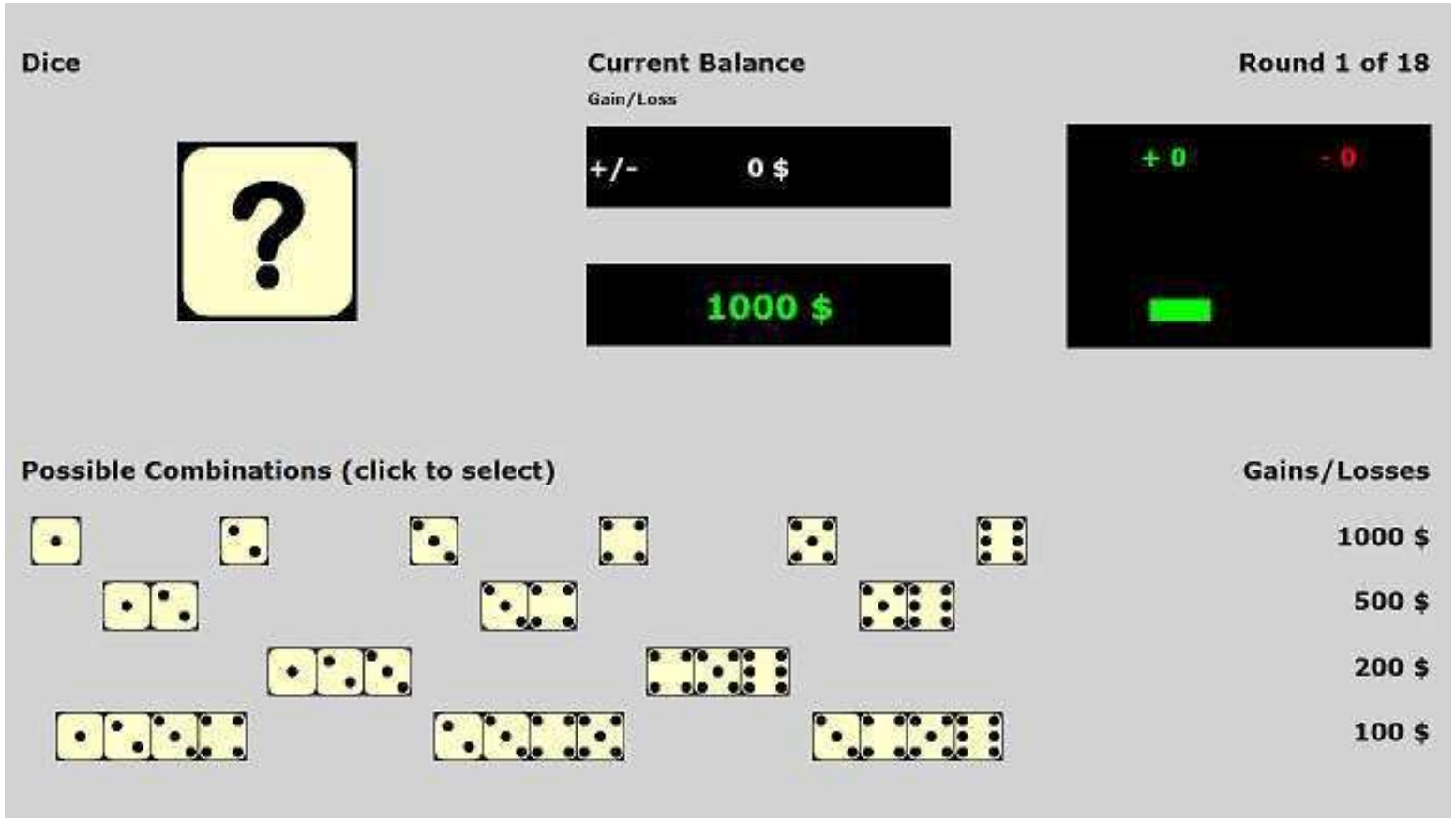
Standard Instruction Condition:

Welcome to the Game of Dice Task. In this task, you are going to throw a virtual dice 30 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 30 throws of the dice. Good luck!

Each time you select an option, the computer will roll virtual dice for you. If the virtual dice lands on a number that is included in your selected option (the group you chose earlier) then the computer will tell you that you won some money.

