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Very Superstitious: The Relationship Between Desperation and Superstitious Behavior

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Abstract

Superstitious behavior has been found to emerge during situations of uncertainty and often used by those who desire control. Desperation, a negative emotion that motivates behavior, tends to also occur in uncontrollable environments. This study attempts to analyze the possible relationship between desperation and the use of superstitious behavior in circumstances that leave individuals with little to no control. This was achieved by simulating an uncertain environment through a computerized card game involving chance (i.e. War). Results from this study demonstrated that those who felt desperate due to uncertainty engaged in superstitious behaviors, and desperation was a greater predictor for use of superstitions than even a desire for control.

Keywords: superstition, desperation, superstitious beliefs, superstitious behaviors, control

Table of Contents

Acknowledgements.....	iii
Abstract	iv
Table of Contents.....	v
List of Tables and Figures.....	vii
Chapter I: Introduction.....	1
Chapter II: Current Study.....	8
Chapter III: Method.....	9
Chapter IV: Results.....	18
Chapter V: Discussion.....	27
Appendix A: Global Desperation Scale.....	35
Appendix B: Belief in Superstition Scale.....	36
Appendix C: Gambling and Superstitious Beliefs Scale.....	38
Appendix D: Multidimensional Locus of Control Scale.....	39
Appendix E: The Desirability of Control Scale.....	41
Appendix F: Consideration of Future Consequences Scale.....	44
Appendix G: UPSS Impulsive Behavior Scale.....	45
Appendix H: State Desperation Scale.....	47
Appendix I: The Brief Social Desirability Scale.....	48
Appendix J: Demographics.....	49
Appendix K: E-prime War Screenshots.....	51
Appendix L: Perceived Control Reanalysis Results.....	52
Appendix M: IRB Approval Letter.....	56

References.....57

List of Tables

Table 1: Intercorrelations between Superstitious Behaviors and Constructs at each Time Point.....	21
Table 2: Intercorrelations for all Variables with Measures during the in-Lab Portion.....	22
Table 3: Correlation Coefficients between Superstitious beliefs and Relevant Constructs.....	23
Table 4: Summary of Hierarchical Regression Analysis for Variables predicting Superstition.....	24
Table 5: Moderated Regression of Desperation and Need for Control on Superstitious Behaviors.....	26

List of Figures

Figure 1: Mediation analysis of desire for control, desperation, and superstitious behavior.....	25
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Chapter 1: Introduction

Superstitious belief has been a part of the human experience for tens of thousands of years (Jahoda, 1969; Panati, 2016; Rendu et al., 2014; Vyse, 1997). A recent book of superstition throughout history (Panati, 2016) details how early Celtic totemism bore the belief in a rabbits' foot being lucky for the possessor. North American Indians believed that “knocking on wood,” or more specifically the oak tree, prevented retribution from the “sky god” (p. 7). While the ancient Egyptians are responsible for the popular superstition that walking under a ladder is bad luck, as to do so was to desecrate the sacred triangle, a shape the Egyptians believed to be closely connected to the gods and formed from ladders leaning against walls (Panati, 2016). Superstitious burial rituals may have existed over 50,000-years-ago and originated not with humans, but with Neanderthals. An excavated Neanderthal burial was found to contain a variety of pollen grains along with the skeletal remains. It was hypothesized that the pollen granules were evidence of a parting gift, a once bouquet of flowers given to the deceased, and evidence for prehuman belief in an afterlife (Rendu et al., 2014, Solecki, 1975).

Interestingly, humans and other hominids are not the only species to practice superstitious behaviors. Skinner (1948) was the first psychologist to describe and produce superstitious behavior in nonhuman animals. Through the use of the “Skinner Box,” cages with trays and constructed levers or buttons which supplied pigeons with food at recurrent intervals, Skinner was able to observe odd behaviors in his avian subjects throughout various trials.

Pigeons would spin counterclockwise, demonstrate repetitive movement patterns, and perform other types of creative motions in anticipation for the arrival of food. This led Skinner to conclude that the pigeons somehow believed that their behavior was causally related to the manifestation of food. Skinner likened the birds' behavior to rituals performed by gamblers to increase their luck at cards. Skinner concluded that if one makes a connection between a behavior and a favorable outcome, the behavior will persist despite evidence to the contrary, be they bird or human (Skinner, 1948).

Defining Superstition

Properly defining superstition can be a difficult undertaking and there are many discrepancies that must be clarified before moving forward. One must first untangle the weave that contributes to what makes a belief or behavior superstitious. There are various definitions of superstition throughout the literature, but two key components remain consistent in defining superstitious belief. One, the superstitious beliefs are baseless, at least rationally and scientifically speaking and two, these beliefs are assumed to have a cause-effect association between events. Thus, superstitions can be described as irrational beliefs which are thought to influence certain outcomes (Damisch, Stoberock, & Mussweiler, 2010).

Superstitions tend to lead to false beliefs that chance events can be controlled or manipulated (Toneatto, 1999). These beliefs then result in superstitious behavior, defined as actions that are believed to have a causal effect between otherwise unrelated events (Joukhador, Blaszczynski, & Maccallum, 2004). Womack (1992, p. 192) more specifically defined superstitious behavior as an "unusual, repetitive, rigid behavior that is perceived to have a positive effect by the actor, whereas in reality there is no causal link between the behavior and the outcome of an event."

Superstitions also tend to be culturally specific (Kramer & Block, 2007). For example, in the United States there is a prevalent belief that the number 13 is unlucky, reflected in the infamous Friday the 13th as day of bad luck, or the absence of the number 13 on most floors in office buildings and hotels throughout the U.S. (Kramer & Block, 2007). Similar to the United States, there is a suspicious lack of floors with the number four in some Chinese buildings and individuals tend to avoid taxis with the supposedly unlucky number (Yardley, 2006). Though most superstitions are culturally unique and shared from generation to generation (Kramer & Block, 2007) there are other aspects which can make superstitions exclusive to a subset of the population.

Arguably, religion is one such aspect. It can be difficult not to confuse superstitious belief with religious faith as religions often have elements of superstition and/ or supernatural beliefs (Buhrmann & Zaugg, 1983; Zhang & Xu, 2007). For example, the practice of prayer is a common religious example of rigid ritualistic behavior that is believed to have a positive effect, but with no verifiable causal link between the behavior and the outcome (similar to Womack's (1992) definition of superstition). In another example, similar to the number 13 and four, the number 666 is often seen as an ominous sign of misfortune in Western Christianity. Though they share commonalities there are also subtle differences, such as the religious tenet of belief in a god or gods which is not typically considered a superstitious belief, but specifically a religious one. Nevertheless, it is challenging to divorce the two as most superstitions have derived from a religious origin, be it a current or a historically extinct religion (Panati, 2016).

Like religion, ritualistic behavior is also arduously distinguished from superstition. Ritualistic behavior is distinct in that the actions one takes have symbolic value but are not thought to lead or cause a specific outcome (Wann et al., 2013). For example, a student who chooses to sit at the

same desk every class period does so out of ritualistic habit. But a student who chooses a specific seat because they believe doing so will result in a positive outcome on an exam does so out of the superstitious belief that such a behavior is beneficial. The difference in these examples can sometimes be finite but are nonetheless important in distinguishing the two types of behavior.

Superstition and Control

There are a few explanations for why humans continue to maintain superstitious beliefs. Biologists Foster and Kokko (2009) hypothesized that superstitious behavior could be an unavoidable and naturally selected form of adaptive behavior. Superstitious belief could stem from the human tendency to lean towards causal determinism, that is, assuming outcomes are caused by preceding events and then searching for reasons to explain them (Wilson et al, 2013). These explanations may be key factors in the continued preponderance of superstitious belief worldwide, but psychological research involving superstition has shown that control is also an important element when attempting to explain the functionality of superstitious beliefs and behaviors in humans.

Uncertainty in a situation can cause individuals to exhibit superstitious behaviors (Rudski, Lischner, & Albert, 1999). Brooks (2009) found that superstitious behaviors were typically engaged when a perceived loss of control had occurred. It may be that superstitions provide people with a false sense of control and therefore are employed in situations of uncertainty (Matute, 1994). In fact, individuals with a high need for control tend to be more susceptible to the false sense of control resulting from superstitions. They may believe that chance occurrences are controllable, if only partially (Langer, 1975). Burger and Lynn (2005) proposed the uncertainty hypothesis to explain why individuals wish to gain control over uncertain situations. This hypothesis was also extended to explain the use of superstitions.

Superstitious individuals who are placed in uncertain situations tend to desire control, which ultimately leads to an engagement of superstitious behaviors to regain said control and satisfy the desire (Burger & Lynn, 2005). Burger and Lynn (2005) took additional steps and proposed that superstitious behavior may also be a coping mechanism to reduce anxiety in uncontrollable environments. The relationship between need for control and superstition is further supported by Fluke, Webster, and Saucier (2014) who found that individuals with an external locus of control held more superstitious belief involving luck. These findings seem to coincide with Burger's (1991) previous research in which games of chance were found to produce an environment of high stakes and uncertainty resulting in a desire for control.

