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Does Emotion-Regulation Moderate Ostracism and Risk-taking?

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DOES EMOTION-REGULATION MODERATE OSTRACISM AND RISK-TAKING?

by

SERENA K. MURPHY

(Under the Direction of Ty Boyer)

ABSTRACT

Ostracism, feeling excluded or ignored, has been associated with increased risk-taking behavior on a number of self-report and lab-based measures (Buelow & Wirth, 2017; Duclos, Wan, & Jiang, 2012; Falk et al., 2014; Svetieva et al. 2016). Anger mediates the relationship between ostracism and risk-taking (Svetieva et al., 2016), and it is possible that emotion-regulation strategies to reduce anger may minimize this relationship. However, research has yet to test if emotion-regulation strategies can reduce affective responses following ostracism. The purpose of the current study is to examine the effects of ostracism via Cyberball and emotion-regulation strategies on risk-taking behavior using the Columbia Card Task (CCT), an objective risk-taking measure. It was predicted that participants in the ostracism condition would uniquely vary on risk-taking based on social condition (included vs. ostracism), emotion-regulation instructions (reappraisal vs. no instructions), and CCT version (Hot vs. Cold). Sixty-five participants were assigned to one of eight conditions in which they were instructed to either reappraise or given no instructions to regulate their emotional responses, were either socially included or ostracized, and then completed the affective (Hot) version of the CCT or the deliberative (Cold) version of the CCT. Although we found that ostracized participants self-reported greater feelings of anger compared to socially included participants, we found no difference between social conditions or emotion-regulation conditions for risk-taking. However, given the limited sample size and

several indicators suggesting the Cold CCT was not an effective measure of risk-taking in the current study, these results should be interpreted with caution. Research should continue to explore the relationship between ostracism and anger on affective and deliberative risk-taking.

INDEX WORDS*:* Risk-taking, Ostracism, Columbia Card Task, Cognitive reappraisal

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INTRODUCTION

Risk-Taking

Risk-taking, or any behavior that can produce negative outcomes (Boyer, 2006), can have serious consequences on individuals and communities. Adolescence and young adulthood are periods in which individuals are presented with new responsibilities and opportunities to take risks such as learning to drive, exploring romantic relationships, and making financial decisions. According to Safer America, on average over 3,000 people die per day from car accidents worldwide, making car accidents the primary cause of death for teens and young adults (Beltz, 2018).

Although there are positive forms of risk-taking (e.g., pursuing college, asking someone on a date, moving into your own apartment) which promote personal growth and independence, it is important to explore the factors that affect risk-taking behavior to minimize negative forms of it such as reckless driving, excessive drinking, gambling, sexual promiscuity, and illicit drug use. Adolescence and young adulthood are also sensitive times to peer influence and social exclusion, which could worsen negative risk-taking behaviors (Blakemore & Mills, 2014).

The Need to Belong

Humans are innately social, and we possess a strong need to form stable, long-lasting relationships. These relationships are crucial for survival and facilitate physical and psychological functioning (Baumeister, Brewer, Tice, & Twenge, 2007). Baumeister and Leary (1995) argue that our need to belong is so fundamental to human existence, it is as important as meeting our basic needs including food, water, and shelter. When individuals feel excluded,

either physically or psychologically separated from others, a number of negative psychological and physiological consequences ensue (Buelow, Okdie, Brunell, & Trost, 2015).

Negative Consequences of Ostracism

Wesselmann and Williams (2017) argue that there are two primary categories of social exclusion: social rejection and ostracism. They argue while references to rejection and ostracism are often used interchangeably that these terms represent distinct experiences of social exclusion and may differentially affect psychological outcomes. Social rejection, a direct experience of social exclusion, is characterized by experiences of being devalued through derogatory comments, stigmatization, microaggressions, and similar experiences. Ostracism, an *indirect* experience of social exclusion, is characterized by feelings of being ignored and excluded while in the presence of someone else (e.g., no eye contact, being avoided, not being considered for a decision). Indeed, social rejection, a more severe experience than ostracism, results in emotional numbing, whereas ostracism results in hypersensitivity and emotional distress (Bernstein & Claypool, 2012a; Bernstein & Claypool, 2012b).

Williams (2009) suggests there are three stages to experiencing ostracism. In the Reflexive stage, people first experience negative psychological and physical consequences (e.g., increased pain, negative affect, violation of fundamental needs, distorted cognitive processes) in response to ostracism. During the Reflective stage, people attempt to utilize various cognitive (appraisal), coping, and behavioral strategies to recover from the pain of ostracism (Hartgerink, Van Beest, Wicherts, & Williams, 2015). For instance, people may attempt to understand why they were ostracized (Wesselmann & Williams, 2017). If ostracism occurs over a prolonged amount of time, people enter stage three, the Resignation stage, in which they experience

feelings of isolation, depression, worthlessness, and that life is meaningless (Riva, Montali, Wirth, Curioni, & Williams, 2017).

Ostracism has been associated with increased negative affect, reduction in working memory, poorer executive functioning, and a violation of fundamental needs including the need to belong, self-esteem, sense of control, and meaningful existence (Buelow, Okdie, Brunell, & Trost, 2015; Baumeister, Twenge, & Nuss, 2002). Few studies have examined the long-term effects of ostracism on fundamental needs, but Buelow et al. (2015) found that the threats to fundamental needs continued into the second stage of ostracism, the Reflective stage. Additionally, while some research suggests that social exclusion via social rejection (e.g., future alone, not being chosen by a group) may lead to emotional numbness (Twenge, Catanese, & Baumeister, 2003), ostracism has been linked with heightened negative arousal and an increase in anger and sadness (Gerber & Wheeler, 2009; Svetieva et al., 2016).

The pain and psychological outcomes of ostracism can be found in a relatively subtle and common manipulation of ostracism, a task referred to as Cyberball. During Cyberball, a participant believes he or she is playing a virtual ball-tossing game with several other players. The participant chooses whom to throw the ball by clicking an avatar representing the other player. Unbeknownst to them, the task is pre-programmed to either exclude or include the participant. In the ostracism condition, the participant only receives the ball in the first few rounds, whereas participants in the inclusion condition receive the ball one-third of the time (Williams, Cheung, & Choi, 2000). A similar task called Atimia has been used to manipulate ostracism (Buelow & Wirth, 2017; Wirth, Turchan, Zimmerman, & Bernstein, 2014). For Atimia, participants are informed they are completing a virtual online typing game with two other players that are computer-programmed. Specifically, the player types a letter or

punctuation mark and then chooses which player will play next. Like Cyberball, participants in the ostracism condition are selected only a few times by the other players at the beginning, and included participants are selected one-third of the time.

When individuals feel that they have been rejected for someone else (a comparative rejection), they report greater negative affect compared to a non-comparative rejection that is experienced or imagined, and if the situation is ambiguous, individuals often assume that they were rejected for someone else (Deri & Zitek, 2017). The fundamental need to belong, threatened more by a comparative rejection, mediated the relationship between rejection type and negative affect (Deri & Zitek, 2017). Given that participants are informed that they are playing with two or three other players for Cyberball, the task may induce social pain and negative affect because the participant believes he or she is being excluded for another player, experiencing a comparative rejection.

Negative psychological consequences occur not only when participants believe they are playing against other people, but also when participants are informed that they are playing against a computer. The threat to four fundamental psychological needs (i.e., belonging, self-esteem, control, and meaningful existence) are also self-reported when participants are told that they are playing against a computer, which is pre-programmed to only pass them the ball a certain proportion of times (Zadro, Williams, & Richardson, 2004). Van Beest and Williams (2006) found that even when it was monetarily advantageous to be ostracized and disadvantageous to be included, the experience of ostracism in Cyberball was perceived as painful. Furthermore, ostracism is experienced as painful regardless of individual differences in personality (McDonald & Donnellan, 2012). However, personality may affect coping responses to ostracism as Ren, Wesselmann and William (2016) found individuals who are higher on

introversion are more likely to socially isolate themselves after being ostracized than individuals lower on introversion (i.e., higher on extraversion). Thus, our reactions to ostracism, at least in part, appear to be driven by automatic processes, which could be explained by our evolutionary dependence on others to survive and reproduce.

It is necessary for psychological well-being that people form stable, long-lasting relationships (Baumeister, Brewer, Tice, & Twenge, 2007). This need to belong and connect with others is so strong that when social inclusion and belongingness are temporarily threatened, even when people are told the experience of ostracism is due to a mechanized response, it can be incredibly painful and result in negative psychological and physiological consequences, which can have powerful effects on decision-making.

Ostracism and Risk-taking

Given the many ill effects of ostracism, it is not surprising that ostracism influences decision-making processes and has been associated with increased risk-taking. Ostracism has been linked with increased risk-taking on various lab-based tasks such as probability tasks, gambling and other financial risk-taking tasks, and driving simulations and has been found when participants are tested individually and in group settings (Buelow & Wirth, 2017; Duclos, Wan, & Jiang, 2012; Falk et al., 2014)

Several mechanisms could explain the link between ostracism and risk-taking. First, emotions may affect decision-making, and emotional responses ensuing after an experience of ostracism could affect information processing and alter risk-taking behavior. Additionally, people may be highly motivated to become reintegrated with the group or achieve a renewed sense of belonging following ostracism, so individuals may be especially motivated to take risks in the presence of others. However, risk-taking behavior is dependent on many factors such as

the type of risk (e.g., health, financial, sexual), whether the task evokes affective decision making or deliberate processing, age, sensitivity to peer influence, gender, available cognitive resources, and other contextual factors.

One of the most ubiquitous opportunities to take risks lies in the realm of financial decision-making. The relationship between ostracism and greater risk-taking has been supported in this domain, though the reason for this relationship is unclear. Duclos, Wan, and Jiang (2012) consistently found that socially excluded individuals preferred the financially riskier options than socially included individuals (e.g., lotteries, retirement, investments) across five studies and multiple manipulations of ostracism. The effect of ostracism on risk-taking was found when tested immediately in the lab and retroactively, based on self-reported financial decisions, providing support that this relationship exists throughout all of William's proposed stages of ostracism. This relationship between ostracism and financial risk-taking could be explained by changes in affect from ostracism that alter decision making, reliance on spending as a coping strategy for ostracism, or individuals seeking greater financial gain to reassert status in the social group.

Then, to what extent, does ostracism affect decision-making, and does this relationship extend to other risk-taking domains? Kahneman (2011) argues there are the following two types of processes in decision-making: Type 1 processes which are automatic, guided by emotions, and often disadvantageous and Type II processes which are controlled, guided by reason, and often yield advantageous results. Importantly, tasks developed to assess risk-taking in the lab often differ in their reliance on Type I and Type II processes.

Buelow and Wirth (2017) examined how ostracism could affect performance on risk-taking tasks differing in Type I and Type II decision-making processes. In Study 1, the

researchers explored the effect of ostracism via Cyberball on Type 1 processes using the Balloon Analog Risk Task (BART). In the BART, participants play a computerized game in which they decide how many times to press a key to inflate a virtual balloon. The bigger the balloon gets, the more points the participant receives, but if the balloon pops, the participant does not receive any points. This task relies on Type 1 processes because the balloon is programmed to explode randomly, making it impossible to calculate the probability that the balloon will explode. Because of the uncertainty associated with the risk, participants must rely on affective responses or "gut feelings" when engaging in this risk task. There was no effect of ostracism on the BART, an affective risk-taking measure under uncertainty. Ostracized participants compared to included participants reported lower scores on the fundamental needs scale and greater feelings of burdensomeness; however, there were no difference in negative affect. The lack of an affective response could explain why there was no effect of ostracism on this risk-taking task. Alternatively, participants may have had discrete affective reactions (e.g., anger) that were not captured by the general negative affect index used. In the second study, Buelow and Wirth (2017) utilized a similar ostracism task called Atimia to manipulate ostracism. After completing the Atimia task, the participants completed the BART (Type 1) and the Game of Dice Task (GDT, Type II). In contrast with the BART, participants choose between riskier and safer bets for the GDT. This task is thought to rely on Type II decision-making processes, in which decisions are deliberate and calculated, because participants can predict different combinations of die being rolled and each bet is independent of the previous choice. Buelow and Wirth (2017) found that ostracism, manipulated with the Atimia task affected performance on the Game of Dice Task (Type II). For Atimia, ostracized participants, compared to included participants, also self-reported higher negative affect, feelings of burdensomeness, and lower satisfaction on the

fundamental needs scale. Together, these findings indicate that ostracism may have a stronger effect on Type II processes than Type I processes. The possible difference of ostracism on Type 1 and Type II processes may be because Type II processes recruit more or different cognitive resources than Type I processes.

