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Risk-Taking, Thinking Styles, and Criminality: A Fuzzy-Trace Theory Perspective

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Risk Taking, Thinking Styles, and Criminality: A Fuzzy-Trace Theory Perspective

By

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ABSTRACT

Preferred modes of thinking, otherwise known as biases, have been well

documented in adult reasoning and decision-making (Evans, 2003; Gilovich,

Griffin, & Kahneman, 2002; Reyna & Brainerd, 2011; Tversky & Kahneman,

1986). Researchers have explained these biases by proposing that the basis for

them is a system of thought that relies mostly on intuition and "gut feelings"

rather than logical analysis of the situation (Reyna & Brainerd, 2011; Tversky &

Kahneman, 1986). According to standard dual-process theories, intuition is

described as a thought process so quick, it is automatic and, at times

unconscious; conversely, analytical thinking is slow and steady, involving

analysis and conscious deliberation (Reyna & Brainerd, 2011). Though several

dual-process models for cognition have been proposed, including system

1/system 2, prototype/willingness, and the hot/cold empathy gap, only fuzzy-trace

theory offers concrete predictions concerning development that are consistent

with known data (Kruglanski & Gigerenzer, 2011; Reyna & Casillas, 2009). For

example, research has shown that adults display greater reasoning biases than

children, in that adults are more likely than children to process and use

extraneous information, such as inconsequential differences in wording, in their

decisions (Jacobs & Potenza, 1991; Reyna & Ellis, 1994). Of interest for the

current study, fuzzy-trace theory posits that different ways of processing lead to

different outcomes in risk-taking behavior. Further, fuzzy-trace theory proposes a framework that explains how risk perception changes across the lifespan and how these changes often lead to less risk-taking from childhood and adolescence into adulthood (Reyna, 2012; Reyna et al., 2018; Reyna & Adam, 2003; Reyna & Farley, 2006).

Keywords: risk-taking, fuzzy-trace theory, criminality, decision-making, framing

ACKNOWLEDGEMENTS

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INTRODUCTION

<u>Fuzzy-Trace Theory</u>

Fuzzy-trace theory (FTT) is an empirically supported theory about

memory, judgment, and decision-making across the life span (Reyna, 2012;

Reyna & Brainerd, 2011, 1995, 1991). The central idea of fuzzy-trace theory is

that different mental representations are encoded, stored, retrieved, and

forgotten separately and roughly in parallel (Broniatowski & Reyna, 2018; Reyna,

2012; Reyna & Casillas, 2009). These memory representations include gist and

verbatim representations. Gist representations are memory forms of the absolute

meaning or substance of a construct without regard to the exact numbers, words,

or pictures (Broniatowski & Reyna, 2018; Reyna, 2012). In other words, gist is a

symbolic representation of meaning for each stimulus (Reyna, 2012).

Conversely, verbatim memory is the surface form representation of memory,

including exact numbers, words, and pictures (Broniatowski & Reyna, 2018;

Reyna, 2012). "Fuzzy-trace" refers to the difference between "fuzzy" gist

representations and vivid verbatim representations (Reyna & Casillas, 2009). In

general, adults exemplify a fuzzy-processing preference, wherein information is

encoded in both gist and verbatim representations (Reyna, 2012). The default

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decision is to allow less precise, gist representations to set the course of action whenever possible, hence fuzzy-processing preference (Reyna, 2012). Adults begin with the lowest, or categorical, level of gist, and only proceed to higher, or more precise, levels when the lower levels do not discriminate between options enough to allow them to complete a task, such as choosing between two options in a choice task (Reyna, 2015, 2012). For example, problems with choices phrases as "less money is won" or "more money is won" represent more precise levels of gist than "some money is won" or "no money is won" (Reyna, 2012).

The Influence of Verbatim and Gist Processing on Decision-Making

Based on previous research, Reyna and Brainerd (2011) identified five components of decision-making including: 1) stored knowledge or values, 2) mental representations of problems or situations, 3) retrieval of knowledge and values, 4) implementation of knowledge and values, and 5) individual and developmental differences in monitoring and inhibiting interference, all of which can contribute to reasoning and decision-making. Stored knowledge and values refer to long-term education, experiences, and instilled values from childhood, including cultural values (Reyna & Brainerd, 2011). Mental representations refer to two distinct ways individuals perceive situations, either gist-based or verbatim-based processing (Reyna & Brainerd, 2011). Gist processing is qualitative and draws on meaning and components extracted from the information presented, including emotional meaning (Mills, Reyna, & Estrada, 2008; Reyna, 2012, 2004;

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Reyna et al., 2015). Reyna and Brainerd (2011) explain that the meaning of the gist of a problem or situation is subjectively based on emotion, education, culture, experience, and worldview (Reyna, 2008, 2004; Reyna & Adam, 2003). When applied to decisions, gist-based processing relies on intuitive and global assessments, rather than trading-off between values, or a cost-benefit analysis. For instance, if confronted with a problem or situation that requires a decision, gist-based processing would involve a global assessment of risk (e.g., "Is there risk involved?") as opposed to calculating risks (e.g., "Do the benefits outweigh the risks?"). On the contrary, when applied to decisions, verbatim-processes are specific and involve quantitative analysis (e.g., "How much risk is there?"). Retrieval of relevant values is an important part of the decision process, as people must access what is valuable to them in each situation; although, even deeply held values may not be retrieved when needed, introducing variance within individuals in reasoning and decision-making (Reyna & Brainerd, 2011). Implementation is putting together what is perceived about a situation (i.e., mental representations) with what is known and valued (gist representations that are retrieved from long-term memory) by the decision-maker (Reyna & Brainerd, 2011). In other words, when confronted with a decision, it is important to use personal values (e.g., "I want to be a law-abiding citizen.") and to understand the fundamental meaning of the problem or situation (i.e., knowledge; Reyna & Brainerd, 2011). When people fail to do this and only pay attention to superficial

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details (e.g., numbers involved or exact phrasing of a problem) variability in their reasoning occurs as implicated by decisions in choice tasks. The assumptions are, according to fuzzy-trace theory, that this likely occurs because numbers are not properly stored in long-term memory, and that retrieval of values are unreliable in differing situations because they rely on specific cues for retrieval (Reyna & Brainerd, 2011).

Verbatim and Gist Preference Shifts in Decision-Making

Traditional theories of rationality provided a consistency criterion; that is, different reasoning problems should be treated consistently across trials (De Martino, Kumaran, Seymour, & Dolan, 2006; Reyna, 2004). For instance, if an individual chooses to undergo surgery described as having an 80% survival rate, the individual should also choose to undergo surgery described as having a 20% mortality rate because they are mathematically equivalent choices (Reyna, 2004). However, this is not necessarily the case in fuzzy-trace theory. What we see, instead, is preference shifts because of the way a decision task is phrased (i.e., in terms of loss or gains) because dependence on gist representations and the application of values and principles favors options differently across frames (Broniatowski & Reyna, 2018; Tversky & Kahneman, 1986). This lack of consistency, not often displayed in younger children, suggests that adults are less rational than children are in decision tasks; however, fuzzy-trace theory argues that reliance on gist, which produces inconsistency, is the zenith of

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development and rationality (Levin, Weller, Pederson, & Harshman, 2007; Reyna & Ellis, 1994). Decisions become more efficient, quicker, and often protective against unnecessary risks, thus increasing survival for the developed individual (Reyna, 2012; Reyna & Lloyd, 2006).