Games of chance and superstition seem to go hand in hand. Superstitious behaviors are often associated with gambling (Ariyabuddhiphongs & Chanchalermporn, 2007; Burger 1991; Griffiths & Bingham, 2005; Joukhador et al., 2004; Ohtsuka & Chan, 2010) and those who gamble often believe that even chance games can be controlled through skill or supernatural means (Källmén, Andersson, & Andren, 2008). Gambling produces a sufficient high stakes, anticipatory environment that helps to motivate superstitious behavior. The high risk, high reward scenarios are often completely left to chance, leaving very little control in the hands of the gambler. This may be one explanation for the connection between gambling and superstition. The lack of control for the outcomes may influence individuals to attempt to regain that control, ostensibly through superstitious behaviors. Of course, one would want to analyze those behaviors beyond other individual differences often found in gambling, such as a lack of consideration for future consequences (Toplak et al., 2007) and impulsivity (Steel & Blaszczynski, 1998).

Gambling and sports share many similarities, the employment of superstition being one of them (Burger & Lynn, 2005; Wann & Goeke, 2018; Wann et al., 2013; Wilson et al., 2013).

The use of lucky apparel and fortune trinkets are plentiful among both athletes and sport fans alike (Wann & Goeke, 2018). Another common theme between gambling and sports, especially spectator sports, is the uncertainty of outcomes within a game. Though skill is most certainly a factor in many athletic sports there are still unpredictable and uncontrollable circumstances, which can alter the outcome of a game. This can be frustrating and anxiety-ridden for highly identified sport fans, leaving them in situations where they can do little but watch. Wann and colleagues (2011) claimed that such an environment can lead some fans to engage in acts of desperation, such as fans claiming they would forgo sweets or sex just for their team to win a chance at the championship, all to regain some semblance of control over an otherwise uncontrollable situation. These acts varied from the mundane to the illegal, but such actions indicated that the negative emotions felt were intense enough to motivate their behavior (Wann et al., 2011).

Desperation

Desperation has been described as a negative emotion that accompanies situations of stress, anxiety, fear, anger, shock, or lack of control, which ultimately motivates one's behavior (Baker, 2002; de Haes, van Knippenberg, & Neijt, 1990; Garlow et al., 2008; Hendin et al., 2004; Rosenthal, 1992; Shapiro & Lie, 2004; Zuckerman, 1960). Little known research has been conducted on desperation itself, as it is usually referenced as a part of a larger psychological construct (e.g. romantic relationships, depression, suicidal ideation, psychological distress; de Haes et al., 1990; Garlow et al., 2008; Hendin et al., 2004; Sperling, 1985). Thus far, the best operational definition for desperation emerged from Garlow and colleagues (2008) who defined this negative emotion as “a core feeling of intense distress with an urgent need for relief” (p. 486). Desperation could be a possible link between uncontrollable situations (e.g. gambling or

sports) and the use of superstitious behavior. That is, situations of uncertainty could lead to individuals feeling desperate, which in turn motivates action, and provides one way to regain control and relieve this distress, namely superstitious behaviors.

Chapter 2: Current Study

The purpose of the current study was to evaluate the possible positive connection between desperation and superstition. This positive connection was expected due to desperation occurring in environments or situations in which individuals have little to no control (Garlow et al., 2008). Moreover, this should be exacerbated for individuals who desire and wish to gain control (Brooks, 2009; Langer, 1975; Matute, 1994). In alignment with the purpose of this study, there were three main hypotheses and two research questions of interest:

Hypothesis 1: Desperation, desirability of control, and external locus of control will positively correlate with belief in superstition.

Hypothesis 2: Desperation and desirability of control will positively predict the use of superstitious behaviors.

Hypothesis 3: Desperation will be a stronger predictor for the use of superstitious behaviors above and beyond consideration of future consequences, impulsivity, and desirability of control.

Research question 1: Does desperation mediate the relationships between superstitious behavior and desirability of control?

Research question 2: Does desperation moderate the relationship between superstitious behavior and desirability of control?

Chapter 3: Method

Participants

Participants ($N = 200$) were recruited from a convenience sample of undergraduates at a regional Midwestern university to complete an online survey in the spring of 2019. The participants who completed the online portion of the study were recruited to participate in a second in-lab study ($N = 48$). For adequate power, it was determined that a minimum of 142 participants would be needed in the first portion of the study (Fritz & Mackinnon, 2007), and a minimum of 62 participants in the second portion (Hsieh, 1989). Though the power of first portion of the study was achieved, due to a technical error which resulted in a loss of half of the post study data, only 48 participants' data were collected within the available timeframe for the second portion. The potential power limitations of this loss will be fully addressed in the discussion section.

The demographics of the online portion of this study revealed approximately 76.2% identified as female (154), 22.3% as male (45), and one participant chose not to respond to the question. Participant age ranged from 18 to 28 years ($M = 19.21$, $SD = 1.47$). The racial background of the sample was predominately Caucasian ($n = 173$; 85.6%), however other ethnicities were also represented: African American ($n = 17$; 8.4%), Bi-racial ($n = 6$; 3.0%), Hispanic/ Latina-Latino ($n = 1$; 0.5%), Asian ($n = 2$; 1.0%), and one participant chose not to identify with any of the given choices (i.e. Other/ Non-specified; $n = 1$; 0.5%). Participants

were also predominantly Freshman ($n = 130$; 64.4%), though other levels of education were represented, i.e. Sophomore ($n = 37$; 18.3%), Junior ($n = 25$; 12.4%), Senior ($n = 8$; 4.0%), and two participants declined to answer. Participants were also asked about their parent's level of education, ranging from some high school education to achieving higher degrees. Participants reported the following: Some High School ($n = 2$; 1.0%), High School Diploma ($n = 28$; 13.9%), Some College ($n = 45$; 22.3%), Associate's Degree ($n = 24$; 11.9%), Bachelor's Degree ($n = 53$; 26.2%), Master Degree ($n = 40$; 19.8%), Doctoral Level Degree (e.g., PhD; $n = 8$; 4.0%), and two participants chose not to answer. Participants were asked about their religious affiliation, which was comprised primarily by Christianity ($n = 160$; 79.2%), though other faiths/non-faiths were also represented: Buddhism ($n = 1$; 0.5%), Spiritualism ($n = 1$; 0.5%), Nonreligious ($n = 27$; 13.4%), other/ non-specified ($n = 6$; 3.0%), and five participants chose not to answer. Participants were also asked about their typical attendance at religious services ranging from never ($n = 34$; 16.8%), a few times a year ($n = 43$; 21.3%), once or twice per month ($n = 40$; 19.8%), almost every week ($n = 29$; 14.4%), every week ($n = 49$; 24.3%), and five participants chose not to answer. In line with religious affiliation and service attendance, participants were also asked how spiritual they considered themselves to be ($M = 2.29$, $SD = 1.20$) ranging from 0 (*Not at all*) to 4 (*Very Much*). Finally, political ideology was also gauged with 14.9% ($n = 30$) identifying as liberal, 31.2% ($n = 63$) as center/moderate, 26.2% ($n = 53$) as conservative, 20.8% ($n = 42$) feeling as though none of these options represented their political ideology (i.e. None/ Not applicable), and 12 chose not to answer.

In the second in-lab portion of the study participants were primarily female (68.8%; $n = 33$), primarily Freshman (62.5%; $n = 30$), primarily Christian (79.2% $n = 38$) and Caucasian

(83.3%; $n = 40$). These demographics are typical for the convenience sampling within this university.

Materials and Procedure

Participants were given the opportunity to participate in psychological research via SONA, an online lab appointment management system. The first portion of the study appeared in a list of other potential research opportunities under the title of “Beliefs and Behaviors”. If the study was chosen, participants were presented with an online consent form, and upon consent could complete various measures of emotion and behaviors in a random order. These measures are as follows:

Global Desperation Scale (GDS; revised; Hannan & Hackathorn, under review; Appendix A). The GDS asks participants to rate how well nine statements describe their overall level desperation. These 9 items are categorized into two subscales: Desperation Emotion (“*I often feel hopeless.*”) and Desperation Motivation (“*I often feel as though it is urgent to act/do something.*”). Items range from 0 (*Does Not Describe at All*) to 9 (*Describes Very Well*). The ninth, and final item, simply asks participants “*I often feel desperate?*” Participant scores from all items are averaged to create one score, with higher scores indicating higher desperation ($\alpha = .90$).

Belief in Superstition Scale (BSS; Fluke et al., 2014; Appendix B). The BSS asks participants to rate their opinions involving items pertaining to belief in superstitions. Though the whole scale will be used, focus will be placed on the three subscales concerning luck: belief in good luck (“*I have a good luck charm.*”), belief in bad luck (“*Friday the 13th is unlucky.*”), and changing luck (“*I often attempt to change my luck.*”). Participants are asked to rate each item on a nine-point Likert scale, ranging from 0 (*Strongly Disagree*) to 9 (*Strongly Agree*). Six of the 18

items are reverse coded (items 6, 11, 15, 16, 17, and 18 respectively). For example, item 6 states “*I don’t believe in luck.*” Participant scores from all items are averaged to create one score, with higher scores indicating higher superstitious belief ($\alpha = .91$).