Much of decision-making in everyday life involves a combination of Type I and Type II processes, so the generalizability of some lab risk-taking tasks may be limited. Risk-taking manipulations that may be more typical or reflective of daily risk-taking behavior include simulated driving tasks. The effects of ostracism on risk-taking during driving simulations have been found for both adolescents and adults. Falk et al. (2014) examined the neurological underpinnings of ostracism on risky driving. Participants played Cyberball while in an fMRI scanner and returned a week later to complete a simulated driving task in the presence of a confederate that either endorsed or did not endorse risk. The driving task was rigged so that the stoplights would turn yellow, and risk-taking was measured as the proportion of the time spent at the intersection when the light was red during the game. Greater activity in brain regions associated with mentalizing (e.g., Anterior Insula + subACC) and social-affective (e.g., DMPFC + rTPJ + PCC) processes during Cyberball predicted risky driving during the presence of a peer, beyond baseline driving measures and confederate risk-attitude. This indicates that peer presence affects risk-taking behavior and that emotional reactions to ostracism may drive this relationship. In contrast to Buelow and Wirth (2017), the findings on risky driving show that ostracism may impact automatic, gut-level Type I processes as well and applies to situations in which the amount of risk involved is uncertain or cannot be calculated.

Moreover, emotional reactions to ostracism can influence risk-taking behaviors in other ways. Negative emotions ensue after ostracism, which can produce hypersensitivity, especially if

the individual is sensitive to peer influence, and result in even greater negative affect. In a similar neuroimaging study utilizing Cyberball and the Stoplight task, Peake et al. (2013) found that participants who performed poorly driving in the presence of peers *after* being ostracized showed increased activation in the ACC and IPFC, areas related to emotional distress and emotion-regulation. Thus, negative emotions from ostracism may be further exacerbated by an increased concern regarding others' judgments when performance suffers. Adolescents may be particularly sensitive to how they perform in the presence of others after being ostracized and these emotional reactions may affect driving behaviors, having dire consequences.

Furthermore, the effects of ostracism on risky driving continue into adulthood. Svetieva and colleagues (2016) sought to identify specific mediating factors between ostracism and risk-taking behavior in young adults. They predicted that anger (an approach-oriented emotion), but not sadness or need for control, would mediate the relationship between ostracism and risk-taking. In Study 1, participants played Cyberball and then completed self-report measures on anger and the Evaluation of Risks Questionnaire (EVAR). They found that anger, but not need for control, mediated ostracism and self-reported risk-taking propensity. In Study 2, participants completed the Cyberball task and then played a driving simulation video game. It was found that anger, not sadness, mediated the relationship between ostracism and increased risk-taking during this driving simulation. Importantly, this is the first study to differentiate between the effects of anger and sadness on risk-taking, whereas other studies have either not measured anger or only analyzed generalized negative affect rather than discrete emotions. Thus, it may be that anger resulting from ostracism, rather than general negative affect, impacts risk-taking behaviors.

Emotions and Risk-taking

Several theoretical frameworks exist regarding how emotions impact decision-making

such as the Appraisal Tendency Framework (ATF, Learner and Keltner, 2000), the Affect Infusion Model (AIM, Forgas, 1995), and the Broaden-and-Build theory (Fredrickson, 2004). These theories postulate that affective states differentially influence cognitive processes. Because the Broaden-and-Build theory focuses solely on the effects of positive emotions, it is less pertinent to the affective consequences of ostracism on decision-making. The Affect Infusion Model (AIM) has been used to investigate risk-taking behavior; however, it focuses on the general effects of mood for decision-making, and such research has been mixed (Angie, Connelly, Waples, & Kligyte, 2011). Thus, researchers began to isolate the different effects of discrete emotions on risk-taking. Negative emotions such as anger, anxiety, fear, sadness, and disgust have been associated with different risk-taking behaviors.

The Appraisal Tendency Framework (ATF) is a particularly strong theoretical framework because it accounts for how different negative emotions can impact decision-making. According to this framework, emotions have specific cognitive characteristics associated with them that guide behaviors, or action tendencies. For ATF, discrete emotions are associated with different risk-taking outcomes as a function of the appraisal that accompanies it. According to the ATF, negative emotions (e.g., anger and sadness) can have different outcomes on decision-making, whereas emotions differing in valence (e.g., anger and happiness) can have similar outcomes. Specific emotions are associated with different feelings of control and certainty for future events. For instance, anger is associated with appraisals of high certainty and control, whereas fear is associated with appraisals of low certainty and control (Learner & Keltner, 2000). Thus, when someone experiences anger, he or she is likely to perceive future events as predictable and controllable, creating a low perception of risk. In contrast, someone who experiences fear is likely to perceive future events as unpredictable and uncontrollable, perceiving risk as high.

Anger and happiness, both associated with high appraisals of certainty produce heuristic processing, in which participants rely on emotional cues from previous decisions. Sadness and fear, associated with feelings of unpredictability and lack of control, indicating the possibility of a risky situation, yield more systematic processing to ensure that all risks are evaluated.

In line with the ATF, a meta-analysis revealed that anger is associated with increased risk-taking (Angie, Connelly, Waples, & Kligyte, 2011). However, the effects of anger on risk-taking are context-dependent, dependent on the type of task. Lab-based behavioral measures of risk-taking differ in terms of task uncertainty and deliberative risk-taking and affective and non-affective components. For instance, the BART involves uncertainty as participants do not know at what point the balloon will pop. Importantly, this uncertainty is inherent in the task and is distinct from appraisals of certainty associated with specific emotions. Examples of deliberative risk-taking involve tasks with calculable risk probabilities such as the Game of Dice Task, common lottery tasks, and the Columbia Card Task (Schiebener & Brand, 2015). The Columbia Card Task is a particularly strong behavioral risk-taking measure as it provides greater insight into what information is used for decision-making including gain, loss, and probability (Figner, Mackinlay, Wilkening, & Weber, 2009).

In the Columbia Card Task (CCT), participants see a virtual array of cards, lying face down, and are instructed that the cards include gain cards, for which they can earn points, and loss cards, which end the trial. Participants can select the number of cards to flip over to win points based on the number of loss cards (probability), points earned for each card (gain) and points lost for a bad card (loss). Risk-taking is measured based on the number of cards chosen to flip over (i.e., the more cards a participant flips, the riskier the participant is scored). Moreover, the Columbia Card Task has been developed to assess risk-taking in tasks that involve affective

(hot, heuristic processing) and non-affective (cold, systematic) processing (Figner et al., 2009). In the Hot CCT, participants are able to flip over individual cards, receiving feedback if each card is a loss or gain card. In the Cold CCT, participants select the number of cards for each trial but are not provided feedback regarding the outcome of the decision (i.e., they do not receive a score at the end of the trial). Generally, people tend to be riskier on the Hot CCT than on the Cold CCT (Figner et al., 2009).

Baumann and DeSteno (2012) sought to further illuminate the paradoxical effects of anger on deliberative risk-taking using the CCT. Although anger is associated with increased risk-taking, it is also associated with increased estimates that negative events will occur (perceiving risk as high). Based on the Conceptual Act Model, they proposed that anger would decrease risk-taking on the Hot CCT, as participants rely more on the affective components of anger in which anger is used as an "informational cue" that risk is high, and would decrease risk-taking on the Cold CCT as participants rely more on the conceptual components of anger (appraising control and certainty as high). Supporting this prediction, Baumann and DeSteno (2012) found that participants who had written about an experience that had made them feel angry for four minutes were riskier on the Cold CCT than participants that wrote about a typical day. In contrast, angry participants were less risky on the Hot CCT than their neutral counterparts. Angry participants were still riskier on the Hot CCT than the Cold CCT, replicating the findings of Figner et al. (2009), such that riskiness was in the following order based on condition and task: neutral – Hot CCT (riskiest) > Angry – Hot CCT > Angry – Cold CCT > and Neutral – Cold CCT (least risky). Thus, it appears that anger may have opposing effects on deliberative risk-taking, depending on the context of the risk-taking task. However, this diverges

slightly from the Appraisal Tendency Framework, has only been tested once, and the researchers used only four trials of the CCT rather than the 24 round version now commonly used.

As we have discussed, ostracism increases negative affect, specifically anger and sadness. It was found that anger, not sadness, mediated the relationship between ostracism and greater risk-taking on a driving simulation. Specific emotions, not affective valence, have distinct effects on information processing and risk-taking behavior as supported by the Appraisal Tendency Framework. Anger is often associated with increased risk-taking, but these effects are dependent on the type of risk-taking being assessed. Moreover, considering the stages of ostracism, it is likely that people employ emotion-regulation strategies to reduce negative feelings, particularly during the second stage of ostracism, the Reflective stage, which could affect risk-taking behavior. Indeed, emotion-regulation success for anger may moderate the relationship between ostracism and risk-taking behaviors.

Emotion-Regulation Strategies

Emotion-regulation is broadly defined as our ability to control and maintain which emotions we experience and when and how we experience those (Gross, 2002). Emotion-regulation can be automatic or intentional. There are a number of emotion-regulation strategies that vary in temporal relation to the emotion experienced. According to the process model of emotion-regulation, emotion strategies are antecedent-focused, occurring before the emotion is fully experienced physiologically and psychologically, or response-focused, occurring after the emotion-response tendency (Gross, 2002). To regulate emotional responses, people can selectively choose situations such as seeking known positive environments and avoiding potentially anxiety inducing situations (e.g., avoiding an event in which someone disliked will be attending). Alternatively, people can modify existing situations (e.g., have a friend join an

uncomfortable social situation to lessen the tension), change attentional focus (e.g., look away from a sad movie scene), cognitively reevaluate the situation (e.g., reassess an event as more positive or negative), or attempt to change emotional responses (e.g., meditate to relieve anxiety).

One emotion-regulation strategy that has been explored in-depth is cognitive reappraisal. Reappraisal is reevaluating the meaning of something that is potentially emotion inducing in a way that does not elicit an emotional response. Reappraisal is considered an antecedent-focused emotion-regulation strategy, meaning that it occurs before an affective response is fully formed. Reappraisal effectively down-regulates (reduces) negative affect and increases positive affect (Gross, 2002; Richards and Gross, 2000). People also differ in habitual uses of reappraisal, and reappraisal is associated with strong psychological well-being (Gross & John, 2003). Therefore, cognitive reappraisal should be a particularly strong emotion-regulation strategy to utilize following ostracism. But to what extent do people utilize emotion-regulation strategies in response to ostracism?

Ostracism and Emotion-Regulation

Emotion-regulation can be automatic, beyond awareness, or deliberative. DeWall et al. (2011) examined automatic emotion-regulation responses in response to ostracism. Some individuals may automatically utilize emotion-regulation strategies in an attempt to reduce the aversive effects of ostracism on mood. They found that, although participants were unaware of the cognitive change, they displayed an increase in positive affect following ostracism, based on the number of positive emotions recalled from childhood and completion of ambiguous word stems. This automatic shift to positive information was found across nine studies but was only found for participants low in depressive symptoms and high self-esteem. Therefore, individuals

that could benefit the most from such an automatic emotion-regulation process likely do not utilize it.

Emotion-regulation strategies are also consciously employed following ostracism. Goodman and Southam-Gerow (2010) found that even relatively young children (7-12 years old) utilize a variety of coping and emotion-regulation strategies in response to social rejection (teasing) and ostracism. Gender may influence the effect of ostracism on cognitive processes as ostracism decreases working memory for girls but not boys (Hawes et al., 2012). Hawes and colleagues suggest that this difference in working memory may occur because girls rely on different emotion-regulation strategies than boys after being ostracized. Additionally, several neurological studies on ostracism suggest that adolescents differ in their ability to effectively regulate negative emotional responses (Masten et al. 2009; Peake et al., 2013). Young adults were less able to effectively regulate emotional responses to social stimuli compared to non-social stimuli, especially if they were more sensitive to rejection (Silvers et al., 2012). Thus, emotion-regulation strategies are used following ostracism, but doing so effectively may be difficult and may differ based on gender, age, and rejection sensitivity.