<u>Fuzzy-Trace Theory and Risk Perception vs. Risk-Taking</u>

Risk-taking can, at times, incur high damage and healthcare costs, and lost potential for people and their communities (Mills, Reyna, & Estrada, 2008). For example, if a young person makes the risky decision to drink and drive and the result of that decision was a fatal accident, there is lost potential of life and costs to repair and replace damaged property. Researchers predict that risk perception and risk-taking behavior are negatively correlated, or that perceived risk is protective. For some, the higher the perceived risk of a behavior, the lower the tendency to engage in the behavior (Brewer, Weinstein, Cuite, & Herrington, 2004; Mills et al., 2008). Ironically, the opposite relationship (a positive correlation between risk perception and behavior) has also been observed: the higher the perceived risk, the greater the tendency to engage in the behavior (Johnson, McCaul, & Klein, 2002; Mills et al., 2008; Reyna & Farley, 2006). Fuzzy-trace theory explains these seemingly contradictory findings by positing that specific cues related to gist and verbatim representations elicit sometimes positive (when verbatim is applied) and sometimes negative (when gist is applied) relations between risk perception and risk-taking (Mills et al., 2008). For

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example, asking an individual a question about the likelihood of getting arrested

for a crime in the next six months can cause an individual to recall specific

memories (verbatim), such as the number of crimes or offenses the individual

has recently committed (Mills et al., 2008). In contrast, asking an individual

whether they intend to engage in risky-behavior may produce a focus on the

negative consequences of risk, hence leading to a negative relationship between

risk-perception and risk-taking (Mills et al., 2008).

Susceptibility to Risk Based on Gist or Verbatim Preference

Fuzzy-trace theory states that people differ when thinking about risk

across a continuum of verbatim to gist. At one end of the continuum is qualitative

thinking, or using simple gist representations, such as "don't go to jail." On the

other end is quantitative thinking using verbatim representations wherein the

individual trades off risks and rewards (Mills et al., 2008). Thus, the latter thinking

preference is more susceptible to increased risk-taking behaviors, because

trading off the magnitude of risks versus the magnitude of rewards typically

favors risk-taking (Mills et al., 2008; Reyna, Wilhems, McCormick, & Weldon,

2015). More specifically, the decision maker who trades off (i.e., thinks

analytically) can perceive the magnitude of benefits as better than the magnitude

of risk involved (Mills et al., 2008). On the other hand, the decision maker who

avoids risk altogether ignores the magnitude of the possible benefits and thus, is

protective of risk (Mills et al., 2008; Reyna & Ellis, 1994; Reyna & Farley, 2006).

For example, adolescents who think about risk in terms of gist perceive risk as categorically bad and risk as high; therefore, they avoid risky behavior altogether (Reyna & Casillas, 2009; Reyna & Ellis, 1994; Reyna & Farley, 2006).

<u>Framing Effects</u>

According to Tversky and Kahneman (1981), a "decision frame" is the decision maker's concept of the performances, outcomes, and likelihoods associated with an option. The decision frame conception is dependent, in part, upon the formulation of the problem, in addition to norms, habits, and personal characteristics of the person (Tversky & Kahneman, 1981). Classic rational choice requires that the preference between options should not reverse with changes of frame when options remain mathematically equivalent; for example, preferring to purchase meat described as 90% lean, but avoiding purchasing when the meat is described as 10% fat. Framing effects occur when an objectively identical decision is phrased in terms of gains or losses, provoking different preferences for risk (Tversky & Kahneman, 1986). Classically, Tversky and Kahneman (1981) developed the Asian Disease Problem to exemplify framing effects:

<u>Preamble</u>: The U.S. is preparing for the outbreak of a mysterious disease originating in the Asian-Pacific region, which is expected to kill around 600 people. The CDC proposes 2 alternative programs to combat the disease

assuming the exact scientific estimate of the consequences of the programs are as followed:

Option 1: varies in terms of program options and is presented in terms of gains) "If Program A is adopted, 200 people will be saved (72 percent chance). If Program B is adopted, there is 1/3 probability that 600 people will be saved, and 2/3 probabilities that no people will be saved (28 percent chance)."

After presenting the problem, participants chose between programs. Despite the two choice options having equal expected values, the majority choice turns out to be risk-averse, because the prospect of saving 200 lives is more attractive than the possibility of saving zero lives (Tversky & Kahneman, 1981). The alternative "frame" in which the options were presented was as follows:

Option 2: (varies in terms of program options and is presented in terms of loss)

"If Program C is adopted, 400 people will die (22 percent). If Program D is adopted, there is a 1/3 probability that nobody will die, and 2/3 probability 600 people will die (78 percent)."

The majority choice in this case, despite equal expected values between options, is risk taking, because the certain death of 400 people is less attractive than the high 2/3 probability that 600 will die (Tversky & Kahneman, 1981).

The only difference between the two problems is the phrasing in terms of gains (option 1, lives saved) or losses (option 2, lives lost; Tversky & Kahneman, 1981). Framing effects provide a problem for classic decision theory because in classical decision theory, a large assumption of rationality was that preferences remain constant across options no matter the phrasing (De Martino et al., 2006; Tversky & Kahneman, 1986). Nevertheless, the pattern observed by Tversky and Kahneman (1981) using the classic Asian Disease Problem is commonly found in decision-making research: Choices phrased in terms of gains are often risk averse, whereas choices phrased in terms of losses are risk seeking (De Martino et al., 2006). If someone chooses a sure outcome over a gamble with equal or greater expected value, their choice is considered risk-averse, but if the opposite is observed and the individual chooses a gamble over sure option with equal or lower expected values, their choice is then considered risk-seeking (Kahneman & Tversky, 1984). This pattern of preference is standard in adult bias and is referred to as "standard framing" (Kahneman & Tversky, 1984).

Fuzzy-trace theory explains framing effects in terms of applying verbatim or gist to decisions in framing tasks, producing three distinct patterns of choice (Reyna & Brainerd, 2011; Reyna & Ellis, 1994; Reyna et al., 2011). First, gist-based processing often supports framing effects. Participants in these tasks focus information first on losses, and work to minimize loss in both frames. For gains, minimizing loss means choosing the sure option. For losses, since a loss

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is certain for the sure option, the chance to minimize loss is present in the gamble option. Thus, reliance on gist-based processing leads to observed standard framing effects. Reliance on verbatim-based processing leads to two patterns: consistency across frames and reverse framing.

Determining Gist or Verbatim in Participant Responses

Framing effects, or "standard framing," are solely associated with gist-based decision-making in risky-choice framing tasks, the preferred mode of thinking for most adults (Reyna et al., 2018). Standard framing is a choice pattern of preferring sure options when options are framed in terms of gains (e.g., survival, winning money) but preferring the gamble when options are framed as losses (e.g., mortality, losing money). Standard framing is related to gist processing because when the simple, categorical representation is not there, framing effects are not observed (Reyna et al., 2018). The opposite pattern of choice (i.e., choosing the sure loss and the risky gain) is called "reverse framing," or "framing-inconsistent choice" (Reyna et al., 2018). Reyna and colleagues (2018) explain that reverse framing is more evident when there is a greater distinction between reward outcomes because reliance on precise distinctions between outcomes (i.e., verbatim) rather than fuzzy representations that ignore detail (i.e., gist) produces a cost/benefit analysis that favors the sure option in the loss frame, but favors the gamble option in the gain frame. This indicates that reverse framing is prevalent when the decision maker uses verbatim processing.