Gambling and Superstitious Beliefs Scale (GSBS; Joukhador et al., 2004; Appendix C). The GSBS asks participants to rate how well each of the 8 items, involving superstitious beliefs in gambling, relate to them. Example statements include “*My hunches have a big influence on my winning*” and “*I think I have the psychic ability to predict a winner.*” Participants are asked to rate each item on a four-point Likert scale, ranging from 0 (*Not At All*) to 4 (*Very Much*). Participant scores from all items are averaged to create one score, with higher scores indicating higher superstitious belief pertaining to gambling ($\alpha = .84$).

Multidimensional Locus of Control Scale (MLOC; Levenson, 1973; Appendix D). The MLOC scale asks participants whether they agree or disagree with the 24 statements involving perception of control. The scale can be broken down into three subscales: Chance (items 2, 6, 7, 10, 12, 14, 16, and 24; e.g. “*When I get what I want, it’s usually because I’m lucky.*”), Powerful others (items 3, 8, 11, 13, 15, 17, 20, and 22; e.g. “*I feel like what happens in my life is mostly determined by powerful people.*”), and Internal (items 1, 4, 5, 9, 18, 19, 21, and 23; e.g. “*When I make plans, I am almost certain to make them work.*”). Participants are asked to score each item with a range from -3 (*Strongly Disagree*) to +3 (*Strongly Agree*). Participants scores from each subscale are totaled and 24 points are added to each of these to create the three individual scores. Scores should range between 0 and 48. Higher scores on the Internal subscale indicate an internal locus of control while higher scores on the Chance and Powerful others subscales indicate an external locus of control (Internal $\alpha = .59$, Powerful $\alpha = .77$, and Chance $\alpha = .73$ respectively).

The Desirability of Control Scale (DCS; Burger & Cooper, 1979; Appendix E). The DCS asks participants to rate how accurately each of the 20 items applies to them. Example statements include “*I enjoy making my own decisions*” and “*Others usually know what is best for me.*” Participants are asked to rate each item on a seven-point Likert scale, ranging from 1 (*This statement doesn’t apply to me at all*) to 7 (*This statement always applies to me*). Participant scores from all items are summed to create one score, with higher scores indicating a greater desirability of control ($\alpha = .77$).

Consideration of Future Consequences Scale (CFC; Strathman, Gleicher, Boninger & Edwards, 1994; Appendix F). The CFC scale asks participants to indicate whether or not a series of statements are characteristics of them. An example statement includes “*I consider how things might be in the future, and try to influence those things with my day to day behavior.*” Participants are asked to rate each statement on a five-point Likert scale, ranging from 1 (*Extremely uncharacteristic*) to 5 (*Extremely characteristic*). Seven of 12 items in this scale were reverse coded (items 3, 4, 5, 9, 10, 11, and 12 respectively). For example, item 3 states “*I only act to satisfy immediate concerns, figuring the future will take care of itself.*” Participant scores from all statements are summed to create one score, with higher scores indicating a consideration of future consequences ($\alpha = .80$).

UPSS Impulsive Behavior Scale (UPSS; Whiteside & Lynam, 2001; Appendix G). The UPSS asks participants to indicate the degree to which each of the 35 items describes them. The measure can be broken down into four subscales: Premeditation (“*I am a cautious person.*”), Urgency (“*I have trouble controlling my impulses.*”), Sensation Seeking (“*I’ll try anything once.*”) and Perseverance (“*Unfinished tasks really bother me.*”). Participants are asked to rate each statement on a five-point Likert scale, ranging from 0 (*Not at all*) to 4 (*Very much*).

Participant scores from all items are averaged to create one score, with higher scores indicating higher impulsivity ($a = .85$).

Upon completion of the online survey, the second portion of the study became available on SONA for participants to choose from within the list of overall studies. This second portion was listed under the title of “Gambling and Emotions”. The second portion of the study asked participants to make an appointment to come into the lab and participate in a card game.

Before entering the lab, participants encountered a confederate leaving the lab pretending to talk over the phone to a friend and exclaiming how they should participate in the study for a chance to win money. Once the participant entered the lab they were given an informed consent that explained the details of the gambling study. To reduce the risk of real distress, participants were informed that they could not lose money, but could only gain money as part of the gambling experiment.

Upon consent, participants were given a survey packet containing two measures of emotion and social desirability respectively, these scales are as follows:

State Desperation Scale (SDS; Hannan & Hackathorn, under review; Appendix H).

The SDS asks participants to rate how well nine statements described their current level of desperation. These 9 items are categorized into two subscales: Desperation Emotion (“*At this moment, I feel hopeless.*”) and Desperation Motivation (“*At this moment, I feel as though it is urgent to act/do something.*”). Items range from 0 (*Does Not Describe at All*) to 9 (*Describes Very Well*). The ninth, and final item, simply asks participants “*How desperate do you feel at this moment?*” This item serves as a reliability check for the remainder of the items, and helps to assess whether individuals understand the emotion of desperation as operationally defined by the

measure. Participant scores from all items are averaged to create one score, with higher scores indicating higher desperation ($\alpha = .95$).

The Brief Social Desirability Scale (BSDS; Haghghat, 2007; Appendix I). The BSDS consists of four items that attempts to gauge participant's level of social desirability. An example question includes *"If you say to people that you will do something, do you always keep your promise no matter how inconvenient it might be?"* Participants are given the option to answer each question dichotomously with either *"Yes"* or *"No."* Scores of social desirability are tallied based on the number of yes or no responses to each question. The final question, *"Would you ever lie to people?"* was reversed coded. Participants with scores greater than two are considered to have a high tendency for social desirability, $K-R(20) = .42$.

After the survey, a brief tutorial on how to play a computerized card game of "War" was presented. The rules of the game were explained to each participant as follows: "War is typically played with a 52 card deck containing numerical values starting at "2" and rising to "10" with higher value face cards consisting of "Jack," "Queen," "King," and "Ace" respectively. The "2" is the lowest value card with "Ace" being the highest value. The deck is divided evenly between players with all cards face down. Players turn up the first card at the top of their divided decks and the player with the highest card value wins that round. This typically continues until both player decks are depleted and the player with the most wins is victorious (War – Card Game Rules, 2018). Today, you will be playing a computer version of this game. Also, for each game of War you win, you will be rewarded \$10. Conversely, each War that you lose will result in a deduction of \$10 from your winning pool. Importantly, you will begin the game with a winning pool of \$50 but your winnings cannot go below \$0. Let me quickly show you how to play."

The computerized game of War used in this study was created through the software tool, E-Prime (see appendix K for a screenshot of the game in E-Prime). During the tutorial, the experimenter demonstrated how to play and explained the user interface to the participant. Upon completion of the demonstration, the experimenter stated, “Now you will get a chance to play 10 hands, and your emotions will be measured throughout the game periodically.” Then the computer mouse and keyboard was handed to the participant, and a new screen with further instructions on how to play (i.e. keys to press to operate the game) appeared.

The keys to reveal both the participant’s card and the opponent’s card during the game of War consisted of pressing any of the number pad digits “1” through “9.” Participants were told that the last participant who won (i.e. the confederate) was pressing “shift+7” and it seemed to be working great for them. Any key pressing combinations that the participant used were recorded by the E-prime program and stored for later analysis.

Though the game appeared random, and participants were led to believe they were playing against a computer opponent, the outcomes were fixed and always resulted in a complete loss of winnings during the final game of War. Real 10 dollar bills were placed or removed from the winnings pile directly positioned in front of the participant for visibility of gain and losses between each round.

Participant’s feelings of desperation, stress, and control were measured throughout the game. Desperation, stress, and control were gauged every three rounds (i.e. 3rd, 6th, and 9th round respectively) by prompting participants to answer a single item for each before progressing to the next round. The items asked the participant, “*How desperate do you feel at this moment?*”, “*How stressed do you feel at this moment?*”, and “*How much control do you feel you have at this moment?*” Response options range from 0 (*Not at all*) to 9 (*Very much*).

Prior to the final War (round 10), participants were informed that the last round would be an “*All-or-Nothing*” situation, with a loss resulting in \$0 and a win resulting in a \$100 reward. Importantly, the program has been fixed such that a loss will always occur in the final War.

Multiple experimenters were used interchangeably to observe and take notes on participant behavior while participants played the game of War. The experimenter’s task was to record any time the presented key sequence was used (i.e. shift+7), as well as any other behaviors that might qualify as superstitious (e.g., crossing fingers, knocking on wood). Participants engagement in superstitious behaviors right before the final round was coded dichotomously (i.e. 0/no and 1/yes).

Upon completion of the study, participants were reminded that their participation still resulted in full credits being granted despite the loss. Participants were also asked how they felt about losing the game, whether they had used any techniques to put the odds in their favor, and whether they could guess what the experimenter’s hypothesis could be. The purpose of this was to make sure that any recorded behaviors were accurate, and that the deception was not obvious. If participants were able to guess the hypothesis their data would be removed from the study. Finally, participants were debriefed on the deception within the study and offered a debriefing form that explained the purpose of the study in full detail. In the sample collected none of the participants were able to accurately surmise the hypotheses being tested and none saw through the deception being used, therefore no participants were removed from this experiment.