Emotion-Regulation and Risk-taking

Based on the interactive influence model of emotion and cognition (IIEC), Luo and Yu (2015) suggest that emotion-regulation strategies influence cognitive processes when emotional responses are particularly strong or when cognitive resources are weakened. Therefore, emotion-regulation is likely to play a role in ostracism and risk-taking because ostracism elicits strong affective responses, while reducing cognitive functioning including working memory and executive functioning (Gerber and Wheeler, 2009).

Exploration of habitual emotion-regulation strategies indicates that emotion-regulation may impact decision-making in important ways. Habitual reappraisal, usually considered an effective emotion-regulation strategy, has been associated with increased risk-taking and suppression, often a poor emotion-regulation strategy, has been associated with decreased risk-taking on the Cold CCT (Panno, Lauriola, & Figner, 2013). Similarly, habitual suppression has been linked with less financial riskiness (Li, Sang, & Zhang, 2015). Although the studies are only correlational, this research provides some support that emotion-regulation strategies may affect real world decision-making.

Several studies have investigated the role of emotion-regulation strategies and their effect on decision-making in the lab. Heilman et al. (2010) investigated if emotion-regulation instructions moderate the effect of emotion and risk-taking. The emotions fear and disgust were induced with film clips, and participants were instructed to either reappraise, suppress, or given no instructions to utilize an emotion-regulation strategy. Heilman and colleagues found that reappraisal but not suppression was effective for reducing negative affect (fear or disgust) from watching the film clip. Participants who were instructed to reappraise displayed greater risk-taking on the BART (i.e., more pumps) than participants in the suppression or no instructions condition. Thus, reappraising feelings of fear and disgust (associated with appraisals of low control) effectively down-regulated these negative emotions and reduced the associated risk-aversion.

Guided by the Appraisal Tendency Framework (ATF), Szasz, Hofmann, Heilman, and Curtiss (2016) further examined the effects of emotion-regulation strategies on risk-taking using the BART. Specifically, they induced feelings of sadness or anger (via autobiographical memory) and instructed participants to either reappraise, accept, ruminate, or gave them no

instructions. Based on the ATF, they predicted that anger (linked with appraisals of higher certainty and control) would be associated with increased risk-taking, whereas sadness (linked with appraisals of low certainty and control) would be associated with decreased risk-taking. Given that reappraisal reduces negative affect, they predicted that reappraising anger would decrease risk-taking, whereas reappraising sadness would increase risk-taking relative to the other emotion-regulation strategies employed on the BART. Contrary to their predictions, they found that reappraisal was associated with the greatest risk-taking behavior compared to the other emotion-regulations strategies for both anger and sadness. These findings further support that reappraising negative emotions increases risk-taking (Heilman et al., 2010). Reappraisal may be associated with cognitive processes that independently affect or interact with the effects of emotions on risk-taking. For instance, habitual reappraisal has also been associated with less sensitivity to fluctuations in probability and loss amount (Panno et al., 2013). Thus, it is unclear, and worthy of further exploration, if reappraising negative emotions increases risk-taking, regardless of the specific negative emotion, and if discrete emotions can differentially affect risk-taking as the Appraisal Tendency Framework suggests.

Another explanation that reappraising anger did not decrease risk-taking in the Szasz et al. (2016) study is the risk-taking measure utilized. As discussed previously, risk-taking measures differ on uncertainty or deliberative risk-taking and on their reliance of affective information. The BART measures risk-taking under uncertainty; however, perhaps anger has distinct effects on deliberative risk-taking as measured by the Hot and Cold versions of the Columbia Card Task. This explanation is also supported by the findings of Bulow and Wirth (2017) that ostracism, associated with anger, increased risk-taking on the Game of Dice task (deliberative, Type II) but not on the BART (automatic, Type I process).

The Current Study

Previous research has shown that ostracism increases anger (Svetieva, 2015; Gerber & Wheeler, 2009), which can have diverging effects on deliberative risk-taking, depending if the risk-taking task is affective or non-affective (Baumann & DeSteno, 2012). Past studies that have examined the role of affect in ostracism and risk-taking have focused on general negative affect rather than specific negative emotions (Blackhart et al., 2009; Buelow & Wirth, 2017), which may have obscured the role of discrete negative emotions like anger between ostracism and risk-taking. Additionally, previous research investigating emotion-regulation has predominantly focused on risk-taking under uncertainty, but has consistently found that reappraisal, regardless of negative emotion, is associated with increased risk-taking (Heilman et al. 2010; Panno et al., 2013; Szasas et al., 2016).

Research has yet to test if instructing individuals to use different emotion-regulation strategies could alter the relationship between ostracism and risk-taking. The present study aims to fill this gap by exploring if cognitive reapprasial can effectively down-regulate ostracism-related anger and impact the link between ostracism and risk-taking. In the current study, participants were either socially included or ostracized (via Cyberball), instructed to either reappraise or given no instructions to regulate their emotional responses, and completed either the Hot or Cold CCT.

I have four aims in this study. First, this study aims to extend previous findings on ostracism and risk-taking to affective and non-affective deliberative decision-making. To my knowledge, previous studies of ostracism and risk-taking have not utilized the Columbia Card Task to assess risk-taking behavior. Secondly, this study aims to replicate the effects of ostracism for increasing anger reported by Svetieva et al. (2016). Thirdly, this study will further illuminate

if ostracism-induced anger (associated with high certainty appraisals) has differential effects on the Hot and Cold CCT or if reappraisal will be associated with high risk-taking regardless of task. Lastly, this study will assess if simple emotion-regulation instructions are sufficient to moderate the effects of ostracism on risk-taking.

Predictions:

As discussed, anger has been shown to mediate the effect of ostracism and risk-taking (Svetieva et al., 2016) and has been associated with increased risk-taking on the Cold CCT and decreased risk-taking on the Hot CCT (Baumann & DeSteno, 2012). Additionally, reappraisal has been shown to effectively down-regulate anger.

Hypothesis 1: Based on these findings, I predict that ostracized participants will be riskier than socially included participants on the Cold CCT. Participants instructed to cognitively reappraise ostracism, decreasing feelings of anger, will be less risky than participants given no instructions for ostracism.

Hypothesis 2: Conversely, for the Hot CCT, I predict that ostracized participants will be less risky than socially included participants. Participants who are ostracized and instructed to reappraise ostracism will be riskier than participants given no instructions for ostracism.

CHAPTER 2

METHOD

Participants

Seventy-two participants[1](48 females, 24 males; *M* age =19.43, *SD* age = 1.45), ranging in age from 18 to 25 years old, from Georgia Southern University were assigned to one of eight conditions as a function of arbitrarily assigned participant numbers. Importantly, the researchers who interacted with the participants were unaware of what numbers corresponded with each of the conditions. Thirty-six participants identified as White (50.0%), 25 as Black or African American (34.7 %), and 11 as Multiracial (15.3%). Of these participants, sixty-seven participants (93.0%) identified as Not Hispanic or Latino, 2 participants (2.7%) identified as Hispanic or Latino, and 3 participants (4.2%) opted to not respond. All participants were undergraduate students and were recruited through SONA Systems during the Spring of 2019. The study was advertised on SONA as in-person study on computerized choice tasks. Participants were awarded course credit for completing the study.

Four criteria were determined to eliminate careless responders prior to data analysis. Participants were excluded if they incorrectly answered both catch questions on the PANAS (4 participants), indicated that their data should not be used (2 participants), selected the same number of cards for a string of six rounds (2 participants), or were three standard deviations from the mean number of cards selected (no participants). One participant violated two of the above criteria. These exclusionary criteria eliminated 7 participants from the overall analysis. As seen in Table 1, excluded participants did not systematically belong to any one condition. After

[1] This sample size was used for the purposes of completing this master's thesis. Data collection continued until the desired sample size, approximately 120 participants, was reached for final project completion.

excluded participants were removed, there were 65 participants remaining (46 females, 19 males). Of these participants, there were 34 freshman, 14 sophomores, 12 juniors, and 5 seniors.

Procedure

Upon arrival to the laboratory, the experimenter or a research assistant greeted participants and obtained informed consent. All experimental tasks and questionnaires were completed individually, presented on a computer, and programmed using E-Prime 3.0. Participants were assigned by E-Prime to one of eight conditions as noted above, and the study lasted approximately 15-30 minutes. All research assistants were blind to participant condition. The full procedural outline is available in Appendix A.

After obtaining informed consent, participants were seated at a cubical to complete the experiment. Participants began by putting on headphones and entering their age. Then, participants were simultaneously presented with instructions for the Cyberball task and to either emotionally regulate their responses or given no emotion-regulation instructions. As recommended by Williams and Jarvis (2006), participants were instructed that they were completing a mental visualization task and that their ball-throwing performance did not matter during the Cyberball game. Cyberball and emotion-regulation instructions were presented in text on the computer screen and heard via an audio recording. The experiment was programmed such that participants could not continue until the audio recording finished playing.

Emotion-regulation Instructions. Participants were assigned to either cognitively reappraise their emotions or given no emotion-regulation instructions. Cognitive reappraisal instructions were adapted from Richards and Gross (2000) and appeared on the computer screen prior to completing the Cyberball task. For the cognitive reappraisal condition, participants were

asked to think about the game objectively. Heilman et al. (2010) successfully replicated the effectiveness of these emotion-regulation instructions for fear and disgust.

Specifically, participants assigned to the cognitive reappraisal emotion-regulation strategy received these additional instructions adapted from Richards and Gross (2000): "*In addition, we would like to see how well you can control the way you view things. Therefore, it is very important to us that you try your best to adopt a neutral attitude as you play the game. To do this, we would like for you to play with the detached interest of a medical professional. In other words, as you play the game, try to think about it objectively and analytically rather than as personally, or in any way, emotionally relevant to you. So, as you play the game please try to think about what you are seeing in such a way that you don't feel anything at all."*

Ostracism. After receiving the Cyberball and emotion-regulation instructions, participants either completed the social inclusion or ostracism condition. Ostracism was manipulated based on Cyberball 4.0. Cyberball is a virtual ball tossing game in which participants believe they are throwing a ball back and forth with two other players. For the social inclusion condition, participants received the ball from the pre-programmed players, represented by an avatar, one-third of the time and continued to select whom to throw the ball by pressing a corresponding number on the keyboard. For the ostracism condition, participants were only thrown the ball for the first two passes, but then did not receive the ball the rest of the game (for approximately 30 ball tosses). This task has been used extensively and has been validated by Williams, Cheung, and Choi (2000). Towards the end of the experiment, participants were asked, "Who did you think the players were in the Cyberball game*?"* with "Real People" and "Computer" response options. Fifty-seven of the 65 participants (88%) responded with "Computer."

Anger Measure. Given that previous research suggests that anger induced from ostracism specifically guides risk-taking behavior (Svetieva et al., 2016; Szasz et al., 2016), participants were asked to rate the extent to which they enjoyed playing and felt angry during the Cyberball game from 1 (*Not at all*) to 9 (*Very much so*) immediately following Cyberball, respectively. These questions were adapted from Zadro, Williams, and Richardson (2003). The enjoyment question was not analyzed; however, it was included so that participants did not become suspicious about the purpose of the Cyberball task.