Impulsivity/Inhibition and Fuzzy-Trace Theory

When learning about gist preference choices in fuzzy-trace theory it might be tempting to say that intuition is simply impulsivity, or lack of inhibition. However, research using the fuzzy-trace theory framework separates intuition from impulsivity (Reyna, 2012). Specifically, gist-based intuition is a skill that increases from childhood through adulthood, and is linked to inhibition, or cognitive control (Reyna, 2012; Reyna & Brainerd, 2011; Reyna & Rivers, 2008). In fuzzy-trace theory, inhibition is not a reasoning mode, but rather, works to withhold thoughts and actions as needed (Reyna & Brainerd, 2011). Impulsivity likely declines with age due to maturation of the prefrontal cortex, which includes increased white-matter connectivity between cortical and subcortical limbic areas of the brain (Casey, Getz, & Galvan, 2008; Reyna & Brainerd, 2011). Inhibition, or cognitive control over one's behavior, is dependent on gist representations because they are meaningful and impressionistic – decision factors that have been shown to reduce unhealthy risky behaviors (Reyna & Brainerd, 2011; Reyna et al., 2018). Behavioral inhibition accounts for variance in people's decisions in risky-choice problems (Reyna & Brainerd, 2011; Zuckerman, 1979).

Fuzzy-Trace Theory, Risk-Taking, Criminal Behaviors, and the Brain

Given that crimes are decisions that involve risk suggests that fuzzy-trace theory can be applied to criminal behavior and risk. Crime can be analyzed as reasoned, or thought out, choice that balances risks (e.g., getting caught and

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going to jail) versus rewards (e.g., gaining monetary possessions to sell) and as impulsive or reactive, indicating emotions or desires that supplant a person's self-control (Casey, Galván, & Somerville, 2016; Reyna, Helm, Weldon, Shah, Turpin, & Govindgari, 2018). Like prior research, fuzzy-trace theory incorporates influences such as reward sensitivity, emotion, and failures of inhibition on risky decision-making tendencies (Reyna & Casillas, 2009; Reyna et al., 2018, 2015). The largest difference is that fuzzy-trace theory incorporates a cognitive distinction between gist and verbatim mental representations relied on in decision-making (Reyna et al., 2018). Criminal behavior is an example of heightened risk-taking behavior that peaks in adolescence for most individuals but persists through adulthood for some (Cohen & Casey, 2014; Moffitt, 1993; Reyna et al., 2018). Cohen and Casey (2014) refer to an "age-crime curve," or the introduction of criminal behavior that begins in adolescence and peaks at age 17. This implies that criminal behavior is reflective of developmentally immature thinking patterns. The different preferences in risk taking behavior can be explained by developmental and individual differences that affect reliance on gist or verbatim representations (Reyna et al., 2018). Reyna and colleagues (2018) posit that with respect to crime, those engaged in criminal behavior are more apt to use trading off and analysis of risk and reward that supports risk-taking (i.e., committing the crime) rather than deterrence, and are supported by verbatim representations of risk.

Crime and Thinking Styles

Over the years, several researchers have attempted to explain criminal behavior with development of theories such as social disorganization theory (Shaw & McKay, 1942); social learning theory (Burgess & Akers, 1966); strain theory (Agnew, 1985; Merton, 1938); and rational-choice theory (Cornish & Clarke, 1986). Social disorganization theory explains delinquent behavior by socio-economic status and in relation to geographic location (Shaw & McKay, 1942). Like social disorganization theory, social learning theory proposes that behavior is learned from a person's environment (Burgess & Akers, 1966). However, this theory focuses more on learned behavior from others over geography. Strain theory proposes that criminal behavior stems from the emergence of unstable social structures and blocked opportunity for achievement (Agnew, 1985; Merton, 1938). Most closely related to fuzzy-trace theory, rational-choice theory posits that people are rational decision makers who weigh costs and benefits to make the most utilitarian decision (Cornish & Clarke, 1986).

Fuzzy-trace theory characterizes crime as highly risky behavior, and so it is important to understand how risk-perception plays a part in the engagement of criminal activity, and further, how each mode of thinking supports and predicts risk-taking. The current study uses fuzzy-trace theory to explore how preferred modes of thinking, risk perception, and criminal behavior are related. We first hypothesize that if we frame criminal activity as risky behavior, we should find

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similar thinking processes underlying both risk-taking and criminal behavior. As explained, verbatim processing is supportive of risk-taking, while gist is protective of risk-taking. Therefore, we can expect to see criminal behavior positively correlated with reverse framing in a framing choice task, given that reverse framing is indicative of verbatim processing. We also endeavor to distinguish patterns related to gist/verbatim processing of choice from impulsivity, or inhibition. Finally, we will explore integrating common thinking patterns found in criminal behavior with fuzzy-trace theory.

<div align="center">Implications of Research</div>

Real-World Problem: Court Decisions by Young People

Fuzzy trace-theory suggests that despite an individual's capability for understanding and reasoning, there are some who may have a lower capacity for making value-based decisions when faced with tempting offers, such as whether to engage in a criminal act (Helm & Reyna, 2017). The implication is that it is important for individuals facing a plea, bargain, or other risky choice, to make decisions based on their values (meaning-based representations) rather than the immediate cost-benefit choices when weighing their options (Helm & Reyna, 2017). Furthermore, if young adults who prefer verbatim processing are also observed to be more likely to commit criminal offenses (i.e., acts that are in violation of the law), we can reduce their chances of future offenses with gist-based interventions, such as curriculum using gist processing (Reyna et al.,

<div align="center">14</div>

2018). Using gist representations instead of verbatim representations when processing information, such as cueing a "moral" value (e.g., "I can go to jail if I get caught") instead of trading off risks and rewards (e.g., "If I am caught, the fine for stealing is $200, but if I am successful, I can get $200 from pawning this game console"), has been found to reduce unhealthy risk-taking (Blalock & Reyna, 2016; Reyna et al., 2018). This implies that with respect to criminal behavior, gist-based interventions should have a protective effect against criminal behavior, even when the risk is low, and the benefits are high (Reyna et al., 2018).

Remember that fuzzy-trace theory suggests some people simply do not rely on gist when faced with tempting rewards (Helm & Reyna, 2017). This study adds to our understanding of decision-making processes in young adults when confronted with risk and increases our understanding of factors that may lead to criminal behavior.

Method

Participants

Participants were recruited from the undergraduate research pool from the psychology department at Stephen F. Austin State University. Of the total number of participants, one was excluded due to corrupt data from the framing task, leaving 101 total participants. Participants were reflective of SFA's demographics; that is, mostly White ($N = 60$; 59.4%), Non-Hispanic ($N = 76$;

75.2%), female (*N* = 80; 79.2%), and between the ages of 18 and 43 (*M* = 19.97; *SD* = 3.15). Participants received one research credit toward satisfying course requirements for their participation.

<u>Design</u>

The study used a mixed measures approach. The experimental component of our study was a 2 (Frame: Gain, Loss) x 3 (Reward: Small, Intermediate, Large) x 3 (Risk: Low, Medium, High) completely factorial within-participants design. The correlational aspect involved a survey to measure criminal thinking, risk-taking and criminal behavior, and impulsivity. Each scale was presented in blocks and each block was presented in a randomized order for each participant. A Cronbach's Alpha score was calculated to measure internal consistency of our scales, resulting in a high level of internal consistency with the average Cronbach's alpha of all scales (α) = .855.

<u>Risky-Choice Framing Problems</u>

The framing task included 18 risky-choice problems, counterbalanced for whether the sure option was presented on the left or right across participants. In this experiment, participants were tasked with choosing between a sure option and a gamble option (i.e., the risky option). Both options in every decision problem had equal expected values to determine thinking preference patterns, including expected preference shifts. Each problem was a factorial combination of a level of Frame, Risk, and Reward. There were 2 frames (a gain frame and a

loss frame); 3 levels of risk (i.e., low, medium, and high); and 3 levels of reward (i.e., small, intermediate, and large). The three levels of risk are set at probable chances of the risky option occurring in the gamble of an outcome (i.e., low=0.4, medium=0.6, high=0.8). And the three levels of reward are set at low (small), medium (intermediate), and high (large); the amount is dependent on the problem and level of risk involved as determined by calculating equal expected values for each level. An example of a small reward gain frame problem (i.e., Gain, Small Reward, Low Risk) involved a 100% chance of gaining an ostensible $5 endowment in the sure option, or the 60% possibility of gaining $10 or $0 in the gamble option, each with an expected value (EV) of 5, which is consistent across both sure and gamble options. The loss frame problems are mathematically identical, save for a varying endowment amount given at the beginning of each problem and the chances are against them (or they face a large chance loss in the gamble frame or a smaller sure loss in the sure frame).