Chapter 4: Results

Preliminary Analysis and Data Preparation

All relevant items across all scales were appropriately reversed coded, and final scores were totaled, or averaged based on prior use in past literature. Reliability of each scale is indicated in the section above using a Cronbach's alpha criterion of .70, excluding the BSDS, in which a Kuder-Richardson Formula 20 (KR-20) was used due to the binary variables within the measure. All measures, excluding the BSDS and the internal subscale within the MLOC used to measure internal locus of control, met these criterion for internal reliability. Because the BSDS and the MLOC Internal subscale failed to meet these standards, we caution interpretation of the results garnered from these measures and advise skepticism on their validity to accurately assess these constructs.

The primary indicator of superstitious behavior was the "Shift+7" prime that was prompted during the tutorial and key-logged throughout the game for later analysis. Further key pressing combinations were also examined, and participants were asked post-experiment questions before debriefing occurred (e.g. "*Did you use any techniques that you believed put the odds in your favor?*"). These questions were used to clarify or confirm the use of superstitious behaviors observed, or perhaps missed by the experimenter, throughout the lab session. Twenty-one out of the 48 participants were recorded using a superstitious behavior. These behaviors included the Shift+7 prime, as well as other card flipping techniques that participants believed

put the odds in their favor. Examples include, pressing higher number keys for themselves and lower number keys for their opponent, or using initial letters in combination with their favorite or lucky number. The experimenter records of superstitious behaviors were then confirmed via E-prime's key-logging software. As previously mentioned, the use of superstitious behaviors was coded dichotomously as either 0 (no) or 1 (yes).

“All-or-Nothing” Manipulation Check. A manipulation check was conducted in order to examine if participant's desperation increased over time while playing War during the in-lab portion of the study, as was expected. Desperation (along with perceived stress and control) was measured three separate times (every three rounds) throughout the 10 round game of War. Before the final round and final measure of desperation, participants were informed of the “*All-or-Nothing*” situation in which they could lose or win the full \$100 in the last round. This was used in order to actively manipulate participant's feelings of desperation. It was expected that the feeling of desperation would increase, as well as the use of superstitious behaviors. A repeated measures ANOVA was conducted to compare the effect of the manipulation on participants' level of desperation after the third ($M = 1.48, SD = 2.38$), sixth ($M = 1.31, SD = 2.13$), and ninth round ($M = 3.04, SD = 3.27$) respectively. Mauchly's test indicated that the assumption of sphericity had been violated (Mauchly's $W = .52, X^2(2) = 29.97, p < .001$), therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = .68$). There was a significant effect of time on the level of desperation participants reported, $F(1.35, 63.57) = 22.07, MSE = 64.58, p < .001, \eta^2_{partial} = .32$. Pairwise comparisons indicated that desperation was significantly higher when at the third measure (the 9th round; after the “*All-or-Nothing*” manipulation) compared to the first (i.e., 3rd round) and second (i.e., 6th round) measures (all $ps < .001$), while there was no significant difference in desperation felt between the third and sixth

round ($p = .330$). Thus, we conclude that the manipulation applied in the 9th round did significantly increase feelings of desperation in the participant.

Correlations at each Time Point. A series of bivariate correlational analyses were conducted in order to examine the relationship between participants who engaged in a superstitious behavior during the in-lab study and the single question measures used during the game of War to assess desperation, stress, and perception of control. A positive relationship between state desperation measured at the 9th round after the “*All-or-Nothing*” manipulation and engagement in a superstitious behavior during the final round was expected. The analysis indicates that engagement in a superstitious behavior was correlated with desperation and stress at all three rounds and control on the final round that was measured. See Table 1 for the correlation coefficients between engagement in superstitious behaviors (measured as yes/no) and the relevant constructs measured at each time point.

Table 1.

Intercorrelations between Superstitious Behaviors and Constructs at each Time Point (N = 48)

<i>Measurement</i>	<i>t</i>	Engagement in Superstitious Behavior_a Mean(SD)	Non-engagement in Superstitious Behavior Mean(SD)
Desperation 1 _b	-2.594*	2.48(2.713)	.70(1.772)
Desperation 2	-3.505**	2.48(2.482)	.41(1.217)
Desperation 3	-10.678****	6.14(1.931)	.63(1.644)
Stress 1	-2.525*	2.57(2.420)	1.00(1.710)
Stress 2	-3.052**	2.86(2.393)	.96(1.743)
Stress 3	-6.113****	6.43(2.420)	2.00(2.542)
Control 1	-.031	3.62(2.692)	3.59(3.104)
Control 2	.493	3.19(2.316)	3.59(3.129)
Control 3	2.114*	1.48(2.015)	3.04(3.082)

Note_a = engagement in superstitious behaviors was coded such that engagement was higher (1) than non-engagement (0)

Note_b 1 = after third round; 2 = after sixth round, 3 = after ninth round

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

Construct Correlations. A second sequence of bivariate correlational analyses was conducted in order to examine the relationships between state desperation and social desirability (given before the game of War), and engagement in superstitious behaviors (dichotomized as no/yes or 0/1), as well as all variables that were measured in the first online portion of the study (e.g., locus of control). See Table 2 for the correlation coefficients between all constructs measured throughout the study, as they relate to the engagement in superstitious behaviors during the in-lab portion of the study.

Table 2.

Intercorrelations for all Variables with Measures during the in-Lab Portion (N = 48)

	1	2	3	4	5	6	7	8	9	10	11
1. Engagement in Superstition	-										
2. Global Desperation	.22	-									
3. Superstitious Beliefs	-.06	.07	-								
4. Gambling Superstitions	-.03	-.05	.62***	-							
5. Internal Locus of Control	.25	.17	-.12	-.04	-						
6. Powerful Others	-.02	.37**	.32*	.25	.20	-					
7. Chance	-.24	.06	.49***	.45**	-.27	.55***	-				
8. Desirability of Control	.35*	-.06	.01	.02	.24	-.01	-.21	-			
9. Consideration of Future Consequences	.09	.13	-.26	-.29*	.27	-.17	-.39**	-.07	-		
10. Impulsivity	.06	.20	.15	.21	.29*	.35*	-.04	.35*	.06	-	
11. State Desperation	.35*	.39**	-.09	-.12	-.02	.002	-.08	-.09	.01	-.03	-
12. Social Desirability	-.17	-.10	-.01	-.19	-.09	.10	.15	-.01	-.22	.14	.15

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

Hypothesis 1

It was hypothesized that desperation, desirability of control, and external locus of control would be correlated with belief in superstition, thus a series of bivariate Pearson's correlations were conducted. The results of these analyses indicated that global desperation was positively correlated with desirability of control and external locus of control (i.e. both Powerful Others and Belief in Chance subscales). Though global desperation was not correlated with superstitious beliefs in general (i.e. the BSS), it was found to be positively correlated with superstitious gambling beliefs specifically (i.e. the GSBS). Overall, the results support the predictions of the first hypothesis in that desperation, desirability for control, and external locus of control share a positive relationship with belief in superstitions, more precisely gambling superstitions. See Table 3 for the correlation coefficients between superstitious belief (BSS and GSBS) and the relevant constructs measured in the first portion of the study.

Table 3.

Correlation Coefficients between Superstitious beliefs and Relevant Constructs (N = 200)

	Superstitious beliefs	Superstitious Gambling Beliefs
Global Desperation	.11 ($p = .13$)	.16 ($p = .03$)
Internal Locus of Control	-.09 ($p = .21$)	-.01 ($p = .94$)
Powerful Others (External)	.24 ($p = .001$)	.33 ($p < .001$)
Chance (External)	.46 ($p < .001$)	.40 ($p < .001$)
Desirability of Control	.05 ($p = .20$)	.14 ($p = .04$)
Consideration of Future Consequences	-.25 ($p < .001$)	-.31 ($p < .001$)
Impulsivity	.16 ($p = .02$)	.21 ($p = .003$)

Hypothesis 2

To examine whether the variables of state desperation (measured at the 9th round) and desirability of control positively predicts the use of superstitious behaviors, a multiple binary logistic regression was conducted. The predictor variables were state desperation and desirability of control. A logistic regression analysis was employed and a test of the full model (93.8% accuracy) was statistically significant, $\chi^2(2, N = 48) = 49.67, p < .001, Nagelkerke R^2 = .86$. Desperation was a significant predictor of superstitious behaviors, $OR = 2.99, p = .001$, whereas desirability of control was not, $OR = 23.88, p = .115$. Overall, the results of this analysis only partially support the second hypothesis.

Hypothesis 3

To analyze whether the variable of state desperation (measured at the 9th round) is a greater predictor for the use of superstitious behaviors, above and beyond variables such as consideration of future consequences, impulsivity, and desirability of control a hierarchical binary logistic regression was conducted. The predictors consideration of future consequences, impulsivity, and desirability of control were entered at step one of the regression, while desperation was entered at step two. Results indicated that in the first step, the only significant Hypotheses 2 & 3 and research questions 1 & 2 were also analyzed using participant's perceived control (measured at the 9th round) during the game of War in place of desirability of control. The results were similar to the findings presented here. See appendix L for full results.

predictor was desire for control. However, upon the addition of desperation, the model was significant and accounted for a great amount of variance (see Table 4). These results support the third hypothesis. Desperation predicts the use of superstitious behaviors above and beyond the aforementioned variables.