Emotion-regulation Manipulation Check. After completing the enjoyment and anger measures, participants completed three reappraisal items, modified from the State Suppression and Reappraisal Scale (Eglogg, Schmukle, Burns, & Schwedtfeger, 2006) to assess the extent to which participants utilized the instructed emotion-regulation strategy. This scale consists of two 3-item measures for suppression and reappraisal and has shown acceptable internal consistency in previous research (Cronbach's $\alpha \geq 0.73$, Egloff et al., 2006). The original scale was slightly modified for the current study, similarly to the modifications made by Srivastav (2017), which also showed good internal consistency ($\alpha \geq .75$ for each subscale). Participants were asked to indicate to what extent that each item applied to them during Cyberball from 1 (*Not at all*) to 5 (*Extremely*). The three items on the cognitive reappraisal scale appeared in the following order and included: *I tried to see the task as objectively as possible, I viewed the Cyberball as just part of the experiment, and I thought of the task in a way that made me stay calm*. In the current study, we had weak internal reliability for the three reappraisal items (Cronbach's $\alpha = .53$). When removing the second reappraisal item, internal reliability slightly increased (Cronbach's $\alpha = .63$). Reliability analysis were conducted for the Reappraisal scale (first and third item only)

for each emotion-regulation condition (No instruction condition Cronbach's α = .714, Reappraisal condition Cronbach's α = .245).

Columbia Card Task (CCT). Upon completion of the emotion-regulation check questions, participants completed a behavioral measure of risk-taking known as the Columbia Card Task, a virtual card playing game (Figner et al., 2009). The CCT was specifically selected to examine the effects of ostracism on affective processes (Hot CCT) and more deliberative processes (Cold CCT). The Hot CCT is associated with greater electrodermal activity (EDA) than the Cold CCT and baseline EDA levels. Additionally, self-reported decision-strategies supported relatively different decision-making strategies on the Hot and Cold CCT as the Hot CCT was associated with relying on "gut-level" strategies and the Cold CCT was associated with relying more on mathematical strategies (Figner et al., 2009).

For the current study, the CCT was programmed in E-Prime 3.0 based on the most updated and shortened 24 game round version (described in Figner & Weber, 2011; Somerville et al., 2018) rather than the older 54 game round version (Figner et al., 2009). For each trial or round, 32 virtual cards were shown face down. At the top of the screen, participants saw information regarding the number of loss cards (1 or 3), the gain amount (10 or 30), and the loss amount (-250 or -750), which were factorially crossed, yielding eight different combinations, which appeared in three randomized blocks. Risk-taking was determined by the number of cards chosen (i.e., the more cards a participant chose, the riskier the participant was scored). Reliability analyses were conducted on each version of the CCT (Cold CCT Cronbach's α = .815, Hot CCT Cronbach's α = .663)

Participants were assigned to complete the cold or hot version of the Columbia Card Task as a function of their arbitrarily assigned number. In the cold version of the Columbia Card Task,

participants selected a number from 0 to 32 displayed above the array of cards for each of the 24 rounds. After each trial, participants saw a screen that displayed the number of cards they chose, but no feedback was provided about potential points earned. In the hot version of the CCT, designed to evoke affective responses, participants individually selected which card to flip over and immediately received feedback if it was a win or loss card. Each of the 24 rounds began with a score of zero. Unlike the cold version, participants saw a score for each round. If a win card was chosen, the round total was updated accordingly at the top of the screen. Participants could continue to flip over cards until they decided to stop and proceed to the next round or until a loss card was chosen. If a loss card was flipped over, the round was terminated, and the loss amount was subtracted from the round total. A cumulative score was never shown to participants. Instructions used for the CCT can be found in Appendix B (Hot CCT instructions) and Appendix C (Cold CCT instructions).

*Self-Reported Affect Measure***.** After completing either the cold or hot version of the CCT, participants completed the Positive Affect and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) to assess the effect of Cyberball and emotion-regulation instructions on state negative affect. The PANAS includes two 10-item subscales widely utilized to assess general positive and negative affect and has been validated, showing strong internal consistency (Crawford & Henry, 2004) and strong convergent validity (Watson et al., 1988). In the current study, we had strong internal reliability (Cronbach's $\alpha = .87$) for general negative affect.

Participants rated the extent they felt each emotion on a scale from 1 (*Very slightly or not at all*) to 5 (E*xtremely*). A General Negative Affect subscale was determined by summing scores to the following negative emotions: distressed, upset, guilty, scared, hostile, irritable, ashamed,

nervous, jittery, and afraid. To identify careless responders, two catch items were placed within the PANAS measure, indicating that participants should “Press 2” or “Press 5” for that item.

Ostracism Manipulation Check. Next, participants were asked to rate the extent that they felt ignored and the extent that they felt excluded, respectively. Participants were also asked to estimate the percentage of throws they received during the Cyberball task assuming that included participants received the ball about 33% of the time. Participants also reported if they believed the other Cyberball players were real or computer-programmed and if their data should be used.

Demographic information. Lastly, participants completed information regarding their sex, ethnicity, racial identity, and class standing. Age was recorded at the beginning of the experiment, but all other demographic questions were completed at the end of the study.

After completing the study, participants were debriefed regarding the purposes of the study. Participants were also informally asked during the debriefing process the following questions: what did you think about the experiment, did you use any particular strategies for any of the tasks, and what do you think the study is about? No participant fully suspected the key variables being tested in the study. During the debriefing, participants also had the opportunity to be led through a short breathing exercise to mitigate any negative affect that participants may have experienced.

Table 1

The Conditions and Sex of Excluded Participants

Participant ID	Sex	Ostracized?	Emotion-regulation Instructions	CCT Version
114	M	No	Control	Hot CCT
120	F	No	Reappraisal	Cold CCT
126	M	Yes	Reappraisal	Cold
132	F	Yes	Control	Hot
142	M	Yes	Reappraisal	Cold
151	M	Yes	Control	Cold
170	M	No	Control	Hot
Totals	2 F, 4 M	3 Included, 4 Excluded	4 Control, 3 Reappraisal	3 Hot, 4 Cold

Note. Excluded participants did not systematically belong to any of the eight experimental conditions.

CHAPTER 3

RESULTS

Preliminary Analyses

Ostracism Manipulation Check. A two-tailed, independent samples *t*-test was used to determine if participants in the ostracism condition felt significantly more excluded and ignored than those in the social inclusion condition. Self-reported feelings of being excluded and ignored were combined. As expected, participants in the ostracism condition ($M = 3.71$, $SD = 1.14$) self-reported greater feelings of ostracism than participants in the social inclusion condition ($M = 1.97$, $SD = 1.02$), $t(63) = -6.49$, $p < .001$, Cohen's $d = 1.61$.

A two-tailed, independent samples *t*-test was also used to determine if participants in the social inclusion condition estimated receiving the ball a higher percentage of times than participants in the ostracism condition. As expected, participants who were socially included ($M = 27.32\%$, $SD = 11.55\%$) estimated receiving a greater percentage of throws than ostracized participants ($M = 9.16\%$, $SD = 4.95\%$), $t(63) = 8.10$, $p < .001$, Cohen's $d = 2.04$. Taken together, these results suggest that the manipulation of ostracism was effective.

Emotion-regulation Manipulation Check. A two-tailed, independent samples *t*-test was used to determine if participants utilized the cognitive reappraisal instructions. Given the low Cronbach's alpha found for the reappraisal measure, the second reappraisal question was removed, and the first and third reappraisal measures were summed to create a reappraisal composite score, with an overall scale range of 2 to 10. A two-tailed, independent samples *t*-test revealed, as expected, participants in the cognitive reappraisal condition ($M = 7.47$, $SD = 1.27$) self-reported higher scores for reappraisal than participants in the no instruction condition ($M = 6.55$, $SD = 1.86$), $t(63) = -2.33$, $p = .023$, Cohen's $d = 0.58$.

Anger Manipulation Check. A 2 (social condition: inclusion vs. ostracism) x 2 (emotion-regulation instructions: reappraisal vs. no instructions) fully between-subjects ANOVA was conducted to analyze mean differences for self-reported anger, measured on a scale from 1(*Not at all*) to 9 (*Very Much So*). A significant interaction was predicted such that those in the ostracism-no instructions condition would self-report significantly higher anger ratings than those in the ostracism-reappraisal condition and social inclusion conditions. Table 2 provides marginal means and standard deviations for anger based on social condition and emotion-regulation instructions.

There was a significant main effect for social condition $F(1, 61) = 7.55$, $p = .008$, $\eta_p^2 = .110$ such that participants in the ostracism condition self-reported greater feelings of anger ($M = 4.13$, $SD = 2.53$) than those in the social inclusion condition ($M = 2.47$, $SD = 2.26$). Self-reported anger did not differ between those given instructions to cognitively reappraise ($M = 3.25$, $SD = 2.63$) compared to those given no emotion-regulation instructions ($M = 3.27$, $SD = 2.44$), $F(1, 61) < .001$, $p = .995$, $\eta_p^2 = .000$. Finally, I expected a two-way interaction such that cognitive reappraisal instructions would reduce self-reported anger for participants in the ostracism condition. Contrary to this prediction, and as illustrated by Figure 1, self-reported anger did not differ across instruction conditions within social conditions, $F(1, 61) < .001$, $p = .995$, $\eta_p^2 < .001$.

General Negative Affect. A 2 (Social condition: inclusion vs. ostracism) x 2 (Emotion-regulation Instructions: reappraisal vs. no instructions) between-subjects ANOVA was conducted to analyze mean differences on the general negative affect subscale, which ranged from 10 to 50. The purpose of this analysis was to further evaluate the claims of Svetieva et al. (2016) that it is specifically anger, not general negative affect, which changes following ostracism. Because several studies have failed to find a change in self-reported general negative affect following

ostracism (Buelow & Wirth, 2017), it was predicted that there would be no interaction between social condition and emotion-regulation instructions for general negative affect. There was no difference between self-reported negative affect on the PANAS between the ostracism condition (M = 18.48, SD = 6.61) and the social inclusion condition (M = 19.32, SD = 8.55), $F(1, 61) = .21$, $p = .65$, $\eta_p^2 = .003$. There was no difference for self-reported negative affect for participants in the reappraisal condition (M = 17.94, SD = 7.78) and those given no emotion-regulation instructions (M = 19.88, SD = 7.50), $F(1, 61) = 1.06$, $p = .31$, $\eta_p^2 = .017$. Supporting the prediction, participants did not uniquely vary in general negative affect based on social condition and emotion-regulation instructions, $F(1, 61) = .07$, $p = .79$, $\eta_p^2 = .001$.

Primary Analyses

Ostracism, Emotion-regulation, and Risk-Taking. A 2 (Social Condition: inclusion vs. ostracism) x 2 (Emotion-regulation Instructions: reappraisal vs. no instructions) x 2 (CCT version: Hot vs. Cold) between-subjects full factorial ANOVA was conducted on risk-taking. In a neutral affective state, participants are riskier, selecting more cards on average, on the Hot CCT than on the Cold CCT (Figner et al., 2009). Thus, I expected unique changes in the number of cards selected based on social condition, emotion-regulation instructions, and CCT version such that ostracized participants would be riskier than socially included participants on the Cold CCT. Additionally, I predicted that participants instructed to cognitively reappraise ostracism would be less risky than participants given no instructions for ostracism on the Cold CCT. Conversely, for the Hot CCT, I predicted that ostracized participants would be less risky than socially included participants. I predicted that participants who were ostracized and instructed to reappraise would be riskier than participants given no instructions for ostracism. Results did not support the

proposed predictions. Table 3 provides marginal means and standard deviations for risk-taking for social condition, emotion-regulation instructions, and CCT version.

Contrary to previous findings, there was a significant main effect for CCT version $F(1, 57) = 21.36$, $p < .001$, $\eta_p^2 = .273$ such that participants were riskier on the Cold CCT ($M = 13.62$, $SD = 3.93$), selecting a greater number of cards on average, than participants on the Hot CCT ($M = 9.79$, $SD = 2.22$). This indicates that participants diverged in risk-taking behavior based on CCT version as previously reported by Figner et al. (2009). Risk-taking behavior did not significantly differ for participants in the social inclusion condition ($M = 12.10$, $SD = 3.28$) and those in the ostracism condition ($M = 11.20$, $SD = 4.11$) $F(1, 57) = 1.19$, $p = .280$, $\eta_p^2 = .020$. This indicates that ostracism did not affect risk-taking behavior collapsing across versions of the CCT. Risk-taking behavior did not significantly differ for participants in the cognitive reappraisal condition ($M = 11.20$, $SD = 3.66$) and those who received no instructions ($M = 12.13$, $SD = 3.73$), $F(1, 57) = .93$, $p = .340$, $\eta_p^2 = .016$. This indicates that cognitive reappraisal instructions did not change risk-taking behavior. Lastly, I expected that cognitive reappraisal would reduce the effects of ostracism for each version of the CCT. Contrary to this prediction, the three-way social condition x instruction condition x CCT version interaction was not statistically significant, $F(1, 57) = 0.35$, $p = .56$, $\eta_p^2 = .006$, with limited variability between emotion-regulation instruction conditions as a function of social condition and CCT condition, as illustrated by Figure 2.