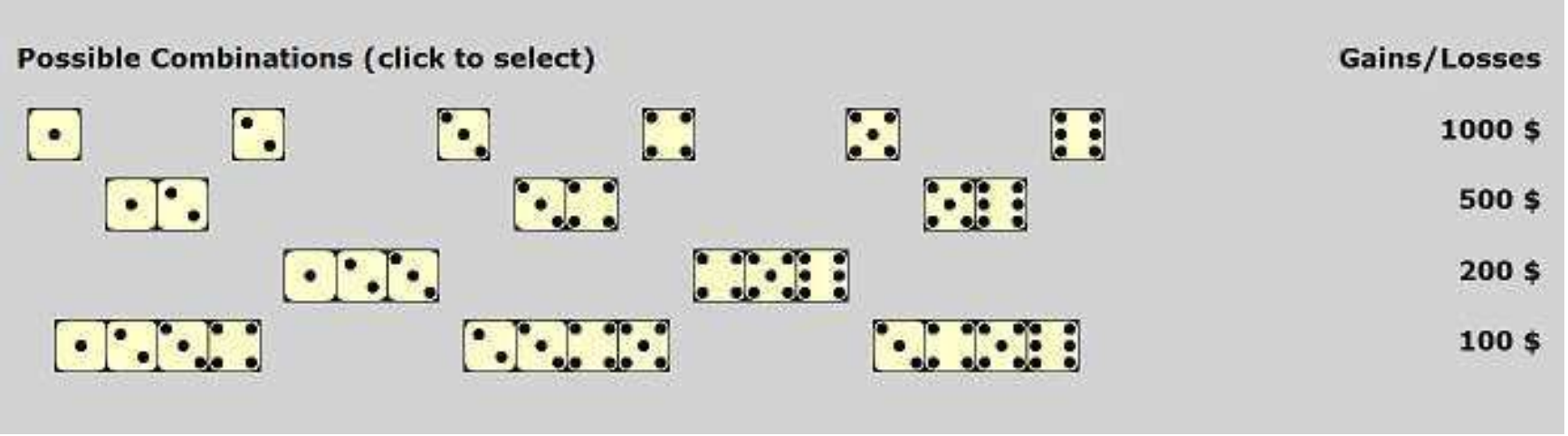
Your job is to win as much money as possible within 30 throws of the dice. Good luck!

Explicit Instruction Condition



Welcome to the Game of Dice Task. In this task, you are going to throw a virtual dice 30 times. Your job is to win as much money as possible within 30 throws of the dice.

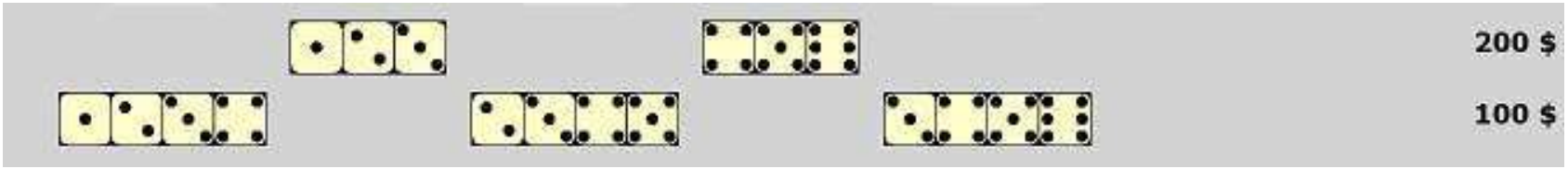
Before each throw, you will be able to bet on the outcome by selecting a single die (for example, the '3') or combinations of 2 to 4 dice (for example, the '1-2-3' dice). You can pick any of the following options on each throw.



Each time you select an option, the computer will roll the virtual die for you. If the virtual dice lands on a number that is included in your selected option (the group you chose earlier) then the computer will tell you that you won some money. If the virtual dice lands on a number that is not included in your selected option, then the computer will tell you that you lost some money.

Some rows are a safer bet than others. The top 2 rows (see figure below) have a lower chance of falling on your choice, but the gains and losses are higher. Therefore, these rows involve riskier bets.

The bottom 2 rows (see figure below) have a higher chance of falling on your choice, but the gains and losses are lower. These rows involve safer bets.



On each throw of the dice, you need to decide the level of risk you wish to take and then, after the throw, evaluate whether your decisions are providing the best outcomes (that is, the most money). Good luck!