Table 4.

Summary of Hierarchical Regression Analysis for Variables predicting Superstition (N = 48)

	Predictors	b	p	OR
Step 1				
	Consideration of Future Consequences	.04	.436	1.04
	Impulsivity	-.44	.588	.64
	Desirability of Control	1.91	.019	6.77
Model Statistics	$\chi^2(4, N = 48) = 7.17, p < .067, Nagelkerke R^2 = .19.$			
Step 2				
	Consideration of Future Consequences	.28	.154	1.32
	Impulsivity	-.96	.699	.38
	Desirability of Control	4.35	.094	77.35
	State Desperation (9 th round)	1.44	.006	4.22
Model Statistics	$\chi^2(4, N = 48) = 52.56 p < .001, Nagelkerke R^2 = .89.$			

Research question 1

To determine if the variable of state desperation (measured at the 9th round) mediates the relationship between superstitious behavior and desirability of control a mediation analysis was conducted. Due to a technical limitation in the current PROCESS software (Hayes, 2012), wherein dichotomous outcome variables cannot be calculated, the Baron and Kenny approach (1986) was used. Using this method, there are four steps to determine if a mediation is present. First, demonstrate that the predictor (desire for control) is related to the outcome variable (superstitious behavior), denoted by the c path. Second, demonstrate that the predictor is related to the mediator (desperation), denoted by a path. Third, demonstrate the mediate predicts the

outcome variable, denoted by the b path. Finally, demonstrate the mediation by showing a decrease in the relationship between the predictor and the outcome when controlling for the mediator, denoted by the c' path.

Overall, it would appear that both desire for control and desperation predict superstitious behaviors independently (as shown in all previous analyses). Moreover, when desperation is controlled for, the predictive ability of desire of control is negated. However, step two was not supported. That is, desire for control does not predict desperation. See Figure 1 for an illustration of the mediation analyses.

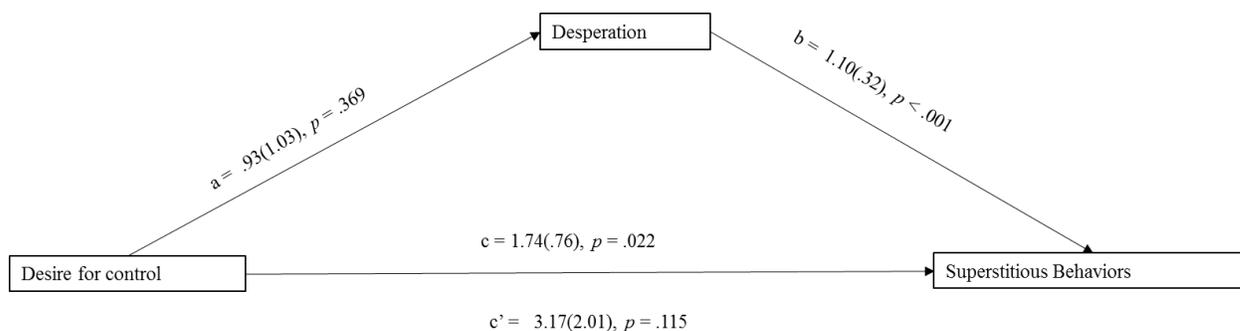


Figure 1. Mediation analysis of desire for control, state desperation, and superstitious behavior.

Research question 2

To determine if the variable of state desperation (measured at the 9th round) moderates the relationships between superstitious behavior and desirability of control, a moderated regression was conducted. First, desperation and need for control were both centered on the mean and entered into the first step. In the second step, we entered the interaction term. The results suggest that desperation was the only significant predictor, and that there was no interaction between them, and thus no moderation (see Table 5).

Table 5.

Moderated Regression of State Desperation (9th round) and Desire for Control on Superstitious Behaviors (N = 48).

	Predictors	b	p	OR
Step 1				
	Desire for control	3.17	.115	23.88
	State Desperation	1.10	.001	2.99
Model Statistics	$\chi^2(2, N = 48) = 49.67, p < .001, Nagelkerke R^2 = .86.$			
Step 2				
	Desire for control	2.81	.140	16.53
	State Desperation	1.13	.001	3.09
	Interaction	.36	.578	1.44
Model Statistics	$\chi^2(3, N = 48) = 49.98, p = < .001, Nagelkerke R^2 = .87.$			

Chapter 5: Discussion

The overall goal of this study was to evaluate the potential positive connection between desperation and superstition. The lab experiment attempted to create a high stakes environment through the simulated game of chance, War. The game, and the incremental winnings totaling in \$100, was used to create a convincing gambling scenario where participants believed they had a chance at winning. The uncertainty in this artificially created circumstance was used to elicit a desire for control, as outlined by Burger (1991). It was predicted that superstitious behavior would be more readily used when individuals were placed in situations that contained uncertainty and whose outcomes appeared to be random. Furthermore, it was believed that such ambiguity and insecurity in lack of choice when playing a game of chance (e.g. War) would lead to individuals feeling desperate, especially if the consequences were salient enough (i.e. potentially winning or losing \$100).

It was predicted that the desperation individuals felt would lead them to behave superstitiously. This study used four separate statistical tests to assess the potential connection between desperation and superstition. First, a repeated measures ANOVA verified that the “All-or-Nothing” manipulation, in which participants were told that in the last round they could win the full \$100 reward or lose all their winnings, increased desperation. Moreover, correlational

analyses supported the positive relationship between feelings of desperation and engagement in superstitious behaviors.

Additionally regression analyses examined whether desirability of control and desperation predicted the use of superstitious behavior. Results indicated that desperation often leads to the use of superstitious behaviors, beyond even desirability of control, a prominent explanation for superstition use (Burger & Lynn, 2005; Fluke et al., 2014; Langer, 1975).

The first hypothesis proposed that desperation, desirability of control, and external locus of control would be correlated with superstitious beliefs. Both desirability of control (Burger & Lynn, 2005; Langer, 1975) and external locus of control (Fluke et al., 2014) have previously been correlated with belief in superstitions. In this study superstitious beliefs were gauged in the pre-online portion by both belief in general superstitions (i.e. BSS measure) and more specifically, gambling superstitions. For example, a belief that black cats are bad luck would be considered a general superstition, while beliefs in positive hunches or bad vibes when playing games of chance are more specific to gambling. Both these scales were chosen in order to cover the wide and varying range of superstitious beliefs. The Gambling Superstition Belief Scale was also a way to expressly measure superstitious beliefs that pertained to the in-lab game simulation. External locus of control was found to have a positive relationship with both types of superstitious beliefs (i.e. general and gambling specific), replicating and further supporting the findings of Fluke and colleagues (2014).

Desperation and desirability of control had a positive relationship with superstitious gambling beliefs, yet they shared no relationship with the more general superstitious beliefs. Though differing types of superstitious beliefs (e.g. belief in ghosts vs. belief in lucky coins) was not expected to play a role in the relationship between these constructs, it is nevertheless

interesting to note. Future studies interested in the inter-relationships between desperation, control, and superstitious belief should examine the distinctions in the various types of superstitions and how these constructs may interact.

The second hypothesis postulated that desperation and desirability of control would positively predict the use of superstitious behaviors. To test this, participants in the lab were apprised of the “All-or-Nothing” final round in the simulated game of War. In the previous rounds their feelings of desperation, stress, and control were measured. Immediately after participants were notified of the stipulated final round they were evaluated once again on these constructs. Results indicated that participants were indeed feeling higher levels of desperation and that these participants were more likely to use superstitious behaviors before revealing the final cards in the last round. On the other hand, desirability of control was not found to be a positive predictor of superstitious behavior. This was surprising, seeing as past literature has shown that a desire for control can lead to subsequent use of superstitious behaviors (Langer, 1975). Though the relationship between desirability of control and use of superstition was not replicated in this study, desperation was substantiated as a predictor in the use of superstitions in this experiment. Thus our second hypothesis was only partially supported by our data.

Though desperation was shown to be a predictor of superstitious behaviors, the goal of hypothesis three was to test if desperation was a better predictor beyond desirability of control and other explanatory constructs, such as impulsivity and consideration of future consequences. The results indicated that desperation was indeed a greater predictor of engaging in superstitious behavior beyond the other aforementioned variables. Consideration of future consequences and impulsivity did not significantly contribute to the model. Though the overall model in step one was significant with the inclusion of desirability of control, when desperation was added in step

two, the model became more robust. Desperation's predictive power overshadowed that of desirability of control for whether participants would use superstitious behaviors during the last round of the experiment.

The mediation analysis showed surprising results. That is, both desirability for control and desperation predict engagement in superstitious behaviors. Moreover, when desperation is controlled for, the predictive relationship between control and behavior is diminished. However, control does not predict desperation. This may mean that the overall findings suggest that the relationship is not causal. That is, need for control does not lead to desperation, which then leads to superstitious behavior. Instead, this may suggest parallel processes, or perhaps, that there is a mediating or even moderating variable between one's need for control and one's feelings of desperation.