In an example of large reward in a high-risk loss frame (i.e., Loss, Large Reward, High Risk), a participant was given an endowment of $720 at the beginning of the problem. The participant then chose between the sure option (100% chance) of losing $576, and the gamble option (0.8 or 80% of losing all, and 0.2 or 20% chance of losing nothing) with the possibilities of losing either $720 or $0 (see Appendix A for a full description of all stimuli).

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Decision Response

Decision responses were recorded for each individual risky-choice framing problem using E-Prime 2.0 survey software.

Adolescent Risk-Taking Questionnaire (ARQ)

Participants completed the Adolescent Risk-Taking Questionnaire (ARQ) to assess risk-taking from self-reported risky behaviors they have participated in. The questionnaire includes 22 items separated into four subscales: 1) thrill-seeking behaviors (e.g., parachuting, roller blading); 2) rebellious behaviors (e.g., drinking, smoking, using illegal drugs); 3) reckless behaviors (e.g., drinking and driving, racing, having unprotected sex); and 4) antisocial behaviors (e.g., cheating, teasing people) (Gullone, Moore, Moss, & Boyd, 2002). The response format is in the form of a 5-point Likert scale from never done to done very often (i.e., never do, hardly ever do, do sometimes, do often, do very often). Total scores for risk-taking behavior were calculated by summing each subscale for each participant (*Min* = 0, *Max* = 88).

Barratt Impulsiveness Scale (BIS-11)

The Barratt Impulsiveness Scale (BIS-11; Patton, Stanford, & Barratt, 1995) is a self-report questionnaire designed to assess the personality and behavioral construct of impulsiveness. The scale has been used reliably in research for over 50 years and is currently in its 11th revision (Barratt, 1959; Patton et al., 1995). The 30-item questionnaire describes common impulsive

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behaviors and preferences as well as accounting for non-impulsive behaviors (indicated by reverse-scoring) reported on a 4-point Likert scale ranging from rarely/never to almost always/always (i.e., rarely/never, occasionally, often, almost always/always) and separated into three subscales: 1) attentional impulsiveness (e.g., "I have racing thoughts," "I squirm at plays or lectures"); 2) motor impulsiveness (e.g., "I do things without thinking," "I act on the spur of the moment"); and 3) nonplanning impulsiveness (e.g., "I plan tasks carefully," "I am more interested in the present than the future") (Patton et al., 1995). A total impulsivity score was calculated by summing the subscales for each participant, including reverse-scored items properly calculated for each subscale as instructed by Patton and colleagues (1995) (Min = 30, Max = 120).

TCU Criminal Thinking Scales (CTS)

The TCU Criminal Thinking Scales (CTS) is a 36-item scale intended to measure self-reported thinking patterns related to Entitlement, Justification, Personal Irresponsibility, Power Orientation, Cold Heartedness, and Criminal Rationalization. Entitlement (EN), at its core, conveys a sense of ownership and privilege. Individuals who score high on the EN scale believe that they deserve special consideration and that the world owes them (Knight, Garner, Simpson, Morey, & Flynn, 2006). Justification (JU) reflects a thinking pattern characterized by the offender's minimizing the seriousness of antisocial acts and justifying those actions based on external circumstances (Knight et al., 2006). Individuals

who score high on this scale portray their antisocial acts as permissible due to perceived social injustice (Knight et al., 2006). Personal Irresponsibility (PI) assesses the degree to which an individual is willing to take ownership for their actions, particularly criminal actions (Knight et al., 2006). High scores suggest an individual's unwillingness to accept responsibility for their actions and are associated with the individual blaming others for their behavior (Knight et al., 2006). Power Orientation (PO) measures a need for power and control (Knight et al., 2006). Offenders who score high on the PO scale typically show an outward display of aggression to control their external environment, and they try to achieve a sense of power by manipulating others. Cold Heartedness (CH) addresses callousness toward others, and high scores on this scale indicate lack of emotional depth in personal relationships (Knight et al., 2006). Lastly, Criminal Rationalization (CN) assesses negative viewpoints about the law and authority figures (Knight et al., 2006). High scores on the CN scale reflect that the individual believes their actions are no different than criminal acts authority figures commit on a regular basis (Knight et al., 2006). Each scale was adapted for use in our college-aged non-incarcerated population. For example, questions that asked about the crime the perpetrator committed in the original study were changed to speculative ("if you were to commit a crime…"). The response format for the CTS is reported on a 5-point Likert scale from disagree strongly to agree strongly (i.e., disagree strongly, disagree, uncertain, agree, agree strongly). A

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total CTS score was calculated by summing each scale, including reverse-coded items on the CH and CN scales as indicated by Knight and colleagues (2006) (*Min* = 36, *Max* = 180).

Procedure

After reading and signing a consent form, all participants completed the framing decision task, where they were shown 18 framing problems complete with equal amounts of gain ($n = 9$) and loss ($n = 9$) frames in random order using E-Prime 2.0 software. Each participant was randomly assigned to see all choices with the sure option on the left ($n = 50$) or sure option on the right ($n = 51$) for counterbalancing. Participants assessed their own risky behavior by completing the Adolescent Risk-taking Questionnaire (ARQ). Participants also completed the TCU Criminal Thinking Scales (CTS), a self-report assessment for thinking patterns associated with incarcerated criminals and adapted for use with a non-criminal college-aged population, and the Barratt Impulsiveness Scale (BIS-11) in order to account for impulsive decision-making, or lack of inhibition, in participants' answers. Scales were presented in blocks and each block was presented in random order using Qualtrics survey software for each participant. Before finalizing, participants completed a brief survey to capture demographic information about our sample.