Ostracism, Emotion-regulation, and Risk-Taking Excluding Loss Trials. A 2 (social condition: inclusion vs. ostracism) x 2 (emotion-regulation instructions: reappraisal vs. no instructions) x 2 (CCT version: Hot vs. Cold) between-subjects full factorial ANOVA was conducted on risk-taking excluding trials in which a loss card was chosen, which only affected

data for the Hot CCT. This analysis was conducted as another indication of risk-taking behavior because participants may have unlucky trials in which they quickly hit a loss card, given the random location of loss cards across trials, which may obscure participants' true risk-taking behaviors. For instance, if a participant hit a loss card after selecting two cards, it would appear that participant was not very risky on that round for the previous analysis, selecting only 2 of 32 cards; however, had the participant been able to continue on that round, he or she may have selected many more cards.

Fifty-nine participants were included for this analysis as six participants selected a loss card on all 24 CCT rounds, and thus could not be included. I predicted a three-way interaction for social condition, emotion-regulation instructions, and CCT version for risk-taking. Results did not support the proposed predictions. Table 4 provides marginal means and standard deviations for risk-taking for social condition, emotion-regulation instructions, and CCT version excluding loss trials. However, this data should be interpreted with caution because eliminating trials in which participants chose a loss card (i.e., kept turning over cards until a loss card was chosen) produced missing data for many of cells of the eight possible win amount, loss amount, and number of loss card combinations. In fact, participants opted to hit "Stop and Move On" for only 25% of the trials. Thus, eliminating trials in which a loss card was selected removed 75% of the trials for the Hot CCT.

The analysis revealed no difference for number of cards selected between the Cold CCT (M =13.62, SD = 3.93) and Hot CCT (M = 12.32, SD = 6.36) when excluding trials in which a loss card was chosen, $F(1, 57) = .59$, $p = .45$, $\eta_p^2 = .011$. This indicates that CCT version did not affect risk-taking behavior when excluding loss trials. Risk-taking behavior did not significantly differ for participants in the social inclusion condition (M = 13.12, SD = 4.56) and those in the

ostracism condition (M = 12.92, SD = 5.82), F(1, 57) = .023, p = .88, η_p^2 = .000. This indicates that ostracism did not affect risk-taking behavior collapsing across versions of the CCT. Risk-taking behavior did not significantly differ for participants in the cognitive reappraisal condition (M = 12.24, SD = 4.51) and those that received no instructions (M = 13.83, SD = 5.76), F(1, 57) = 1.20, p = .28, η_p^2 = .023. This indicates that cognitive reappraisal instructions did not change risk-taking behavior. Lastly, I expected that cognitive reappraisal would reduce the effects of ostracism for each version of the CCT. Contrary to this prediction, there was a statistically non-significant three-way (Social condition x ER instructions x CCT version) interaction F(1, 57) = 0.35, p = .56, η_p^2 = .006, which shows that participants in the cognitive reappraisal condition did not uniquely vary based on social condition or CCT version excluding trials when a loss card was chosen.

Exploratory Analyses

A four-way repeated-measures ANOVA was conducted to better understand how participants used information for gain amount, loss amount, and number of loss cards on each version of the CCT for risk-taking. A 2 (loss amount: 250 vs. 750) x 2 (gain amount: 10 vs. 30) x 2 (number of loss cards: 1 vs. 3) x 2 (CCT version: Hot vs. Cold) mixed factorial ANOVA was conducted for number of cards selected. Table 5 provides marginal means and standard deviations for risk-taking for loss amount, gain amount, number of loss cards, and CCT version.

As noted above, participants chose more cards on average in the Cold CCT (M = 13.61, SD = 9.09) than participants on the Hot CCT (M = 9.79, SD = 7.20), F(1, 63) = 23.58, p < .001, η_p^2 = .272. Additionally, participants chose more cards overall when there was one loss card (M = 13.49, SD = 8.68) than when there were three loss cards (M = 9.85, SD = 7.71), F(1, 63) = 69.52, p < .001, η_p^2 = .525. These main effects were qualified by a statistically significant two-

way interaction between number of loss cards and CCT version $F(1, 63) = 28.81$, $p < .001$, $\eta_p^2 = .314$. Specifically, there was a greater difference between one loss card trials ($M = 12.75$, $SD = 6.82$) and three loss card trials ($M = 6.82$, $SD = 4.84$) in the Hot CCT condition ($p < .001$) than between one loss card trials ($M = 14.26$, $SD = .9.34$) and three loss card trials ($M = 12.97$, $SD = 8.81$) in the Cold CCT condition ($p = 0.41$). This indicates that participants noticed that the number of loss cards were changing and used that information when determining how many cards to choose on the CCT, especially in the Hot CCT version. Table 6 provides marginal means and standard deviations for risk-taking for number of loss cards and CCT version. Although participants chose a greater number of cards overall on the Cold CCT than on the Hot CCT, the effect of number of loss cards was greater for the Hot CCT on risk-taking as can be seen in Figure 3.

There was a non-significant main effect for loss amount $F(1, 63) = .06$, $p = .80$, $\eta_p^2 = .001$ such that participants did not differ on the number of cards selected when the loss amount was 250 ($M = 11.71$, $SD = 8.52$) or 750 ($M = 11.63$, $SD = 8.30$). This indicates that loss amount did not strongly affect participants' risk-taking for either version of the CCT. There was also a non-significant main effect for gain amount $F(1, 63) = .01$, $p = .923$, $\eta_p^2 = .000$ such that participants did not differ on the number of cards selected for a gain of 10 ($M = 11.65$, $SD = 8.52$) or a gain of 30 ($M = 11.69$, $SD = 8.30$). This indicates that gain amount did not strongly influence participants' decisions for how many cards to select in either CCT version.

There was, however, a statistically significant interaction between loss amount and gain amount $F(1, 63) = 4.47$, $p = .039$, $\eta_p^2 = .066$. Specifically, participants chose more cards when the loss was 250 points and there was a win of 30 points ($M = 12.04$, $SD = 8.38$) than when there was a loss of 250 points and a win of 10 points ($M = 11.38$, $SD = 8.65$), and conversely,

participants chose more cards when there was a loss of 750 points with a gain of 10 points (M = 11.92, SD = 11.34) than when there was a loss of 750 points and a gain of 30 points (M = 11.34, SD = 8.21), though pairwise comparisons indicated neither of these differences were statistically significant ($ps \geq .19$). However, given the similarity in all of these mean scores for risk-taking and the number of interactions tested in the four-way ANOVA, this two-way interaction may have occurred by chance and is likely not informative for understanding how participants used gain and loss amount on the CCT. All additional interactions were statistically non-significant, all $F(1, 63) \leq 2.00$, all $p \geq .16$. Given that participants' risk-taking behavior did not differ as a function of gain amount, loss amount, and number of loss cards for the Cold CCT, as shown in Figure 4, and that participants chose more cards on average in the Cold CCT than the Hot CCT, it is likely that the Cold CCT in the current study was not reflective of a deliberative risk-taking task. Instead, it is likely that participants randomly chose numbers for the Cold CCT without regard to the different combinations for loss amount, gain amount, and number of loss cards. For the Hot CCT, it is clear that participants primarily used number of loss cards when selecting the number of cards to turn over, so the Hot CCT may be a better risk-taking measure in the current study.

Table 2

The Means and Standard Deviations of Anger by Social Condition and Emotion-Regulation Instructions

Social Condition	Emotion-regulation Instructions	*M*	*SD*	*N*
Social Inclusion	Control	2.47	1.940	17
	Reappraisal	2.47	2.601	17
	Total	2.47*	2.259	34
Ostracism	Control	4.13	2.680	16
	Reappraisal	4.13	2.446	15
	Total	4.13*	2.526	31
Total	Control	3.27	2.440	33
	Reappraisal	3.25	2.627	32
	Total	3.26	2.514	65

Note. Participants' self-reported anger, measured on a scale from 1 (*Not at all*) to 9 (*Very much so*), was significantly higher in the ostracism condition than in the social inclusion condition.

*$p < .05$, **$p < .01$, ***$p < .001$

Table 3

The Means and Standard Deviations of Risk-taking by Social Condition, Emotion-Regulation Instructions, and CCT version

CCT Version	Social Condition	Emotion-regulation Instructions	*M*	*SD*	*N*
Cold CCT	Social Inclusion	Control	14.30	2.64	9
		Reappraisal	14.17	2.81	8
		Total	14.24	2.64	17
	Ostracism	Control	13.66	5.06	8
		Reappraisal	12.05	5.23	7
		Total	12.91	5.02	15
	Total	Control	14.00	3.85	17
		Reappraisal	13.18	4.11	15
		Total	13.62***	3.93	32
Hot CCT	Social Inclusion	Control	10.44	2.79	8
		Reappraisal	9.54	1.99	9
		Total	9.96	2.37	17
	Ostracism	Control	9.83	2.09	8
		Reappraisal	9.36	2.27	8
		Total	9.60	2.12	16
	Total	Control	10.14	2.40	16
		Reappraisal	9.45	2.06	17
		Total	9.79***	2.22	33
Total	Social Inclusion	Control	12.48	3.29	17
		Reappraisal	11.72	3.33	17
		Total	12.10	3.28	34
	Ostracism	Control	11.75	4.23	16
		Reappraisal	10.61	4.03	15
		Total	11.20	4.11	31
	Total	Control	12.13	3.73	33
		Reappraisal	11.20	3.66	32
		Total	11.67	3.70	65

Note. Participants' mean number of cards selected (0-32 cards for each round) for each of the eight conditions.

*$p < .05$, **$p < .01$, ***$p < .001$

Table 4

The Means and Standard Deviations of Risk-taking by Social Condition, Emotion-Regulation Instructions, and CCT version Excluding Loss Trials

CCT Version	Social Condition	Emotion-regulation Instructions	*M*	*SD*	*N*
Cold CCT	Social Inclusion	Control	14.30	2.64	9
		Reappraisal	14.17	2.81	8
		Total	14.24	2.64	17
	Ostracism	Control	13.66	5.06	8
		Reappraisal	12.05	5.23	7
		Total	12.91	5.02	15
	Total	Control	14.00	3.85	17
		Reappraisal	13.18	4.11	15
		Total	13.62	3.93	32
Hot CCT	Social Inclusion	Control	13.45	8.03	5
		Reappraisal	10.53	4.76	8
		Total	11.65	6.07	13
	Ostracism	Control	13.70	8.48	7
		Reappraisal	12.18	5.11	7
		Total	12.94	6.78	14
	Total	Control	13.59	7.92	12
		Reappraisal	11.30	4.82	15
		Total	12.32	6.36	27
Total	Social Inclusion	Control	14.00	4.93	14
		Reappraisal	12.35	4.22	16
		Total	13.12	4.56	30
	Ostracism	Control	13.68	6.61	15
		Reappraisal	12.11	4.97	14
		Total	12.92	5.82	29
	Total	Control	13.83	5.76	29
		Reappraisal	12.24	4.51	30
		Total	13.02	5.18	59

Note. All comparisons were non-significant, $p > .05$. This represents 25% of the trials as participants continued to select cards until a loss card was encountered for 75% of the trials.