It is important to note that because there were technical limitations in the PROCESS macro for SPSS, the mediation analysis was conducted using guidelines provided by Baron and Kenny (1986). This methodology is somewhat controversial as many now consider this method to be outdated (Hayes, 2009), and thus the analyses should be interpreted with caution. That is, according to Baron and Kenny (1986), you cannot proceed with the full mediational analysis if path a is not significant. However, newer information suggests that you can still have an indirect effect even when path a is not significant (Hayes, 2012). As this was just a research question, future researchers may want to create a study with this specific hypothesis in mind, and examine further the variables needed in the model.

An additional research question led to a moderation analysis of the three variables. However, the results suggest that desire for control does not interact with desperation to increase the use of superstitious behaviors. In fact, closer examination of the coefficients would suggest

that it is not desire for control at all, but is desperation that is really the impetus. As in the mediation analysis, future research should take into account what other variables might be a better mix to create an instance where desperation leads to superstitious behaviors.

Limitations and Improvements

Despite the results supporting the hypotheses, there were some limitations and promising improvements that could be made for studies in the future. The greatest limitation to this study was the arguably insufficient sample size resulting in a potential lack of power described in the methodology section prior. The estimated adequate power level for the in-lab portion of this study was determined to be a minimum of 62 participants. The final sample size collected was 48. Though all predictions were confirmed despite the power loss, this deficiency in strength could potentially affect the overall generalizability of the results. In light of this limitation it is encouraged to apply caution when extrapolating these findings beyond the explanations interpreted here. Like most studies, larger samples for suitable replication and further testing will be needed before full confidence can be asserted.

Another limitation arises from the demographics of the convenience sample. Though past literature has not shown notable differences in sex or age for the use of superstitions, it would be remiss if the imbalances within this sample were not briefly mentioned. In both samples for this study, females greatly outnumbered male participants 3:1. Furthermore, the average age of participants was approximately 19 years old. Though this youthful female skew is typical within the region collected, future attempts at replicating this study should strive to collect a more balanced sample to control for the possible effects of gender and age.

Beyond limitations, general improvements could be made to enhance the methodology of this experiment and garner further support for the predictions made. While conducting this

experiment it became clear to both the experimenters and confederates that the sense of uncertainty and feelings of desperation could potentially be more prominent if the consequences or risk of loss involved were greater. Admittedly this discovery did not occur until the experiment was well underway. A handful of participants mentioned during the post debriefing session that they would have felt more strongly about losing, and more invested in the game in general, if they had something of their own to lose. Though most participants were excited at the potential opportunity of winning \$100, they also remarked that since they came in with nothing the idea of leaving with nothing was not particularly devastating. Typically in gambling scenarios, the gambler is betting their own money at a chance of winning more than what they originally wagered. In our experiment participants had nothing to lose and, if the deception was successful, believed they potentially had a chance at winning some amount of money. Loss aversion has been shown to be a powerful motivator in the cognitive literature (Tversky & Kahneman, 1991) and could potentially be a boon in creating a more realistic gambling experience. In other words, to increase uncertainty with each round of War and to more reliably increase feelings of desperation, participants need to feel that something is at stake. Possible improvements aside, the “All-or-Nothing” manipulation still succeeded in increasing desperation among our participants and was enough to satiate the questions derived for this current study.

In order to create a more authentic gambling environment, future researchers may wish to alter the methodology to include options in which participants can place bets of their own. Though asking participants to bet their own money is both unethical in practice and unreasonable to expect; a more reasonable solution might be a point-based system in which participants could wager a desired amount of points during the game of War and spend those points on potential, various costing rewards afterwards. Or, perhaps there might be a way of allowing participants to

wager their study participation points. Regardless of the method, a scenario which includes greater consequences and perceived potential loss for the participant may fair better in creating a more genuine feeling of uncertainty and desperation, especially if they are told they could be losing everything they earned in the final round.

Conclusion

This study indicates that desperation may act as a link between circumstances of uncertainty and the use of superstitious behaviors. Past research would suggest that situations that lack control (i.e. games of chances) may create insecurity and doubt and might ultimately lead individuals to engage in superstitious behaviors. However, the feeling of desperation appears to be a greater predictor or catalyst for engaging in superstitious behaviors. This desperation, for good or bad, motivates the individual to take action, ostensibly, in order to regain control and relieve their distress. For those who hold superstitious beliefs, these actions may result in superstitious behaviors. The results of this study could be considered as both a replication and extension of Burger and Lynn's (2005) uncertainty hypothesis. Included in the mix of possible explanations for the use of superstitions, feelings of desperation may act as a mediator between superstitious beliefs and the use superstitious behaviors. Restated, this modification would assert that superstitious individuals who are placed in situations of uncertainty become desperate to regain control, these feelings motivate the individual to engage in superstitious behaviors in order to relieve the distress and recover their perceived loss of control. Though a minor modification overall, the results of this study highlight the predictive power and importance of desperation in the explanation for the use of superstitious behaviors, even beyond a desirability of control. Without acknowledging this key emotional and motivational component, we may be overlooking a significant explanatory factor in the use of

superstitions. It is my hope that these findings further aid our understanding of superstitious beliefs and serves as a contribution to the psychological explanation for the continued practice and use of superstitions among our species.

	0	1	2	3	4	5	6	7	8	9
10. It is important to avoid unlucky actions.										
Strongly Disagree									Strongly Agree	
	0	1	2	3	4	5	6	7	8	9
11r. I would be okay staying on the 13th floor of a hotel.										
Strongly Disagree									Strongly Agree	
	0	1	2	3	4	5	6	7	8	9
12. Carrying a rabbit's foot can increase your luck.										
Strongly Disagree									Strongly Agree	
	0	1	2	3	4	5	6	7	8	9
13. I often attempt to change my luck										
Strongly Disagree									Strongly Agree	
	0	1	2	3	4	5	6	7	8	9
14. Doing things a certain way can change your luck, for good or bad.										
Strongly Disagree									Strongly Agree	
	0	1	2	3	4	5	6	7	8	9
15r. Trying to change your luck is a waste of time.										
Strongly Disagree									Strongly Agree	
	0	1	2	3	4	5	6	7	8	9
16r. Walking under a ladder has no effect on the rest of my day.										
Strongly Disagree									Strongly Agree	
	0	1	2	3	4	5	6	7	8	9
17r. The only 'bad luck' that happens after breaking a mirror is you have to pick up the pieces.										
Strongly Disagree									Strongly Agree	
	0	1	2	3	4	5	6	7	8	9
18r. I enjoy doing 'unlucky' things just to make people worry.										
Strongly Disagree									Strongly Agree	
	0	1	2	3	4	5	6	7	8	9

Appendix C. *GSBS; Joukhador, Blaszczyński, & Maccallum, 2004*

Please be sure to answer all of the items below, even if you are not certain of the best answer.

1. My hunches have a big influence on my winning.

0	1	2	3	4
Not At All				Very Much

2. Sometimes I get spiritual help when gambling.

0	1	2	3	4
Not At All				Very Much

3. When I'm feeling down I just know that my luck will be bad.

0	1	2	3	4
Not At All				Very Much

4. If someone is sitting or standing next to me that I feel is giving me "bad vibes" then I need to change or I don't win.

0	1	2	3	4
Not At All				Very Much

5. I often get hunches which I must follow.

0	1	2	3	4
Not At All				Very Much

6. I think I have the psychic ability to predict a winner.

0	1	2	3	4
Not At All				Very Much

7. I'm superstitious about the way I gamble.

0	1	2	3	4
Not At All				Very Much

8. I have a ritual which I must carry out when I'm gambling.

0	1	2	3	4
Not At All				Very Much

Appendix D. *MLOC; Levenson, 1973*

For each of the following statements, indicate the extent to which you agree or disagree by writing in the appropriate number.

-3 = strongly disagree

-2 = disagree somewhat

-1 = slightly disagree

+1 = slightly agree

+2 = agree somewhat

+3 = strongly agree

1. Whether or not I get to be a leader depends mostly on my ability.
2. To a great extent my life is controlled by accidental happenings.
3. I feel like what happens in my life is mostly determined by powerful people.
4. Whether or not I get into a car accident depends mostly on how good a driver I am.
5. When I make plans, I am almost certain to make them work.
6. Often there is no chance of protecting my personal interests from bad luck.
7. When I get what I want, it's usually because I'm lucky.
8. Although I might have good ability, I will not be given leadership responsibility without appealing to those in positions of power.
9. How many friends I have depends on how nice a person I am.
10. I have often found that what is going to happen will happen.
11. My life is chiefly controlled by powerful others.
12. Whether or not I get into a car accident is mostly a matter of luck.
13. People like myself have very little chance of protecting our personal interests when they conflict with those of strong pressure groups.
14. It's not always wise for me to plan too far ahead because many things turn out to be a matter of good or bad fortune.
15. Getting what I want requires pleasing those people above me.