Results

Framing Choice

First, a repeated-measures analysis of variance was performed to examine differences in choice across our participants, examining the influences of frame, risk, and reward. Overall, each of the 101 participants completed 18 problems (n_{total} = 909 gain frames; n_{total} =909 loss frames). A framing task score was created by subtracting the proportion of times the participant chose the gamble option in the loss frame from the proportion of times the participant chose the gamble in the gain frame, with negative scores indicating standard framing and positive scores indicating reverse framing.
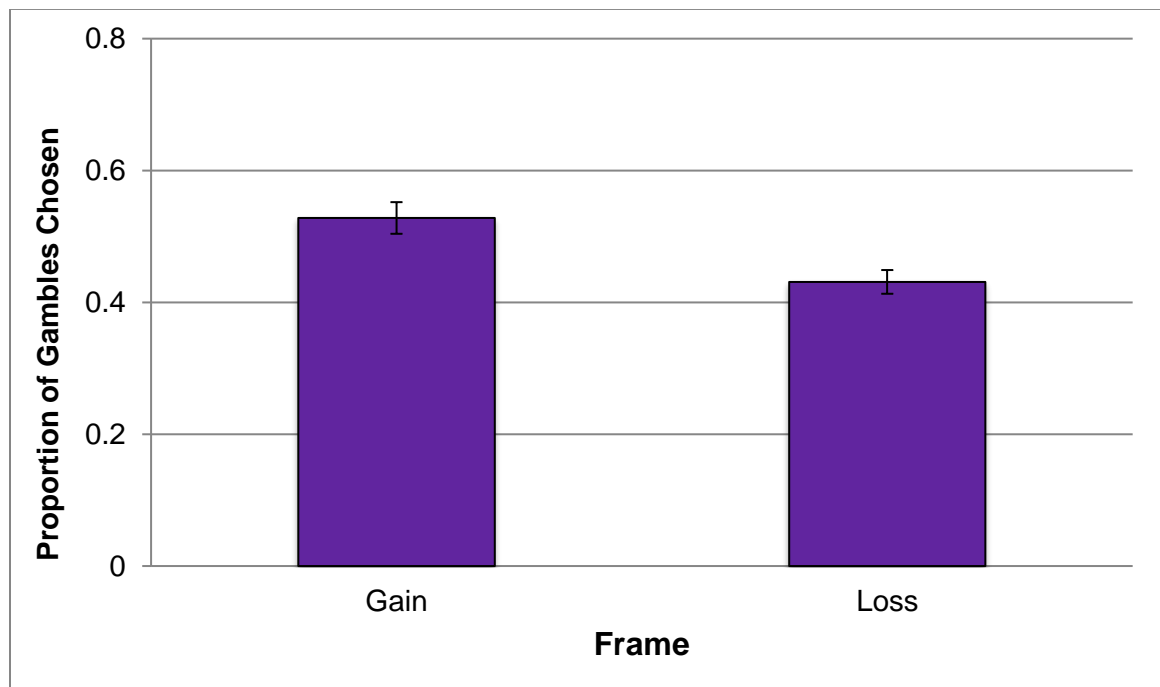
Figure 1. Mean proportion of times gamble chosen and standard deviations based on participant choice in gain and loss frames. Error bars (95% CI) indicated +/- range of one standard deviation.

Mauchly's test indicated that the assumption of sphericity was not met for reward, $\chi^2(2) = 9.56$, $p = .008$ or risk, $\chi^2(2) = 12.94$, $p = .002$. To correct against violations of sphericity, we reported Greenhouse-Geisser values for those variables ($\varepsilon = .916$; $\varepsilon = .891$). A statistically significant effect of framing on choice was found in our sample $F(1, 100) = 4.260$, $p = .004$, $\eta p^2 = .080$. A reverse framing pattern was found to emerge overall in that participants chose the gamble option more often in the gain frame than the loss frame ($M_{gain} = .528$, *SD* = .024; $M_{loss} = .431$, *SD* = .025, see figure 1).

Figure 2. Mean risk scores and standard deviations based on gamble choice across frames. Error bars (95% CI) indicated +/- range of one standard deviation.

The results show there was a significant effect of risk on taking the gamble, $F(1.78, 178.2) = 17.103$, $p = .000$, $\eta p^2 = .274$. Participants chose the gamble less as risk increased from a low level of risk ($M=.612$, $SD = .024$) to medium risk ($M=.444$, $SD = .029$) to high risk ($M=.383$, $SD = .026$) (see figure 2). This suggests that participants were sensitive to and avoidant of risk, but only if the risk was large enough (i.e., greater than 50/50).
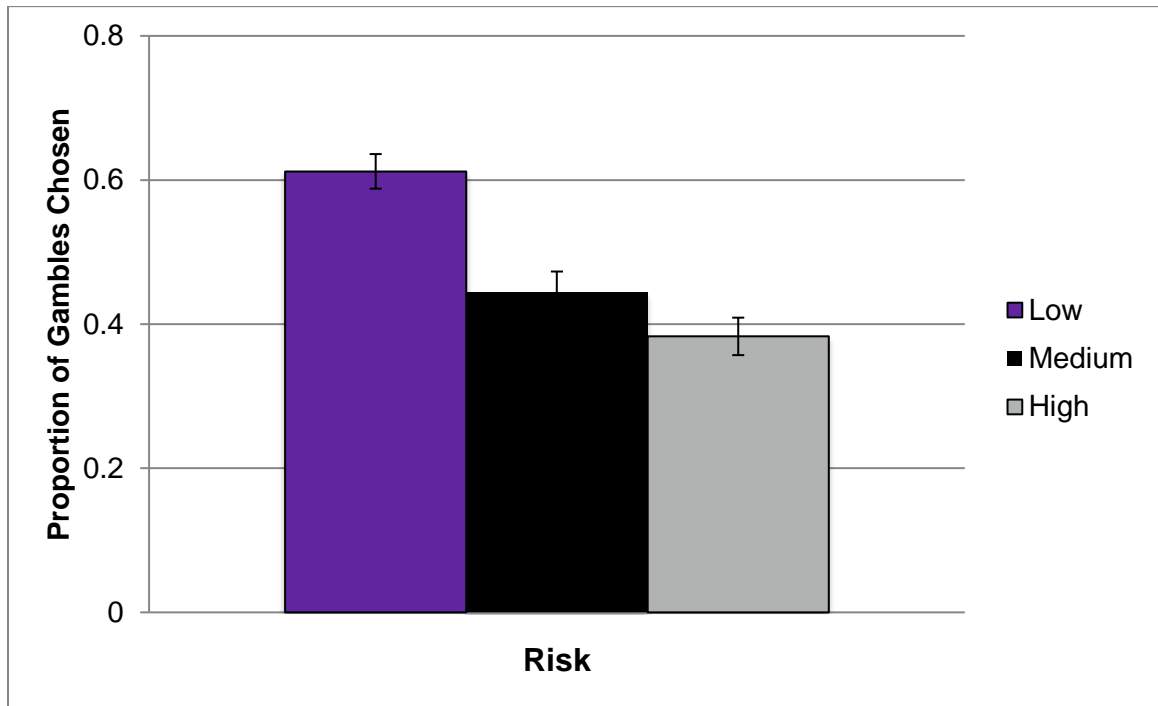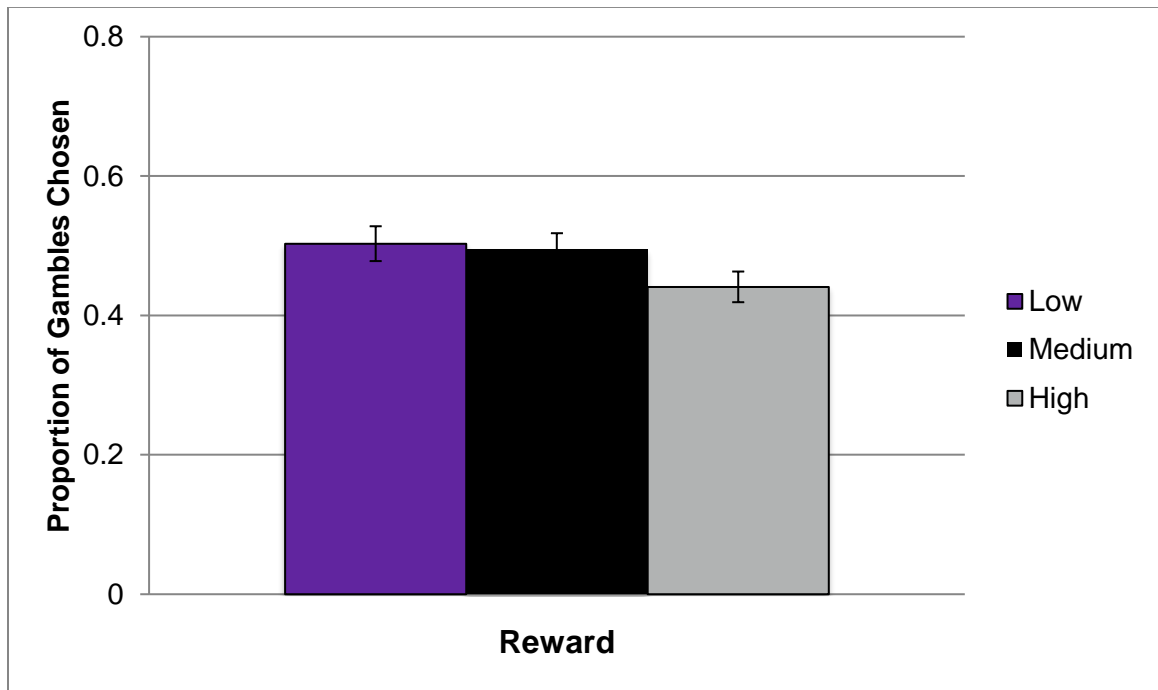

Figure 3. Mean reward scores and standard deviations based on gamble choice across frames. Error bars (95% CI) indicated +/- range of one standard deviation.