Table 5

The Means and Standard Deviations of Risk-taking by CCT version, Loss amount, Gain Amount, and Number of Loss Cards

CCT Version	Loss Amount	Gain Amount	Number of Loss Cards	*M*	*SD*
Cold CCT	250	10	1	14.25	10.00
			3	12.26	9.02
		30	1	15.30	9.15
			3	13.15	8.80
	750	10	1	13.95	9.52
			3	13.69	8.99
		30	1	13.53	8.68
			3	12.79	8.50
	Cold CCT Total			13.61***	9.09
Hot CCT	250	10	1	12.71	8.27
			3	6.41	4.19
		30	1	12.54	8.15
			3	7.32	4.67
	750	10	1	12.97	7.27
			3	7.19	5.39
		30	1	12.80	8.08
			3	6.34	5.01
	Hot CCT Total			9.79***	7.20

Note. Participants' mean number of cards selected for the parameters of the Hot and Cold CCT.
*$p < .05$, **$p < .01$, ***$p < .001$

Table 6

The Means and Standard Deviation of Risk-taking by CCT version (Cold vs. Hot) and Number of Loss Cards (1 vs. 3 cards)

CCT Version	Number of Loss Cards	*M*	*SD*
Cold CCT	1 LC	14.26***	9.34
	3 LC	12.97***	8.81
	Total	13.61***	9.09
Hot CCT	1 LC	12.75*	6.82
	3 LC	6.82*	4.84
	Total	9.79***	7.20
Total	1 LC	13.49	8.68
	3 LC	9.85	7.71
	Total	11.67	8.41

Note. Participants' mean number of cards selected collapsing across CCT version and the number of loss cards. There was a main effect for CCT version, which was qualified by a statistically significant two-way interaction between loss cards and CCT version, $F(1, 63) = 28.81$, $p < .001$, $\eta_p^2 = .314$.

*$p < .05$, **$p < .01$, ***$p < .001$

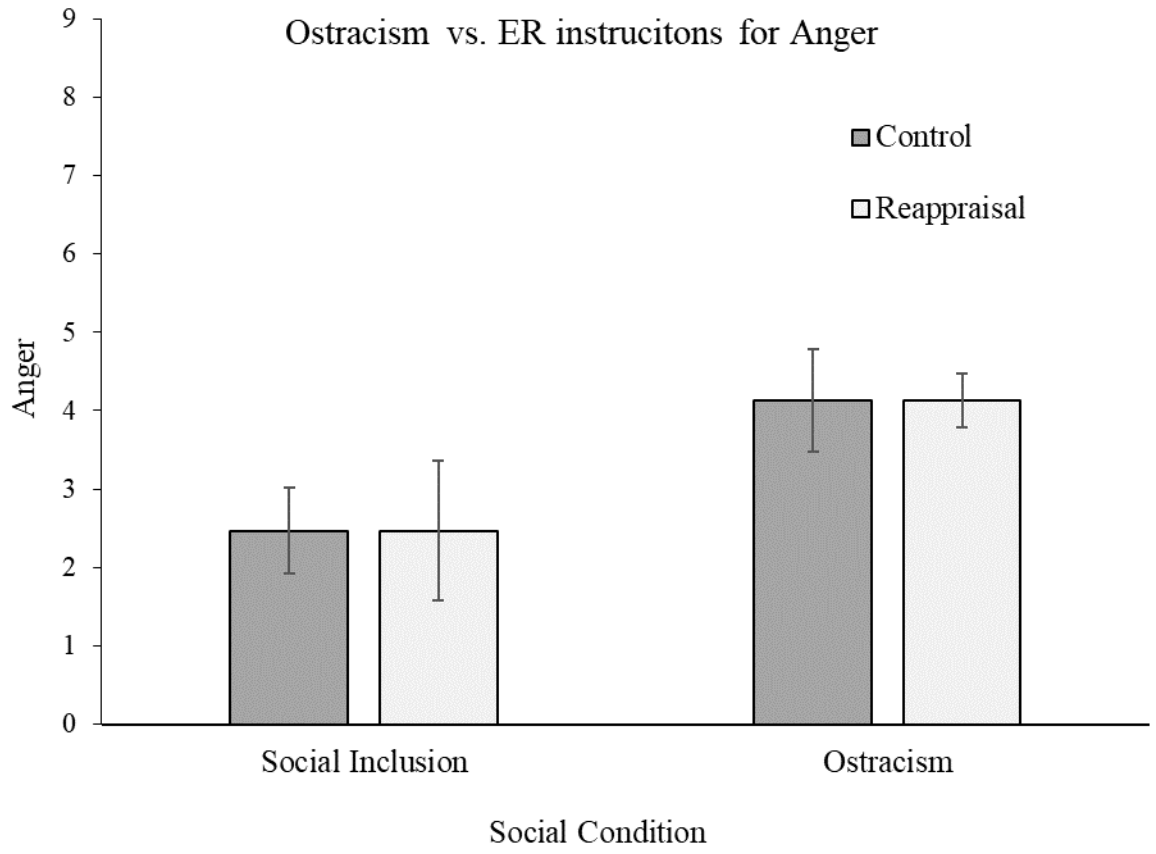

Figure 1. A visual representation of the mean and standard errors for social condition and emotion-regulation condition on self-reported anger. Participants in the ostracism condition self-reported greater feelings of anger than those in the social inclusion condition, $F(1, 61) = 7.55$, $p = .008$, $\eta_p^2 = .110$ Self-reported anger did not differ across instruction conditions within social conditions, $F(1, 61) < .001$, $p = .995$, $\eta_p^2 < .001$

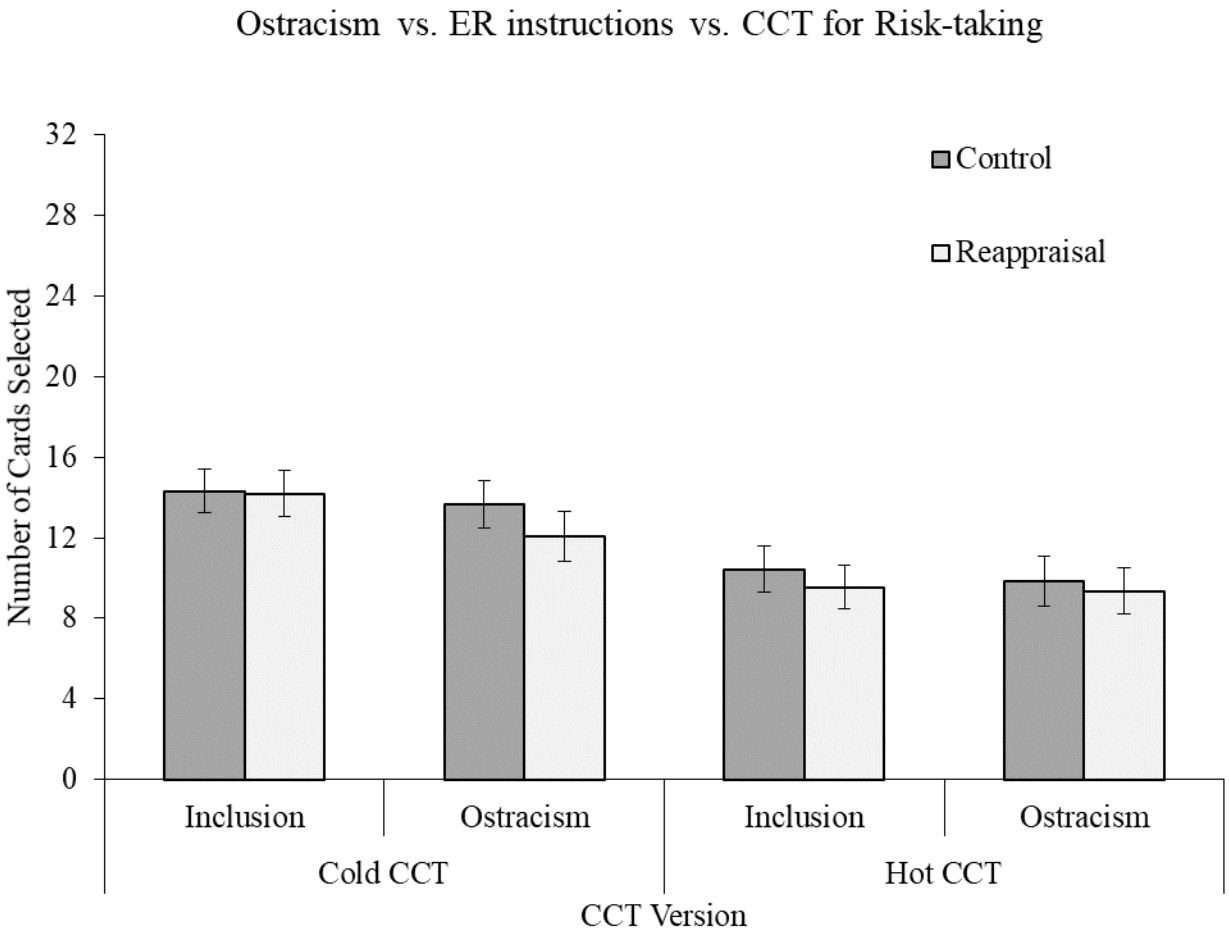

Figure 2. A visual representation of the means and standard errors for social condition, emotion-regulation condition, and CCT version on risk-taking. The predicted three-way interaction was not statistically significant, $F(1, 57) = 0.35$, $p = .56$, $\eta_p^2 = .006$.

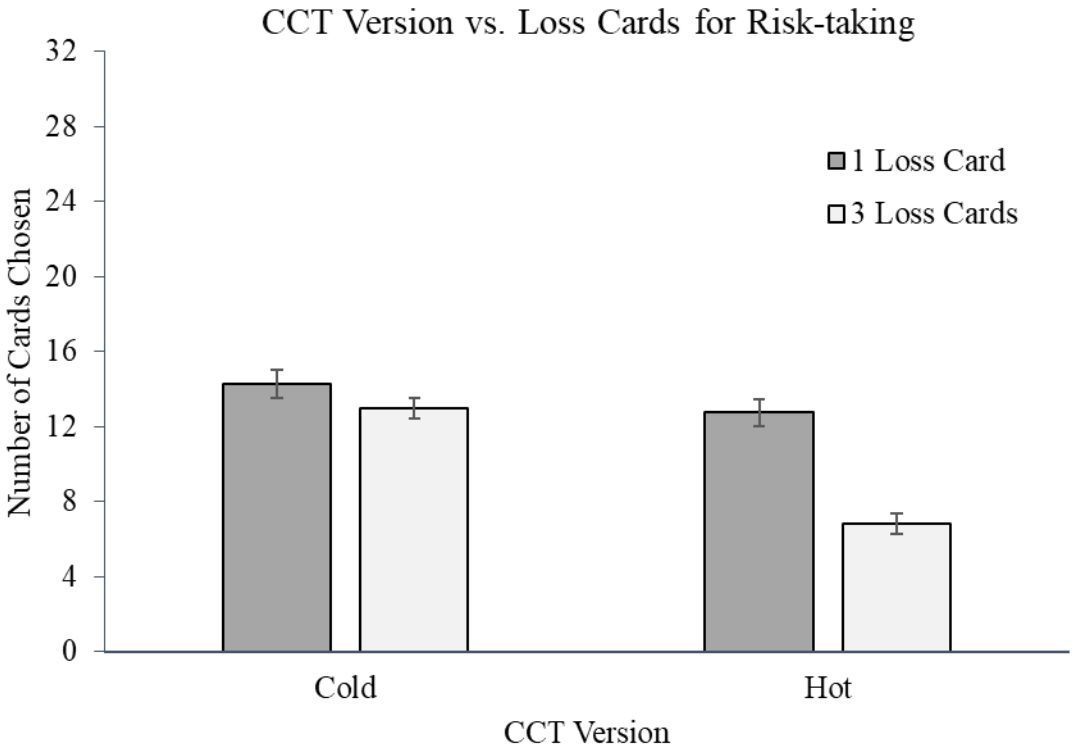

Figure 3. A visual representation of participants' mean number of cards selected and standard errors collapsing across CCT version and the number of loss cards. There was a main effect for CCT version, which was qualified by a statistically significant two-way interaction between loss cards and CCT version, $F(1, 63) = 28.81$, $p < .001$, $\eta_p^2 = .314$.