16. Whether or not I get to be a leader depends on whether I'm lucky enough to be in the right place at the right time.
17. If important people were to decide they didn't like me, I probably wouldn't make many friends.
18. I can pretty much determine what will happen in my life.
19. I am usually able to protect my personal interests.
20. Whether or not I get into a car accident depends mostly on the other driver.
21. When I get what I want, it's usually because I worked hard for it.
22. In order to have my plans work, I make sure that they fit in with the desires of people who have power over me.
23. My life is determined by my own actions.
24. It's chiefly a matter of fate whether or not I have a few friends or many friends.

Appendix E. *DCS; Burger & Cooper, 1979*

Below you will find a series of statements. Please read each statement carefully and respond to it by expressing the extent to which you believe the statement applies to you. For all items, a response from 1 to 7 is required. Use the number that best reflects your belief when the scale is defined as follows:

- 1 = The statement does not apply to me at all**
2 = The statement usually does not apply to me
3 = Most often, the statement does not apply
4 = I am unsure about whether or not the statement applies to me, or it applies to me about half the time
5 = The statement applies more often than not
6 = The statement usually applies to me
7 = The statement always applies to me

- | | | | | | | | | |
|---|---|---|---|---|---|--|--|----------------|
| 1. I prefer a job where I have a lot of control over what I do and when I do it. | | | | | | | | |
| Strongly Disagree | | | | | | | | Strongly Agree |
| 1 | 2 | 3 | 4 | 5 | 6 | | | 7 |
| | | | | | | | | |
| 2. I enjoy political participation because I want to have as much of a say in running government as possible. | | | | | | | | |
| Strongly Disagree | | | | | | | | Strongly Agree |
| 1 | 2 | 3 | 4 | 5 | 6 | | | 7 |
| | | | | | | | | |
| 3. I try to avoid situations where someone else tells me what to do. | | | | | | | | |
| Strongly Disagree | | | | | | | | Strongly Agree |
| 1 | 2 | 3 | 4 | 5 | 6 | | | 7 |
| | | | | | | | | |
| 4. I would prefer to be a leader than a follower. | | | | | | | | |
| Strongly Disagree | | | | | | | | Strongly Agree |
| 1 | 2 | 3 | 4 | 5 | 6 | | | 7 |
| | | | | | | | | |
| 5. I enjoy being able to influence the actions of others. | | | | | | | | |
| Strongly Disagree | | | | | | | | Strongly Agree |
| 1 | 2 | 3 | 4 | 5 | 6 | | | 7 |
| | | | | | | | | |
| 6. I am careful to check everything on an automobile before I leave for a long trip. | | | | | | | | |
| Strongly Disagree | | | | | | | | Strongly Agree |
| 1 | 2 | 3 | 4 | 5 | 6 | | | 7 |

7. Others usually know what is best for me.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree 7
8. I enjoy making my own decisions.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree 7
9. I enjoy having control over my own destiny.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree 7
10. I would rather someone else take over the leadership role when I'm involved in a group project.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree 7
11. I consider myself to be generally more capable of handling situations than others are.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree 7
12. I'd rather run my own business and make my own mistakes than listen to someone else's orders.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree 7
13. I like to get a good idea of what a job is all about before I begin.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree 7
14. When I see a problem, I prefer to do something about it rather than sit by and let it continue.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree 7
15. When it comes to orders, I would rather give them than receive them.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree 7
16. I wish I could push many of life's daily decisions off on someone else.

Strongly Disagree							Strongly Agree
1	2	3	4	5	6	7	

17. When driving, I try to avoid putting myself in a situation where I could be hurt by another person's mistake.

Strongly Disagree							Strongly Agree
1	2	3	4	5	6	7	

18. I prefer to avoid situations where someone else has to tell me what it is I should be doing.

Strongly Disagree							Strongly Agree
1	2	3	4	5	6	7	

19. There are many situations in which I would prefer only one choice rather than having to make a decision.

Strongly Disagree							Strongly Agree
1	2	3	4	5	6	7	

20. I like to wait and see if someone else is going to solve a problem so that I don't have to be bothered with it.

Strongly Disagree							Strongly Agree
1	2	3	4	5	6	7	

Appendix F. *CFC; Strathman, A., Gleicher, F., Boninger, D. S., & Edwards, C. S., 1994*

For each of the statements below, please indicate whether or not the statement is characteristic of you.		Extremely uncharacteristic	Somewhat uncharacteristic	Uncertain	Somewhat characteristic	Extremely characteristic
		(1)	(2)	(3)	(4)	(5)
[CCFCS1]	I consider how things might be in the future, and try to influence those things with my day to day behavior.					
[CCFCS2]	Often I engage in a particular behavior in order to achieve outcomes that may not result for many years.					
[CCFCS3]	I only act to satisfy immediate concerns, figuring the future will take care of itself.					
[CCFCS4]	My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions.					
[CCFCS5]	My convenience is a big factor in the decisions I make or the actions I take.					
[CCFCS6]	I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes.					
[CCFCS7]	I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years.					
[CCFCS8]	I think it is more important to perform a behavior with important distant consequences than a behavior with less-important immediate consequences.					
[CCFCS9]	I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis level.					
[CCFCS10]	I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time.					
[CCFCS11]	I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date.					
[CCFCS12]	Since my day to day work has specific outcomes, it is more important to me than behavior that has distant outcomes.					

Appendix G. *UPSS; Whiteside, S. P., & Lynam, D. R., 2001*

For each of the following statements, indicate the degree to which the statement describes you.		Not at all	A little	Somewhat	Much	Very much
		(0)	(1)	(2)	(3)	(4)
[BIMPUL1]	I have a reserved and cautious attitude toward life.					
[BIMPUL2]	My thinking is usually careful and purposeful.					
[BIMPUL3]	I am not one of those people who blurt out things without thinking.					
[BIMPUL4]	I like to stop and think things over before I do them.					
[BIMPUL5]	I don't like to start a project until I know exactly how to proceed.					
[BIMPUL6]	I tend to value and follow a rational, "sensible" approach to things.					
[BIMPUL7]	I usually make up my mind through careful reasoning.					
[BIMPUL8]	I am a cautious person.					
[BIMPUL9]	Before I get into a new situation, I like to find out what to expect from it.					
[BIMPUL10]	I usually think carefully before doing anything.					
[BIMPUL11]	Before making up my mind, I consider all the advantages and disadvantages.					
[BIMPUL12]	I have trouble controlling my impulses.					
[BIMPUL13]	I have trouble resisting my cravings (for food, cigarettes, etc.).					
[BIMPUL14]	I often get involved in things I later wish I could get out of.					
[BIMPUL15]	When I feel bad, I will often do things I later regret in order to make myself feel better now.					
[BIMPUL16]	Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.					
[BIMPUL17]	When I am upset, I often act without thinking.					
[BIMPUL18]	When I feel rejected, I will often say things that I later regret.					
[BIMPUL19]	It is hard for me to resist acting on my feelings.					
[BIMPUL20]	I often make matters worse because I act without thinking when I am upset.					
[BIMPUL21]	In the heat of an argument, I will often say things that I later regret.					
[BIMPUL22]	I am always able to keep my feelings under control.					
[BIMPUL23]	Sometimes I do things on impulse that I later regret.					
[BIMPUL24]	I generally seek new and exciting experiences and sensations.					
[BIMPUL25]	I will try anything once.					
[BIMPUL26]	I like sports and games in which you have to choose your next move very quickly.					
[BIMPUL27]	I would enjoy water skiing.					
[BIMPUL28]	I quite enjoy taking risks.					
[BIMPUL29]	I would enjoy parachute jumping.					
[BIMPUL30]	I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.					
[BIMPUL31]	I would like to learn to fly an airplane.					

[BIMPUL32]	I sometimes like doing things that are a bit frightening.					
[BIMPUL33]	I would enjoy the sensation of skiing very fast down a high mountain slope.					
[BIMPUL34]	I would like to go scuba diving.					
[BIMPUL35]	I would enjoy fast driving.					

Appendix H. *SDS; Hannan & Hackathorn, under review*

Please answer the questions below, be as honest as possible and make your best estimate.

1. At this moment, I feel hopeless.									
Does not describe									
at all									
0	1	2	3	4	5	6	7	8	9
2. At this moment, I feel as though I need to act/do something.									
Does not describe									
at all									
0	1	2	3	4	5	6	7	8	9
3. At this moment, I feel as though I have no control.									
Does not describe									
at all									
0	1	2	3	4	5	6	7	8	9
4. At this moment, I feel as though I need help.									
Does not describe									
at all									
0	1	2	3	4	5	6	7	8	9
5. At this moment, I feel alone.									
Does not describe									
at all									
0	1	2	3	4	5	6	7	8	9
6. At this moment, I feel as though it is urgent to act/do something.									
Does not describe									
at all									
0	1	2	3	4	5	6	7	8	9
7. At this moment, I feel as though I have to act quickly.									
Does not describe									
at all									
0	1	2	3	4	5	6	7	8	9
8. At this moment, I feel frantic to act/do something.									
Does not describe									
at all									
0	1	2	3	4	5	6	7	8	9
9. How desperate do you feel at this moment?									
Not									
at all									
0	1	2	3	4	5	6	7	8	9
Extremely Desperate									

Appendix I. *BSDS; Haghghat, 2007*

Please answer the questions below with either a “Yes” or “No” response, be as honest as possible and make your best estimate.