APPENDIX B

CONSENT FORM (YOUNGER ADULTS)

You are being asked to participate in a study called "Let's Get Ready to Gamble". Meagan Wood, who is a graduate student at the University of Alabama, is conducting this study. Dr. Sheila Black, who is a professor of psychology at the University of Alabama, is supervising Ms. Wood. This study is about factors related to younger and older adults' gambling decisions. As a part of the study, you will be asked to play a gambling game and answer a few questionnaires. In addition to younger adults like you, older adults will also be participating in this study.

Specific instructions for the survey will be given throughout the study. For example, one section of the study may ask you to answer a series of questions or to use a specific scale to answer questions. Please pay attention to the instructions, and perform accordingly.

There are no risks or discomforts expected from participation in this study other than possible boredom. A possible benefit you can expect to gain from this survey is knowledge about research that is conducted within psychology. Your participation in this study is completely voluntary and you may quit at any time. You are free to decide whether you participate or not.

This study is completely private. The study will not ask you any questions about your identity. As a result, your answers and information will not be linked to who you are personally. You will remain completely unidentified.

The entire study should take no longer than an hour for you to complete. You will receive 1.5 research credits for participation that will count towards your PY 101 course requirement. If you have any questions about the study later on, please contact Meagan Wood at mmwood2@crimson.ua.edu or her faculty advisor, Dr. Sheila Black at 205-348-8648.

If you have questions, concerns, or complaints about your rights as a participant in this research study, you may contact Ms. Tanta Myles, the Research Compliance Officer at UA at 205-348-8461 or toll free at 1-877-820-3066.

You may also ask questions, make a suggestion, or file complaints and concerns through the IRB Outreach Website at http://osp.ua.edu/site/PRCO_Welcome.html. After you participate, you are encouraged to complete the online survey for research participants. You may also e-mail us at participantoutreach@bama.ua.edu

CONSENT FORM (OLDER ADULTS)

You are being asked to be in a research study. This research study is called, "Let's Get Ready to Gamble." This study is being conducted by Meagan Wood, a graduate student in the Psychology Department at the University of Alabama and Dr. Sheila Black, a professor in the Psychology Department at the University of Alabama.

What is this study about?
This study is about factors related to younger and older adults' gambling decisions.

Why this study is important—what good will the results do?
This research will help cognitive researchers better understand the differences between younger and older adults' abilities.

Why have I been asked to take part in this study?
You showed interest through our flyers, phone calls, or meetings asking you to participate in the study.

How many other people will be in this study?
The investigator hopes to interview a total of 139 participants (young and old).

What will I be asked to do in this study?

You'll be asked to play a gambling game and then complete a series of questionnaires that will measure such things as your personality and cognitive state (MMSE).

How much time will I spend being in this study?
The entire experiment will take approximately 90 minutes

Will being in this study cost me anything?
The only cost to you from this study is your time.

Will I be compensated for being in this study?

For your time, you will be given a small donation in the amount of $10. Your time is greatly appreciated.

What are the risks (problems or dangers) from being in this study?
With regard to risks, you might find the task boring. The experiment will take about an hour to complete and may become repetitive. You will be given breaks during the experiment. Other than this, no other risks are known.

What are the benefits of being in this study?
There are no direct benefits to you; however, you will contribute to our knowledge regarding age differences and decision making.

How will my privacy be protected?

You will be tested by yourself; no one but you will know your answers.

How will my confidentiality be protected?

The only place where your name appears in connection with this study is on this informed consent. The consent forms will be kept in a locked file drawer in Dr. Black's laboratory, which is locked when she is not there. No one will be able to recognize you. Data collected from participants will be kept on a computer in a locked laboratory. Only authorized individuals have access to this laboratory.

What are the alternatives to being in this study?

You can choose not to be in the study at any point during the experimental session.

What are my rights as a participant?

Being in this study is voluntary. It is your free choice. You may choose not to be in it at all. If you start the study, you can stop at any time. Not participating or stopping participation will have no effect on your relationships with the University of Alabama or the experimenter.

The University of Alabama Institutional Review Board is a committee that looks out for the ethical treatment of people in research studies. They may review the study records if they wish. This is to be sure that people in research studies are being treated fairly and that the study is being carried out as planned.

Who do I call if I have questions or problems?

If you have questions about this study right now, please ask them. If you have questions later on, please email Meagan Wood at mmwood2@crimson.ua.edu or call her faculty advisor, Dr. Sheila R. Black at (205) 348-0613. If you have questions or complaints about your rights as a research participant, call Ms. Tanta Myles, the Research Compliance Officer at the University of Alabama at (205) 348-8461 or toll free at 1-877-820-3066.