A significant effect of reward on taking the gamble was also found, $F(183.3, 183.1) = 1.407$, $p = .037$, $\eta p^2 = .057$. Participants chose the gamble less

often in the high reward condition (M =.441, SD = .022) versus the medium (M =.495, SD = .023) or low reward conditions (M =.503, SD = .025). This effect could be driven by an increase in appeal as the sure option becomes larger. However, the effect could also be driven by avoidance of the large loss in the gamble option. The current study cannot parse out which process is governing responses. Given no interactions were found, these effects drove choice independent of each other.

Framing Effects, Impulsivity, and Risk-Taking

A multiple regression was conducted to analyze the predictive influence framing scores and impulsivity had on risk-taking (M = -2.82, SD = 0.98). The results of the regression indicated the two predictors were moderately predictive of risk-taking (R^2 = .053, $F(2, 98)$ = 2.742, p = .069, see table 1). Consistent with previous research, it was found that impulsivity was predictive of risky behaviors in our sample (β = .23, [.025, 347], p = .024) but not overall framing scores, (β = -.034, [-.626, .442], p = .733).

Framing and Impulsivity Regression Model

Variable	b	Std. Error	β	p	R^2
Model 1					
Framing Score	-.092	.269	-.034	.733	.053
Impulsivity	.186	.081	.226	.024	

Table 1. Regression table describing framing score and impulsivity predictive strength, significance, and explanatory power of model on risk-taking assessment scores.

A second regression was performed and showed that, specifically, motor impulsivity but no other subscale of impulsivity was most predictive of risky behavior ($\beta = .22$, [-.012, .095], $p = .061$; $R^2 = .074$, $F(4, 96) = 1.929$, $p = .061$, see table 2).

Impulsivity Subscales Regression Model

Variable	b	Std. Error	β	p	R^2
Model 1					
Attentional Impulsivity	-.135	.244	-.065	.581	.074
Motor Impulsivity	.469	.242	.223	.056	
Non-planning Impulsivity	.224	.202	.202	.269	

Table 2. Regression table describing impulsivity subscales predictive strength, significance, and explanatory power of model on risk-taking assessment scores.

What Thinking Styles Predict Reverse Framing?

A multiple regression was conducted to analyze what criminal thinking styles might predict framing effects, particularly the reverse framing pattern that emerged in our sample. Framing scores were regressed onto each subscale of criminal thinking styles. Overall, the subscales for criminal thinking styles were not significant predictors for framing scores, $R^2 = .109$, $F(6, 94) = 1.908$, $p = .087$ (see table 3). However, we found that criminal rationalization was significantly

predictive of framing effects (β = .287, [.046, .392] p = .013) and that power orientation was a marginally significant predictor of framing effects (β = -.223, p = .066).

Thinking Styles on Framing Scores Regression Model

Variable	b	Std. Error	β	p	R^2
Model 1					
Entitlement	-.135	.141	-.149	.342	.109
Justification	.091	.140	.096	.517	
Power Orientation	-.166	.089	-.223	.066	
Cold Heartedness	.115	.124	.097	.355	
Criminal Rationalization	.219	.087	.287	.013	
Personal Irresponsibility	-.086	.132	-.087	.517	

Table 3. Regression table describing criminal thinking styles subscales predictive strength, significance, and explanatory power of model on framing task scores.

<u>What Thinking Styles Predict Risk-Taking?</u>

A multiple regression was run to explore if criminal thinking styles predict risk-taking, and if so, what particular subscales might predict risk-taking. An overall criminal thinking score was significantly predictive of risk-taking (β = .257, [.039, .271], p = .010; R^2 = .066, $F(1, 99)$ = 6.986, see table 4).

Thinking Styles Total Regression Model

Variable	b	Std. Error	β	p	R^2
Model 1					
CTS Total	.155	.058	.257	.010	.066

Table 4. Regression table describing criminal thinking style total scores predictive strength, significance, and explanatory power of model on risk-taking assessment scores.

A second multiple regression was conducted to further explore which subsets of the criminal thinking scales were most predictive of risk-taking. The findings indicated that the subscales significantly predicted risk-taking, (R^2 = .123, $F(6, 94)$ = 2.187, p = .051, see table 5). The subscale found justification to be most predictive of risky behavior, ($β$ = .277, [-.038, 1.468], *p* = .063, see table 5).

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Thinking Styles on Risk-Taking Regression Model

Variable	b	Std. Error	β	p	R²
Model 1					
Entitlement	.087	.383	.035	.821	.123
Justification	.715	.379	.277	.063	
Power Orientation	.024	.242	.012	.920	
Cold Heartedness	-.314	.336	-.097	.352	
Criminal Rationalization	.302	.236	.145	.204	
Personal Irresponsibility	-.165	.356	-.062	.645	

Table 5. Regression table describing criminal thinking subscales predictive strength, significance, and explanatory power of model on risk-taking assessment scores.

Discussion

<u>Framing Choice</u>

A statistically significant effect of framing on choice was found in our sample. However, inconsistent with previous research, a reverse framing pattern was found to emerge overall in that participants chose the gamble (risky) option more often in the gain frame than in the loss frame. Notably, a follow-up analysis showed that participants chose the gamble option more often in the sure right condition where they saw the gamble option first. This suggests a potential serial positioning bias in our sample, a phenomenon that affects attentional processes dependent on script direction (Bettinsoli, Maass, & Suitner, 2019). We did not exclusively see standard framing choices in the sure left condition. However, there was an increase in reverse framing present when the gamble option was on the left. This counter-normative result may be due to the proposed serial positioning bias, which warrants further exploration. Consistent with previous research, there was a significant effect of risk on taking the gamble in that the choice of gamble decreased as risk increased across frames. There was also a significant effect of reward on choice. Given that these main effects emerged independent of interactions suggests that choice of the gamble can be driven by individuals focusing on the reward or focusing on the risk, but our participants tended not to be influenced by the combination of items. This is inconsistent with rational choice theory, which states that decision makers use all information

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available in their choice (Tversky & Kahneman, 1986). In addition, the result is not fully in support of fuzzy-trace theory, in that previous reports have found standard framing using a similar task (Reyna & Brainerd, 1991; Reyna & Ellis, 1994); however, using less information to arrive at a decision is at the core of fuzzy-trace theory, so the results are partially consistent with fuzzy-trace theory.

Framing Effects, Impulsivity, and Risk-Taking

Since impulsivity is not a part of the underlying thinking styles suggested in fuzzy-trace theory but an impetus to taking risk, we expected impulsivity to be positively related to choosing a gamble, i.e. taking risks, but not to the framing score. The results suggest that participants' framing score was not a good predictor of risk-taking. However, impulsivity, especially motor impulsivity, was found to be predictive of risk-taking. This result might be explained in combination with previously suggested serial positioning bias (Bettinsoli et al., 2018). In other words, when participants saw something they liked first (i.e., higher reward on the left), they were drawn to choose that option more often as impulsivity increased. This result is consistent with previous research showing that impulsivity is a strong predictor of risk-taking (Zuckerman, 1979).