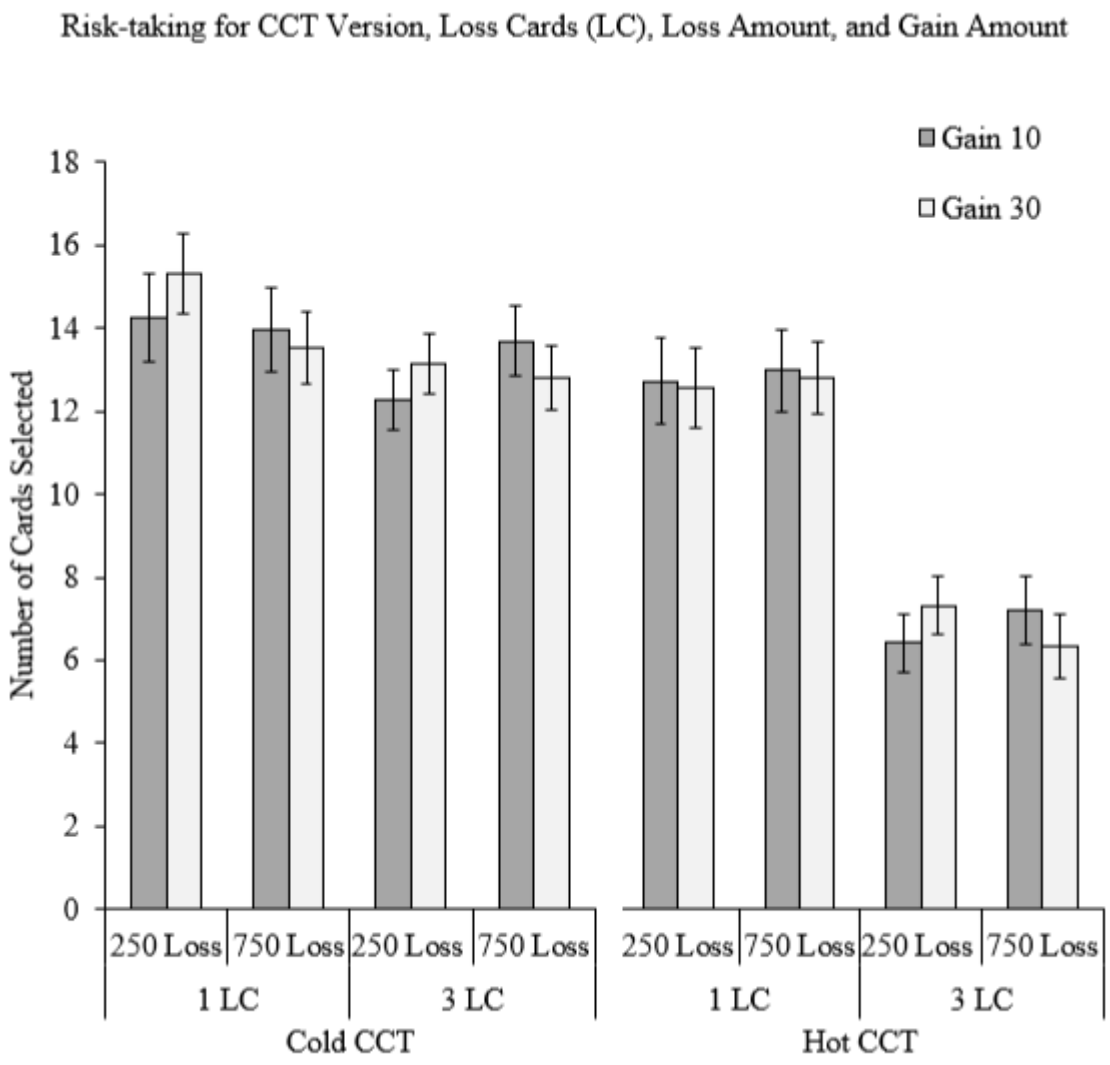

Figure 4. Participants' mean number of cards selected (0-32 cards for each round) and standard errors for each of the parameters of the Hot and Cold CCT. There was a main effect for CCT version, which was qualified by a two-way interaction between loss cards and CCT version, $F(1, 63) = 28.81$, $p < .001$, $\eta_p^2 = .314$.

CHAPTER 4

DISCUSSION

The purpose of the current study was to explore the effects of ostracism and emotion-regulation on risk-taking behavior. To my knowledge this study was the first conducted to examine the effects of ostracism-related anger using the Columbia Card Task. Supporting my prediction, ostracized participants self-reported greater feelings of anger, but not general negative affect, compared to participants who were socially included during Cyberball. Contrary to my prediction, no three-way interaction was found between social condition (ostracism vs. inclusion), emotion-regulation condition (reappraisal vs. no instructions), and CCT version (Hot vs. Cold) on risk-taking. There was no main effect of social condition or emotion-regulation instructions on number of cards selected. There was an effect of CCT version but it was in the opposite direction as predicted.

Ostracism

It appears that the manipulation of ostracism was effective in the current study as ostracized participants significantly differed in self-reported feelings of being excluded, ignored, and estimated number of throws received than included participants did. I decided to limit throws to only 30 ball tosses because Hartgerink et al. (2015) found this to be the most common number of throws to manipulate ostracism and that increasing number of throws between the players decreased the effects of ostracism. Additionally, Buelow, Okdie, and Trost (2015) report that the distortive cognitive effects of ostracism can persist 45 minutes following a manipulation of ostracism. Falk et al. (2014) found that ostracism continued to affect risk-taking behavior in the lab one week after being ostracized during Cyberball. Given that the experiment was only 15-20 minutes and that the ostracism manipulation check questions occurred following the CCT, it is

likely that Cyberball effectively induced feelings of ostracism in the current study, and those feelings persisted to the end of the experiment. Furthermore, participants in the ostracism condition commonly expressed frustration about the Cyberball task in an informal discussion after the experimental tasks were concluded and prior to debriefing. The manipulation of ostracism appears to have been effective; however, it is possible the effects of ostracism on risk-taking were not observed in the current study because there was not enough statistical power to observe small differences between the social conditions.

Anger

It also appears that ostracism relative to social inclusion specifically increased feelings of anger, replicating the finding of Svetiva et al. (2016). Participants who were ostracized reported feeling significantly angrier than included participants. However, regardless of social condition, self-reported anger among participants was relatively low considering a 9-point scale was utilized. Of the 65 participants, 44 participants (67.7%) selected 4 or less for anger on the Likert-type scale. The differences between anger for social conditions were also not as large as reported by Zadro, Williams, and Richardson (2003); however, this may be because of the ambiguity regarding whether or not the players were real people or computer simulated in the current study. Given that there was no statistical difference between social condition and emotion-regulation for anger, anger may not have been strong enough to be reduced by cognitive reappraisal instructions. According to the interactive influence model of emotion and cognition, Luo and Yu (2015) suggest that emotions impact decision-making processes when emotions are particularly strong or when cognitive resources are weakened. Anger-induced ostracism may not have been strong enough to affect risk-taking on the CCT. Additionally, other negative emotions such as sadness (not measured in the current study) may reduce risk-taking behavior (Yuen & Lee,

2003).Thus, it is possible that ostracism may have also increased feelings of sadness, which counteracted or obscured the effects of anger on risk-taking in the current study. Given that anger increased following ostracism, future studies should continue to isolate the specific effects of anger instead of or in addition to general negative affect.

Negative Affect

There was no statistical difference of social condition and emotion-regulation instructions on general negative affect. The findings of the current study support the suggestion of Svetieva et al. (2016) that the effects of ostracism on specific negative emotions such as anger may be obscured by only measuring negative affect. One could argue that because the PANAS instructions asked participants to rate the extent to which they felt each emotion following the CCT task that self-reported affect may not represent emotions felt during Cyberball. These instructions were utilized because it was believed that participants would be unable to retrospectively report their feelings during the Cyberball game and that negative affect from Cyberball would persist throughout the experiment. Additionally, if the effects of ostracism on negative affect are so weak that they do not persist several minutes, these effects are likely not meaningful enough to inform decision-making.

Reappraisal

Cognitive reappraisal scores were calculated for participants in both the cognitive reappraisal condition and the no emotion-regulation condition. It was predicted that participants in the reappraisal condition would be higher on reappraisal than those in the no instruction condition. Supporting the prediction, participants in the reappraisal condition did score higher on the reappraisal measure than those given no instructions. However, these findings should be interpreted with caution given the low Cronbach's alpha observed in the current study, especially

for participants in the Reappraisal condition. There also may have been demand characteristics for participants in the reappraisal condition on the first reappraisal item: "I tried to see the task as objectively as possible." In the cognitive reappraisal instructions, participants are asked to view the task "objectively," which may have cued participants in the reappraisal condition to the manipulation, and resulted in them scoring higher on the reappraisal measure. Additionally, some participants may habitually and automatically reappraise a stressful situation without being given instruction to do so (Panno et al., 2013), which would have reduced observed differences in reappraisal scores. Although the manipulation check of reappraisal partially supports the effectiveness of the cognitive reappraisal instructions, it cannot be concluded with certainty that participants in the reappraisal condition utilized the instructions during the Cyberball task. If participants did not utilize these instructions, this may explain why there was no effect of emotion-regulation condition on anger and negative affect scores. Alternatively, these instructions may not have been sufficient enough to alter negative emotions following ostracism.

Ostracism and Risk-taking on the CCT

Although we found support that ostracism via Cyberball increases feelings of anger, these findings diverge from previous findings reported in the literature for risk-taking. For instance, I was unable to replicate the effects of ostracism for increasing risk-taking (Buelow and Wirth, 2017; Svetieva et al., 2016). However, the type of risk-taking task in the study differed from previously utilized risk-taking measures. Thus, it could be something about decision-making on the Columbia Card Task which may cause ostracism-related anger to have a unique or a limited effect for risk-taking compared to other risk-taking measures.

Additionally, though there was a main-effect of CCT version, this should be interpreted with caution as participants' risk-taking behavior was in the *opposite* direction as previously

found for the Hot and Cold CCT versions. Specifically, participants in a neutral state have been shown to be riskier on the Hot CCT version, selecting more cards on average, compared to the Cold CCT version (Figner et al., 2009). In contrast, I found that participants selected more cards on average in the Cold CCT than in the Hot CCT version. In the exploratory analysis, it became clear that participants were not considering gain amount, loss amount, or number of loss cards on the Cold CCT in the current study. During the debriefing process, many participants verbally indicated that they were confused regarding the instructions for the Cold CCT version, chose randomly, chose their favorite number, or tried to detect a pattern that did not exist. Thus, it is unclear if participants properly understood the directions for the Cold CCT version, if participants responded randomly, or if they understood the instructions but were not motivated to use the information provided about the loss amount, gain amount, and number of loss cards. A poor understanding of the Cold CCT may have reduced interest level in the task, increasing random responding, and may have produced what appears like greater risk-taking on the Cold CCT than the Hot CCT.

Furthermore, nearly half of the participants selected 32 cards in the Cold CCT on at least one of the 24 trials, which could be considered a guaranteed loss even if there is only one loss card present. However, for some combinations, participants may have interpreted the task in a way that it would be advantageous to select all 32 cards for some combinations (e.g., 30 win amount, 750 loss amount, 1 loss card = potential net gain of 180 points; 30 win amount, 750 loss amount, 3 loss cards = net gain of 120 points; 10 win amount, 250 loss amount, 1 loss card = net gain of 60 points). Thus, the ambiguity of the CCT instructions, though modified from previous CCT versions, is a limitation of the current study. It is unclear if participants selected 32 cards

for the Cold CCT because they were carelessly responding, did not understand the task, or interpreted it as advantageous to do so.

Although efforts were made to remove careless responders, it appears that the Cold version of the CCT was not an effective measure of risk-taking behavior. I suspect that the Hot CCT, which is more interactive and easier to understand after several rounds, provided a better measure of decision-making strategies participants used than the Cold CCT. Examining the reliability of the Hot CCT task revealed that participants' consistency on the Hot task was somewhat low (Cronbach's $\alpha = .663$). Variability in responses as a function of the task parameter values (e.g., the number of specified loss cards) is one possible contributor to this modest reliability. The random placement of loss cards might have also decreased task reliability. More specifically, when participants selected one of the randomly placed loss cards it immediately terminated that round of the task, and selecting a loss card by chance in one of their first several choices may have produced a deviation from their normal pattern of response and artificially decreased reliability. It is also possible that participants in the current study were not as motivated as would be hoped. To increase participant understanding and decrease careless responders, previous studies have incorporated CCT comprehension questions and practice rounds and paid participants based on the performance of a random round on the CCT; however, this was not possible in the current study due to time and financial constraints. Given these issues, future research must further explore the reliability of the task when evaluating risk-taking behavior.