You may also ask questions, make a suggestion, or file complaints and concerns through the IRB Outreach Website at http://osp.ua.edu/site/PRCO_Welcome.html. After you participate, you are encouraged to complete the online survey for research participants. You may also e-mail us at participantoutreach@bama.ua.edu

I have read this consent form. I have had a chance to ask questions.

Signature of Research Participant Date

Signature of Investigator Date

APPENDIX C

DEBRIEFING FOR "Let's Get Ready to Gamble"

Experimenter: Meagan M. Wood
Faculty Sponsor: Dr. Sheila Black
Hours: 1

The study you just participated in is a research study that is being carried out at the University of Alabama. In this study, there were two different types of instructions for the Game of Dice Task (GDT). One set of instructions were what normally came with the game. Another set was much more explicit in nature. The purpose of this study was to examine the effect of explicitness on individuals' risk taking tendencies. We were especially interested in the differences between younger and older adults. We believe that the explicit instruction group will be beneficial to individuals, especially those who have lower working memory.

Participants in this study do not know the true purpose of this study when they participate. Now that you know the true purpose of this study and our predictions, we ask that you do not tell anyone else, including friends, about the details or facts of this study. Knowing the true purpose and the predictions of this study might influence participants to answer the questions in a specific way.

As mentioned before this research study is completely voluntary. Now that the true purpose of the research study has been revealed you can request that your responses not be used in this study. This removal of your responses will have no effect on the research credit being offered or your compensation. You will still be compensated even if you request for your data to be removed. If you wish for your responses to be removed from the study, please contact the experimenter that is mentioned below. All participants, young and old, may email or call the experimenters below if you wish to remove your data.

If you have any questions about the study later on, please contact Meagan Wood at mmwood2@crimson.ua.edu or her faculty advisor, Dr. Sheila Black at 205-348-8648. If you have questions, concerns, or complaints about your rights as a participant in this research study, you may contact Ms. Tanta Myles, the Research Compliance Officer at UA at 205-348-8461 or toll free at 1-877-820-3066.

Thank you for your participation in this study!

Meagan Wood

Graduate Student
Psychology Department

APPENDIX D

Big Five Inventory

How I am in general

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who *likes to spend time with others*? Please write a number next to each statement to indicate the extent to which **you agree or disagree with that statement.**

1	2	3	4	5
Disagree Strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly

I am someone who…

1. _____ Is talkative
2. _____ Tends to find fault with others
3. _____ Does a thorough job
4. _____ Is depressed, blue
5. _____ Is original, comes up with new ideas
6. _____ Is reserved
7. _____ Is helpful and unselfish with others
8. _____ Can be somewhat careless
9. _____ Is relaxed, handles stress well.
12. _____ Starts quarrels with others
13. _____ Is a reliable worker
14. _____ Can be tense
15. _____ Is ingenious, a deep thinker
16. _____ Generates a lot of enthusiasm
17. _____ Has a forgiving nature
18. _____ Tends to be disorganized
19. _____ Worries a lot
20. _____ Has an active imagination

10. _____ Is curious about many different things

11. _____ Is full of energy

21. _____ Tends to be quiet

22. _____ Is generally trusting

23. _____ Tends to be lazy

24. _____ Is emotionally stable, not easily upset

25. _____ Is inventive

26. _____ Has an assertive personality

27. _____ Can be cold and aloof

28. _____ Perseveres until the task is finished

29. _____ Can be moody

30. _____ Values artistic, aesthetic experiences

31. _____ Is sometimes shy, inhibited

32. _____ Is considerate and kind to almost everyone

33. _____ Does things efficiently

34. _____ Remains calm in tense situations

35. _____ Prefers work that is routine

36. _____ Is outgoing, sociable

37. _____ Is sometimes rude to others

38. _____ Makes plans and follows through with them

39. _____ Gets nervous easily

40. _____ Likes to reflect, play with ideas

41. _____ Has few artistic interests

42. _____ Likes to cooperate with others

43. _____ Is easily distracted

44. _____ Is sophisticated in art, music, or literature

APPENDIX E

Domain-Specific Risk-Taking (Adult) Scale – Risk Taking

For each of the following statements, please indicate the **likelihood** that you would engage in the described activity or behavior if you were to find yourself in that situation. Provide a rating from *Extremely Unlikely* to *Extremely Likely*, using the following scale:

1	2	3	4	5	6	7
Extremely Unlikely	Moderately Unlikely	Somewhat Unlikely	Not Sure	Somewhat Likely	Moderately Likely	Extremely Likely

1. Admitting that your tastes are different from those of a friend. _____
2. Going camping in the wilderness. _____
3. Betting a day's income at the horse races. _____
4. Investing 10% of your annual income in a moderate growth mutual fund. _____
5. Drinking heavily at a social function. _____
6. Taking some questionable deductions on your income tax return. _____
7. Disagreeing with an authority figure on a major issue. _____
8. Betting a day's income at a high-stake poker game. _____
9. Having an affair with a married man/woman. _____
10. Passing off somebody else's work as your own. _____
11. Going down a ski run that is beyond your ability. _____
12. Investing 5% of your annual income in a very speculative stock. _____
13. Going whitewater rafting at high water in the spring. _____
14. Betting a day's income on the outcome of a sporting event. _____
15. Engaging in unprotected sex. _____

16. Revealing a friend's secret to someone else. _____

17. Driving a car without wearing a seat belt. _____

18. Investing 10% of your annual income in a new business venture. _____

1	2	3	4	5	6	7
Extremely Unlikely	Moderately Unlikely	Somewhat Unlikely	Not Sure	Somewhat Likely	Moderately Likely	Extremely Likely

19. Taking a skydiving class. _____

20. Riding a motorcycle without a helmet. _____

21. Choosing a career that you truly enjoy over a more secure one. _____

22. Speaking your mind about an unpopular issue in a meeting at work. _____

23. Sunbathing without sunscreen. _____

24. Bungee jumping off a tall bridge. _____

25. Piloting a small plane. _____

26. Walking home alone at night in an unsafe area of town. _____

27. Moving to a city far away from your extended family. _____

28. Starting a new career in your mid-thirties. _____

29. Leaving your young children alone at home while running an errand. _____

30. Not returning a wallet you found that contains $200. _____

APPENDIX F

Demographic Questionnaire for Young

1. Please enter your age

2. What sex were you assigned at birth (i.e. what sex appeared on your birth certificate)?

    a. female
    b. male
    c. intersex
    d. Don't know/not sure
    e. choose not to identify

3. How would you describe yourself?

    a. Female and/or woman
    b. Male and/or man
    c. Intersex
    d. Transgender and/or trans
    e. genderqueer and/or gender non-conforming
    f. An identity not listed above
    g. Don't know/not sure
    h. Choose not to identify

4. Please select your current year in college

    a. Freshman
    b. Sophomore
    c. Junior
    d. Senior

5. Please select your ethnicity

    a. Caucasian
    b. African American
    c. Hispanic
    d. Asian
    e. Native American
    f. Other

6. Please select your handedness

    a. Right

    b. Left

    c. Ambidextrous

7. Are you a native English speaker?

    a. Yes

    b. No

8. Do you wear eyeglasses or have corrected eyesight?

    a. Yes

    b. No

9. How would you describe yourself?

    a. Lesbian/gay

    b. Bisexual

    c. Straight/heterosexual

    d. Asexual

    e. Queer

    f. An identity not listed above

    g. Don't know/not sure

    h. Choose not to identify

10. Please rate your overall health

    1 - Poor, 2, 3 - Fair, 4, 5 - Excellent

11. What do you think the true intent of the study is?

12. Have you ever been diagnosed with Attention Deficit Hyperactive Disorder (ADD/ADHD)?

    a. Yes b. No

APPENDIX G

Institutional Review Board Approval Letter

Office for Research

Institutional Review Board for the Protection of Human Subjects

THE UNIVERSITY OF ALABAMA RESEARCH

October 1, 2015

Meagan Wood
Dept. of Psychology
College of Arts & Sciences
Box 870348

Re: IRB#: 15-OR-301 "Let's Get Ready to Gamble"

Dear Ms. Wood:

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. You have also been granted the requested waiver of informed consent for the use of concealment. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies

Your application will expire on September 30, 2016. If your research will continue beyond this date, complete the relevant portions of the IRB Renewal Application. If you wish to modify the application, complete the Modification of an Approved Protocol Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, complete the appropriate portions of the IRB Request for Study Closure Form.

Please use reproductions of the IRB approved stamped consent forms to obtain consent from your participants.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely.

Stuart Usdan, PhD
Chair, Non-Medical Institutional Review Board

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