What Thinking Style Predicts Reverse Framing?

Based on the implications of fuzzy-trace theory and framing effects, we planned to observe that young adults who prefer verbatim processing would also be more likely to take risks, including criminal risks. Although the tendency to

rationalize was related to the tendency to reverse frame in choice, framing scores were not predictive of risk-taking. However, we found that criminal rationalization was significantly predictive of framing effects, as fuzzy-trace theory would suggest. We originally predicted that justification would be predictive of reverse framing as a verbatim-related measure of criminal thinking styles, but results did not support that hypothesis. Instead, the power orientation subscale was found to be moderately predictive of reverse framing effects. There is not a clear understanding of this relationship between power orientation and framing scores. It is possible that these results are reflective of the lack of criminal activity and phrasing in the power orientation items. Statements for power orientation involve the concept of control and are not necessarily related to crime or court proceedings like most of the other criminal thinking subscales. This would not activate gist-related biases (i.e., avoiding associations with criminal labels or criminal risks) as much for our non-criminal sample, possibly driving the results observed between power orientation and reverse framing. Overall, the individual subscales for criminal thinking styles were not significant predictors for framing scores.

<u>What Thinking Styles Predict Risk-Taking?</u>

Our results indicated an overall criminal thinking score was predictive of risk-taking behavior. We proposed that the criminal rationalization and justification subscales of the CTS are related to verbatim-processing, as fuzzy-

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trace theory would suggest (Reyna et al., 2018). The findings indicated that a small portion of variance can be explained by the subscales and that the subscales overall significantly predicted risk-taking. Justification was moderately predictive of risk-taking, indicating those who use external circumstances as justification for antisocial acts are more likely to take risks (Knight et al., 2006). Therefore, it is not clear which specific criminal thinking styles might strongly predict risk-taking. Nevertheless, our results suggest there is a pattern to risk-taking when taking multiple facets of criminal thinking into account.

<u>Implications</u>

Consistent with previous research, our study found that there were significant differences among groups due to experimental conditions of frame, risk, and reward levels. In order to further understand what existing attributes influenced the decision-makers' choice to take risk, we explored relationships between framing scores and risky behaviors, impulsivity, and criminal thinking styles. Although framing scores could not predict any of our participants' existing attributes, some attributes were predictive of framing effects. Impulsivity was significantly predictive of risk-taking, particularly, motor impulsivity.

We expected criminal rationalization to predictive of framing effects and in particular, reverse framing. This expectation was supported by our results, indicating that the existing thinking style is likely related to verbatim-processing when choosing to take risks in a framing task. We did not find the expectation

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that justification was predictive of reverse framing. Instead, we found that power orientation was moderately predictive of reverse framing. As explained before, we believe this may be due to the phrasing in these control-related questions, which would not bring forth gist representation biases about criminals and criminal risk when participants were answering those questions in the risk-taking survey. This may have driven the relationship between power orientation and reverse framing.

Finally, we explored what thinking styles are related to risk-taking and found that, overall, scores on the criminal thinking scales were predictive of risk-taking. This supports previous findings by Knight and colleagues (2006). Contrary to our initial hypothesis, there was not a particular thinking style associated with predicting risk-taking. We predict that may have not been the case in a sample with greater risk-score variability.

Limitations

A large limitation of this study includes non-diverse demographics in our sample, including age-restriction and predominant sex and race representations. The participants were largely reflective of the population at SFA: the age-range was rather wide, but over half of our participants were between 19-20 years of age; only 21 males were represented in our sample of 101; and over half of our sample identified as White or European American. It is possible that range restriction in either verbatim/gist variation, a known developmental effect, or in

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criminal thinking or risky behavior, both known to be greater for males than females, may have limited our ability to detect differences (Byrnes, Miller, & Schafer, 1999). For example, the total score one can obtain on the Adolescent Risk-taking Questionnaire is 88, while the mean scores for our sample were 43.6 (SD = 8.1), with many scores even lower than that (Min = 28, Max = 69). Of note, our sample was college students and not convicted criminals in a prison population. It is possible that although young adults are likely to take risks, many college students do not engage in a large volume of criminal activity. We believe that the relationships we expected to see between risk-taking and our other variables would be present in a more diverse sample.

Future Directions

As stated briefly in the discussion, future studies should explore where participants are looking first and what items they fixate on when participating in a framing choice task. This might rule out or further support the idea that serial positioning biases have a role in risky-decision making in framing tasks. Further, criminal rationalization was predictive of reverse framing in our sample. These items reflect subjectively negative views of justice and systematic issues, and our sample largely reflected those views in conjunction with using more reverse framing processes in decision making. This relationship should be explored further to add to our understanding of how criminal rationalization predicts reverse framing. A final suggestion is that future studies can look at the concept

of locus of control in relation to criminal thinking styles and fuzzy-trace theory. This may further explain how criminal rationalization is predictive of reverse framing, how justification is predictive of risk-taking, or why people choose the gamble option in framing tasks. For example, an internal locus of control may reflect more gist-based processing, indicating protective relationships between risk-perceptions and risk-taking, while an external locus of control may reflect verbatim processing, suggesting a positive relationship between risk-perception and risk-taking.

<u>Conclusion</u>

In conclusion, results indicate that individuals did not take into consideration multiple factors when deciding to take a gamble or not but focused on either factors risk or reward, as no interaction between risk and reward was found. In support of previous findings, impulsivity was largely predictive of risk-taking but not predictive of framing effects (Reyna & Brainerd, 2011; Zuckerman, 1979). Moreover, motor impulsivity was specifically predictive of risk-taking. Criminal rationalization and power orientation were found to be significantly predictive of reverse framing, indicating these subscales may be most related to verbatim-processing in risky decisions. Overall higher scores on the CTS, measuring the tendency to endorse items found to be related to criminal behavior, were predictive of more general risk-taking, suggesting that analyzing criminal behavior as a form of risk-taking is warranted. In understanding the

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precursors to criminal behavior, including how risk is conceptualized, processed, and values, more effective interventions centered around known relations of patterns of thinking to risk can aid in reduction of criminal activity. Further, understanding how risk perceptions may develop towards more protective as opposed to more reflective will further aid the effectiveness of interventions.

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APPENDIX A

Risky-Choice Framing Problems

GAIN FRAME

Option	Risk	0.4	0.6	0.8
	Small Outcomes	EV = 12		
Sure		12	12	12
Gamble		20,0	30,0	60,0
	Intermediate Outcomes	EV = 36		
Sure		36	36	36
Gamble		60,0	90,0	180,0
	Large Outcomes	EV = 144		
Sure		144	144	144
Gamble		240,0	360,0	720,0

LOSS FRAME

Option	Risk	0.4	0.6	0.8
	Small Outcomes	EV = 12		
	Endowment	20	30	60
Sure		-8	-18	-48
Gamble		-20,0	-30,0	-60,0
	Intermediate Outcomes	EV = 36		
	Endowment	60	90	180
Sure		-24	-54	-144
Gamble		-60,0	-90,0	-180,0
	Large Outcomes	EV = 144		
	Endowment	240	360	720
Sure		-96	-216	-576
Gamble		-240,0	-360,0	-720,0

APPENDIX B

Adolescent Risk-taking Questionnaire (ARQ)

DIRECTIONS
Below is written a list of behaviors some people engage in. Read each one carefully and select the box in front of the word that best describes your behavior.
There are no right or wrong answers.