When examining the four-way ANOVA in regards to loss amount, win amount, number of loss cards, and CCT version, participants' risk-taking did not change based on the eight different combinations. Given that the Cold CCT does not appear to be a good measure of risk-

taking in the current study, it is not feasible to make comparisons between the effects of anger or ostracism between the two CCT versions. Thus, we cannot draw any conclusions regarding the potential divergent effects of anger for the hot and cold CCT versions, suggested by Baumann and DeSteno (2012) and based on the Conceptual Act Model. Additionally, participants in the current study may have been riskier than other samples given that most participants persisted on the Hot CCT until a loss card was hit for 75% of the trials and six participants hit a loss card on all 24 rounds.

Strengths and Limitations

There are several strengths and limitations to the current study. One strength of the study was that participants completed the entire study on the computer, which assigned participants to one of eight conditions unknown to the research assistant. This double-blind design minimizes the potential for experimenter bias on risk-taking. It is also important that distractions were minimized by completing the study in the lab, which is especially important for the manipulation of ostracism. Steps were also taken to maximize participant focus such as providing audio recordings for long instruction pages, having participants wear headphones, ensuring that the program slides did not advance until the audio was finished for the instruction pages, and limiting the experiment to 15-30 minutes to complete.

Despite the strengths of the current study, there were still several limitations. First, the sample size for the study was small, limiting statistical power. Thus, the sample size may have simply not been large enough to see an effect of ostracism on risk-taking. Given the questionable efficacy of the Cold CCT in the current study, data on risk-taking for the Cold CCT may have obscured possible effects. Finally, it seems likely that participants' decisions were not affected by the awareness of the ostracism manipulation due to the subtlety of the Cyberball task. A

previous study reported that participants self-reported feelings of anger when ostracized by a computer (Zadro, Williams, & Richardson, 2004); however, that 88% of participants in the present study believed that the other players in the Cyberball game were computer generated may have reduced the effects of ostracism on risk-taking.

Overall Conclusions

The first aim of this study was to extend previous findings of ostracism and risk-taking to affective and non-affective deliberative decision-making. Becasuse we likely did not obtain the necessary sample size to observe an effect of ostracism on risk-taking and the Cold CCT (non-affective measure) appears to be a poor risk-taking measure in the current study, we cannot draw conclusions about the effects of ostracism on affective and non-affective deliberative decision-making. Ostracism via Cyberball may not be sufficient enough to affect risk-taking on the CCT or there could be an aspect of the CCT that is obscuring the results. In regards to the second aim of the study, I replicated the effects of ostracism for increasing anger reported by Svetieva et al. (2016). However, this study could not detemine if ostracism-induced anger had differential effects on the Hot and Cold CCT because of the poor efficacy of the Cold CCT measure. Lastly, it still remains uncertain if emotion-regulation instructions are sufficient to moderate the effects of ostracism on risk-taking. The effectiveness and extent that the cognitive reappraisal instructions were utilized in the current study remains uncertain. Lastly, the effects of emotion-regulation on ostracism and risk-taking could not be evaluated as ostracism did not affect risk-taking.

In all consideration, it is possible that ostracism via Cyberball does not affect risk-taking behavior on the Columbia Card Task. However, before any conclusions can be made it is important to further test the effects of ostracism and anger on the CCT and other risk-taking

measures. It may be that a different paradigm for ostracism or a variation to the Cyberball task (e.g., number of ball throws and deceptively informing participants that the other players in Cyberball are real, utilizing an alternative ostracism manipulation such as Atimia) may differentially affect risk-taking. Additionally, it is important to explore these effects in a community sample with participants of different ages and backgrounds to increase external validity of the findings.

Future research should seek to replicate the divergent effects of anger on the Hot and Cold versions of the CCT as found by Baumann and DeSteno (2012). Anger differs from other negative emotions as it is associated with appraisals of high certainty and control (Learner & Keltner, 2000); however, inducing anger in the lab may be challenging. It is important to determine that anger does differentially affect risk-taking for the CCT versions as only one study has examined and reported this effect. If anger increases risk-taking on the Hot and Cold CCT rather than having divergent effects on risk-taking, this would provide stronger support for the Appraisal Tendency Framework (ATF) than the Conceptual Act Model.

Additionally, alternative manipulations of ostracism should be utilized. Participants are often samples of convinence, coming from psychology classes and thus may be familiar with Cyberball. No participants verbally reported knowledge of the Cyberball task during the debriefing process, but it is important that all studies in a particular area do not rest upon a single paradigm. Futhermore, researchers should investigate the effects of different emotion-regulation strategies and instructions on decision-making. Although Richards and Gross (2000) characterize reappraisal as an antecedent-focused emotion-regulation strategy, it is also commonly utilized following a full emotional reponse, and it is unknown if reappraisal is utilized after an emotional response develops how that impacts its overall effectiveness. Future research could induce

emotional responses, vary when and what emotion-regulation instructions are given, and measure risk-taking behavior.

It is important to determine the extent to which ostracism affects risk-taking, especially for adolescents and young adults who may be especially sensitive to ostracism. It could be that ostracism affects risk-taking more in situations of uncertainty (e.g., driving) rather than objective risk (e.g., some gambling tasks such as Blackjack) or more in the presence of others than when alone. The type of risk-taking task used in the lab may affect what type of processing participants predominantly rely on. For instance, participants may rely primarily on Type I processing (automatic, gut-level) processing for risk-taking tasks under uncertainty (e.g., BART) and Type II processing (careful, deliberative) for situations in which probabiblity of a win or loss can be deterimined (e.g., Game of Dice task, CCT). However, we often utilize a combination of Type I and Type II processes when making a decision, and it is necessary to further explore the extent that ostracism and emotions affect Type I and Type II processes and the many facets of risk-taking. If one domain (e.g., driving) is principally affected by risk-taking, then interventions can be created and implemented to target risk-taking in that area for specific populations.

Given the negative consequences of ostracism and the ubiquity of ostracism and risk-taking, it is important to better understand the relationship between ostracism and risk-taking. In fact, it may be especially important to explore this relationship among adolescents and young adults, who experience novel opportunities for risky behavior (e.g., driving behavior, sexual decisions, financial decisions) and may be particularly sensitive to ostracism. The present study revealed that there potentially are relations between ostracism and the emotions we experience, and previous research suggests that these emotions might affect the way we make decisions.

Additional research is necessary to identify the ways in which ostracism, specific emotions, and emotion-regulation strategies impact decision-making.

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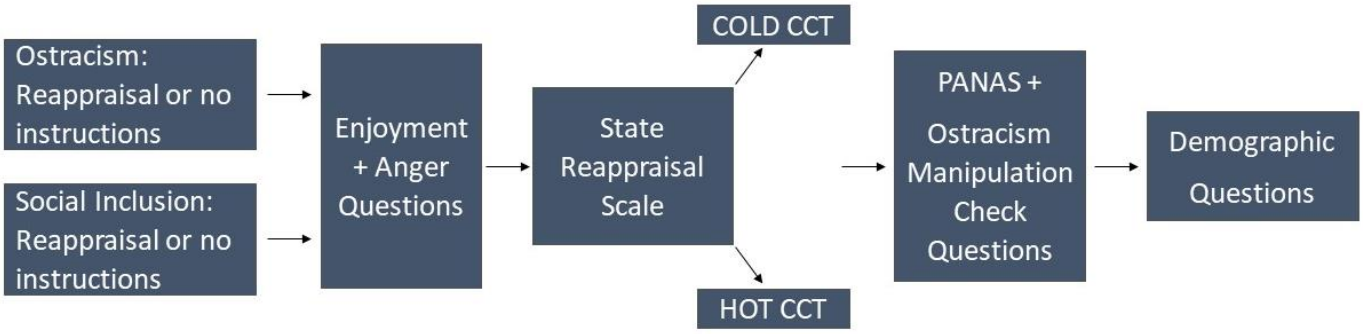
APPENDIX A

PROCEDURAL OUTLINE



APPENDIX B

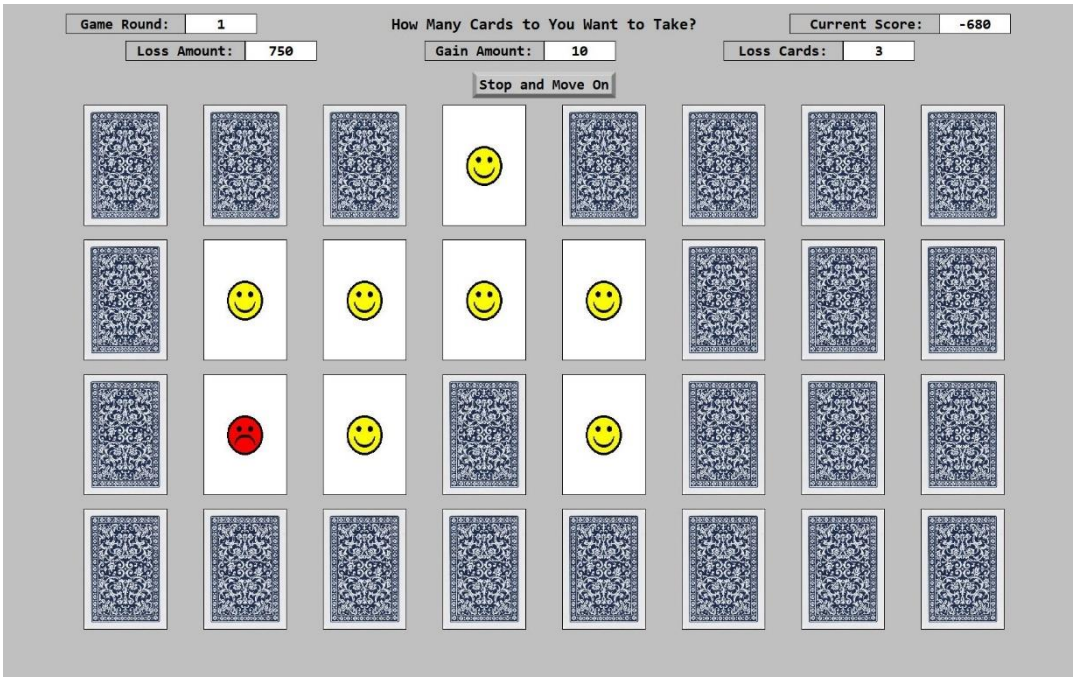
HOT COLUMBIA CARD TASK INSTRUCTIONS

You are now going to participate in a card game. In this game, you will turn over cards to win or lose points.

In each game round, you will see cards laid out on the computer screen, face down. You will decide how many of these cards to turn over. Each card is either a gain card or a loss card. You will know how many gain cards and loss cards there are, and how many points you will gain or lose if you turn over a gain or loss card. What you don't know is which cards are gain cards and which are loss cards.

[Hot CCT Instructions] To flip a card, click it with the mouse. Every time you flip a gain card by you get the points added to your round total and you have the chance to turn over another card. The first time you turn over a loss card, the loss points are subtracted from your current point total and the round immediately ends. You can decide to stop turning over cards at any point, as long as you have not yet turned over a loss card.

You will play a total of 24 rounds.



APPENDIX C

COLD COLUMBIA CARD TASK INSTRUCTIONS

You are now going to participate in a card game. In this game, you will turn over cards to win or lose points.

In each game round, you will see cards laid out on the computer screen, face down. You will decide how many of these cards to turn over. Each card is either a gain card or a loss card. You will know how many gain cards and loss cards there are, and how many points you will gain or lose if you turn over a gain or loss card. What you don't know is which cards are gain cards and which are loss cards.

[Cold CCT Instructions] You will indicate the number of cards (from 0 to 32) you want to turn over by clicking on a small number button. You should make this choice as if that number of cards would then be randomly chosen to be turned over, one at a time, until a loss card is flipped or the number of cards you chose is reached.

You will play a total of 24 rounds.