1. Would you smile at someone every time you met them? _____
2. Do you always practice what you preach to others? _____
3. If you say to people that you will do something, do you always keep our promise no matter how inconvenient it might be? _____
4. Would you ever lie to people? _____

Appendix J. *Demographics*

Please read and answer each of the following questions as honestly as possible.

Age _____

Current biological sex (circle one): Male Female

How do you prefer to identify your gender: _____

Year in college (circle one): Freshman Sophomore Junior Senior

Parent's Highest Level of Education:

Some High School High School Diploma Some College
 Associate's Degree Bachelor's Degree Master Degree
 Doctoral Level Degree (e.g., PhD)

Ethnicity/Race:

African American Bi-racial Caucasian/White
 Hispanic/Latina-Latino Asian/ Pacific Islander Middle Eastern
 Native American Other (Specify)_____

Religious affiliation (circle one):

Christianity Judaism Islam Hinduism Buddhism

Spiritual Nonreligious Other (please specify): _____

How often do you attend religious services?

Every week Almost every week
 Once or twice a month A few times a year Never

How spiritual would you consider yourself?

0 1 2 3 4
 Not At All Very Much

Political ideology (circle one):

Liberalism (Left) - -- Centrism (Moderate) ---Conservativism (Right)

None/Not applicable

Appendix K. *E-prime War Screenshots*

Bank:
\$50



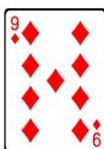
Press *spacebar* to flip card.



Bank:
\$50



Press *spacebar* to flip card.



Bank:
\$50



Press *spacebar* to flip card.



Bank:
\$40

You lose!



Press *spacebar* to continue.

Appendix L. *Perceived Control Reanalysis Results*

To examine whether the variables of state desperation and perceived control (both measured at the 9th round) positively predict the use of superstitious behaviors in the final round, a multiple binary logistic regression was conducted. The predictor variables were state desperation and perception of control at the moment. A logistic regression analysis was employed and a test of the full model (95.8% accuracy) was statistically significant, $\chi^2(2, N = 48) = 45.87, p < .001, Nagelkerke R^2 = .83$. Desperation was a significant predictor of superstitious behaviors, $OR = 3.16, p < .001$, whereas perception of control was not, $OR = 1.02, p = .961$. Overall, the results of this analysis were similar to the findings of hypothesis two.

To analyze whether the variable of state desperation (measured at the 9th round) will be a greater predictor for the use of superstitious behaviors, above and beyond variables such as consideration of future consequences, impulsivity, and perception of control (also measured at the 9th round) a hierarchical binary logistic regression was conducted. The predictors consideration of future consequences, impulsivity, and perception of control were entered at step one of the regression, while desperation was entered at step two. Results indicated that in the first step none of the listed predictors were significant. However, upon the addition of desperation, the model was significant and accounted for a great amount of variance (see Table 6). These results are similar to the findings for the third hypothesis. Desperation predicts the use of superstitious behaviors above and beyond the aforementioned variables.

Table 6.

Summary of Hierarchical Regression Analysis for Variables predicting Superstition (N = 48)

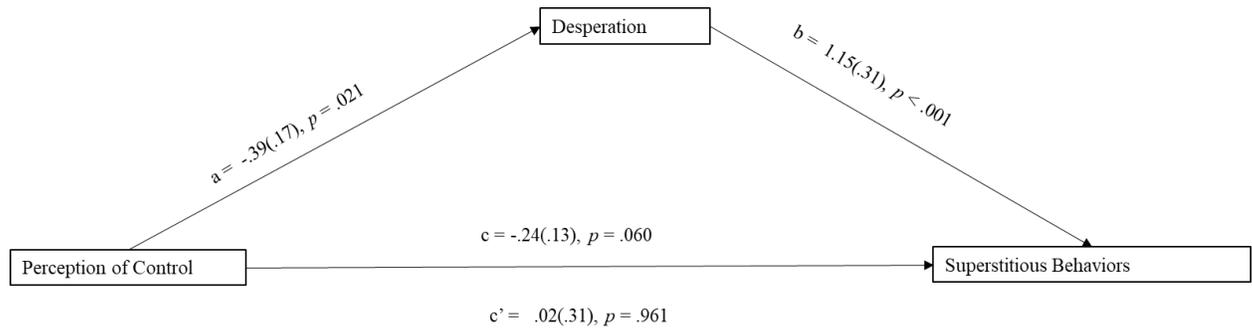
	Predictors	b	p	OR
Step 1				
	Consideration of Future Consequences	.03	.502	1.03
	Impulsivity	.14	.854	1.15
	Perception of Control	-.24	.061	.79
Model Statistics	$\chi^2(3, N = 48) = 4.66, p = .199, Nagelkerke R^2 = .12.$			
Step 2				
	Consideration of Future Consequences	.12	.336	1.12
	Impulsivity	1.10	.516	2.99
	Perception of Control	.07	.806	1.07
	Desperation	1.26	.001	3.54
Model Statistics	$\chi^2(4, N = 48) = 47.53 p < .001, Nagelkerke R^2 = .84.$			

To determine if the variable of state desperation (measured at the 9th round) mediates the relationship between superstitious behavior and perception of control a mediation analysis was conducted. Due to a technical limitation in the current PROCESS software (Hayes, 2012), wherein dichotomous outcome variables cannot be calculated, the Baron and Kenny approach (1986) was used. Using this method, there are four steps to determine if a mediation is present. First, demonstrate that the predictor (perception of control) is related to the outcome variable (superstitious behavior), denoted by the c path. Second, demonstrate that the predictor is related to the mediator (desperation), denoted by a path. Third, demonstrate the mediator predicts the outcome variable, denoted by the b path. Finally, demonstrate the mediation by showing a decrease in the relationship between the predictor and the outcome when controlling for the mediator, denoted by the c' path.

It would appear desperation was the only predictor of superstitious behaviors. While perception of control was related to desperation, step one was not supported. That is, perception

of control does not predict superstitious behaviors. See Figure 2 for an illustration of the mediation analyses.

Figure 2. Mediation analysis of perception of control, desperation, and superstitious behavior.



To determine if the variable of state desperation (measured at the 9th round) moderates the relationships between superstitious behavior and perception of control (also measured at the 9th round), a moderated regression was conducted. First, desperation and perception of control were both centered on the mean and entered into the first step. In the second step, we entered the interaction term. The results suggest that desperation was the only significant predictor, and that there was no interaction between them, and thus no moderation (see Table 7).

Table 7.

Moderated Regression of Desperation and Perception of Control on Superstitious Behaviors (N = 48).

	Predictors	b	p	OR
Step 1				
	Perception of control	.02	.961	1.02
	Desperation	1.15	.001	3.16
Model Statistics	$\chi^2(2, N = 48) = 45.87, p < .001, Nagelkerke R^2 = .83.$			
Step 2				
	Perception of control	.51	.991	1.66
	Desperation	3.77	.001	4.57
	Interaction	14.04	.990	1.25
Model Statistics	$\chi^2(3, N = 48) = 52.36, p = < .001, Nagelkerke R^2 = .89.$			

Appendix M. IRB Approval Letter

**Institutional Review Board**

328 Wells Hall
 Murray, KY 42071-3318
 270-809-2916 • msu.ibr@murraystate.edu

TO: Jana Hackathorn, Psychology

FROM: Jonathan Baskin, IRB Coordinator *JB*

DATE: 2/5/2019

RE: Human Subjects Protocol I.D. – IRB # 19-094

The IRB has completed its review of your student's Level 2 protocol entitled *Beliefs, Behaviors, Gambling and Emotions*. After review and consideration, the IRB has determined that the research, as described in the protocol form, will be conducted in compliance with Murray State University guidelines for the protection of human participants.

The forms and materials that have been approved for use in this research study are attached to the email containing this letter. These are the forms and materials that must be presented to the subjects. Use of any process or forms other than those approved by the IRB will be considered misconduct in research as stated in the MSU IRB Procedures and Guidelines section 20.3.

Your stated data collection period is from 2/5/2019 to 5/10/2019.

If data collection extends beyond this period, please submit an Amendment to an Approved Protocol form detailing the new data collection period and the reason for the change.

This Level 2 approval is valid until 2/4/2020.

If data collection and analysis extends beyond this date, the research project must be reviewed as a continuation project by the IRB prior to the end of the approval period, 2/4/2020. You must reapply for IRB approval by submitting a Project Update and Closure form (available at murraystate.edu/ibr). You must allow ample time for IRB processing and decision prior to your expiration date, or your research must stop until such time that IRB approval is received. If the research project is completed by the end of the approval period, then a Project Update and Closure form must be submitted for IRB review so that your protocol may be closed. It is your responsibility to submit the appropriate paperwork in a timely manner.

The protocol is approved. You may begin data collection now.

**Opportunity
afforded**

murraystate.edu

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