	Never Done	Hardly Ever Done	Done Sometimes	Done Often	Done Very Often
1. Smoking	☐	☐	☐	☐	☐
2. Roller blading	☐	☐	☐	☐	☐
3. Drinking and driving	☐	☐	☐	☐	☐
4. Parachuting	☐	☐	☐	☐	☐
5. Speeding	☐	☐	☐	☐	☐
6. Stealing cars and going for joy rides	☐	☐	☐	☐	☐
7. Tao Kwon Do fighting		☐	☐	☐	☐
8. Underage drinking	☐	☐	☐	☐	☐
9. Staying out late	☐	☐	☐	☐	☐
10. Driving without a license	☐	☐	☐	☐	☐
11. Talking to strangers	☐	☐	☐	☐	☐
12. Flying a plane	☐	☐	☐	☐	☐
13. Cheating	☐	☐	☐	☐	☐
14. Getting drunk	☐	☐	☐	☐	☐
15. Sniffing gas or glue	☐	☐	☐	☐	☐
16. Having unprotected sex	☐	☐	☐	☐	☐
17. Leaving school	☐	☐	☐	☐	☐
18. Teasing and picking on people	☐	☐	☐	☐	☐
19. Snow skiing	☐	☐	☐	☐	☐
20. Taking drugs	☐	☐	☐	☐	☐
21. Overeating	☐	☐	☐	☐	☐
22. Entering a competition	☐	☐	☐	☐	☐

Barratt Impulsiveness Scale (BIS-11)

DIRECTIONS: People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and put an X on the appropriate circle on the right side of this page. Do not spend too much time on any statement. Answer quickly and honestly.

	Rarely/Never	Occasionally	Often	Almost Always/Always
1. I plan tasks carefully.	☐	☐	☐	☐
2. I do things without thinking.	☐	☐	☐	☐
3. I make-up my mind quickly.	☐	☐	☐	☐
4. I am happy-go-lucky.	☐	☐	☐	☐
5. I don't "pay attention."	☐	☐	☐	☐
6. I have "racing" thoughts.	☐	☐	☐	☐
7. I plan trips well ahead of time.	☐	☐	☐	☐
8. I am self-controlled.	☐	☐	☐	☐
9. I concentrate easily.	☐	☐	☐	☐
10. I save regularly.	☐	☐	☐	☐
11. I "squirm" at plays or lectures.	☐	☐	☐	☐
12. I am a careful thinker.	☐	☐	☐	☐
13. I plan for job security.	☐	☐	☐	☐
14. I say things without thinking.	☐	☐	☐	☐
15. I like to think about complex problems.	☐	☐	☐	☐
16. I change jobs.	☐	☐	☐	☐
17. I act "on impulse."	☐	☐	☐	☐
18. I get easily bored when solving thought problems.	☐	☐	☐	☐
19. I act on the spur of the moment.	☐	☐	☐	☐
20. I am a steady thinker.	☐	☐	☐	☐
21. I change residences.	☐	☐	☐	☐
22. I buy things on impulse.	☐	☐	☐	☐
23. I can only think about one thing at a time	☐	☐	☐	☐
24. I change hobbies.	☐	☐	☐	☐
25. I spend or charge more than I earn.	☐	☐	☐	☐
26. I often have extraneous thoughts when thinking.	☐	☐	☐	☐
27. I am more interested in the present than the future.	☐	☐	☐	☐

28. I am restless at the theater or during lectures.	☐	☐	☐	☐
29. I like puzzles.	☐	☐	☐	☐
30. I am future oriented.	☐	☐	☐	☐

APPENDIX D

TCU Criminal Thinking Scales

TCU CTSFORM

Disagree Strongly (1)	Disagree (2)	Uncertain (3)	Agree (4)	Agree Strongly (5)

Please indicate how much you AGREE or DISAGREE with each statement.

1. You get upset when you hear about someone who has lost everything in a natural disaster. .... ○ ○ ○ ○ ○

2. You got in trouble because you had a run of bad luck. .... ○ ○ ○ ○ ○

3. The real reason you get in trouble is because of your race. .... ○ ○ ○ ○ ○

4. When people tell you what to do, you become aggressive. .... ○ ○ ○ ○ ○

5. Anything can be fixed in court if you have the right connections. .... ○ ○ ○ ○ ○

6. Seeing someone cry makes you sad. .... ○ ○ ○ ○ ○

7. You rationalize your actions with statements like "Everyone else is doing it, so why shouldn't I?" .... ○ ○ ○ ○ ○

8. Bankers, lawyers, and politicians get away with breaking the law every day. ..... ○ ○ ○ ○ ○

9. You have paid your dues in life and are justified in taking what you want. .... ○ ○ ○ ○ ○

10. When not in control of a situation, you feel the need to exert power over others. .... ○ ○ ○ ○ ○

11. When being asked about the motives for engaging in illegal activity, you point out how hard your life has been. .... ○ ○ ○ ○ ○

12. You are sometimes so moved by an experience that you feel emotions you cannot describe. .... ○ ○ ○ ○ ○

13. You argue with others over relatively trivial matters. .... ○ ○ ○ ○ ○

14. If someone disrespects you then you have to straighten them out, even if you have to get physical. .... ○ ○ ○ ○ ○

15. You like to be in control. .... ○ ○ ○ ○ ○

16. You find yourself blaming those affected by your illegal behavior. .... ○ ○ ○ ○ ○

17. You feel people are important to you. .... ○ ○ ○ ○ ○

18. This country's justice system was designed to treat everyone equally. .... ○ ○ ○ ○ ○

19. Police do worse things than do the "criminals" they lock up. .... ○ ○ ○ ○ ○

20. You think you have to pay back people who mess with you. .... ○ ○ ○ ○ ○

21. Nothing you do here is going to make a difference in the way you are treated. ...... ○ ○ ○ ○ ○

22. You feel you are above the law. .... ○ ○ ○ ○ ○

23. It is okay to do illegal things in order to pay for the things you need. .... ○ ○ ○ ○ ○

24. Society owes you a better life. .... ○ ○ ○ ○ ○

25. Breaking the law is no big deal as long as you do not physically harm someone. . ○ ○ ○ ○ ○

26. You find yourself blaming society and external circumstances for the problems in your life. .... ○ ○ ○ ○ ○

27. You worry when a friend is having problems. .... O   O   O   O   O

28. The only way to protect yourself is to be ready to fight. .... O   O   O   O   O

29. You are not to blame for everything you have done. .... O   O   O   O   O

30. It is unfair that you suffer the consequences when bankers, lawyers, and politicians get away with their crimes. .... O   O   O   O   O

31. Laws are just a way to keep poor people down. .... O   O   O   O   O

32. Your good behavior should allow you to be irresponsible sometimes. .... O   O   O   O   O

33. It is okay to commit crime in order to live the life you deserve. .... O   O   O   O   O

34. Prosecutors often tell witnesses to lie in court. .... O   O   O   O   O

35. You justify the illegal things you do by telling yourself that if you had not done it, someone else would have. .... O   O   O   O   O

36. You may be a law-breaker, but your environment made you that way. .... O   O   O   O   O

VITAE

After completing her work at Zavalla High School in Zavalla, Texas in 2012, Adrienne Machann went on to study psychology at Stephen F. Austin State University in Nacogdoches, Texas. She earned her Bachelor of Arts in Psychology in May 2017. Adrienne then went on to study further at Stephen F. Austin State University in August 2017 where she received her Master of Arts in Psychology in May 2019. During her two years of graduate school at Stephen F. Austin State University, Adrienne was employed as a graduate assistant at the Center for Career and Professional Development.

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