RISKY BEHAVIOR, MATE VALUE, AND LOW MOOD: 
IS IT ADAPTIVE FOR MEN TO BE RISK TAKERS? 

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BY 
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# TABLE OF CONTENTS

ACKNOWLEDGEMENTS .................................................................................................................. 4  
ABSTRACT ........................................................................................................................................... 6  
INTRODUCTION ................................................................................................................................... 8  
METHODS ......................................................................................................................................... 15  
   A. Participants ................................................................................................................................. 15  
   B. Materials ..................................................................................................................................... 16  
       a. Demographic form ................................................................................................................... 16  
       b. Decision Problems ................................................................................................................ 16  
          i. Resource Loss Problem ...................................................................................................... 17  
          ii. Medical Loss Problem ..................................................................................................... 17  
       c. Mate Value Inventory ............................................................................................................ 18  
       d. Depression-Dejection Subscale of the Profile of Mood States—SF ................................ 19  
   C. Procedures .................................................................................................................................. 20  
   D. Variables ..................................................................................................................................... 21  
       a. Independent Variables and Operational Definition ............................................................ 21  
       b. Dependent Variables and Operational definitions ............................................................. 21  
RESULTS ........................................................................................................................................... 22  
   A. Data Screening, Assumptions, and Internal Consistency of Scales ......................................... 22  
   B. Primary Analyses ...................................................................................................................... 23  
DISCUSSION ..................................................................................................................................... 24  
   A. Results ........................................................................................................................................ 24  
   B. Limitations .................................................................................................................................. 29  
   C. Conclusions ............................................................................................................................... 31  
REFERENCES ...................................................................................................................................... 33  
APPENDICES ..................................................................................................................................... 38  
   A. Appendix A: Definition of Terms and Relevant Theoretical Constructs ................................. 39  
   B. Appendix B: Literature Review and References ....................................................................... 42  
   C. Appendix C: Consort Table ....................................................................................................... 83  
   D. Appendix D: Demographic Questionnaire ................................................................................. 84  
   E. Appendix E: Decision Problems .............................................................................................. 85  
   F. Appendix F: Mate Value Inventory (MVI) .................................................................................. 86  
   G. Appendix G: Depression Dejection Subscale of the Profile of Mood States—Short Form ........ 91  
   H. Appendix H: Introductory Statement ......................................................................................... 92  
   I. Appendix I: Consent for Participation ....................................................................................... 93  
   J. Appendix J: Debriefing Statement ............................................................................................ 95  
   K. IRB Approval Letter ................................................................................................................... 96
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The risky behavior of males has been proposed to be a strategy to display the relative quality of men’s genes and increase their competitiveness in gaining access to a mate. Low mood, a constellation of depression symptoms with less severity than to warrant a Major Depressive Disorder diagnosis, has been proposed to be an adaptive strategy to reduce harm and conserve energy in the face of competition. It is hypothesized in this study that males’ strategy of gaining access to a mate through displaying risky behavior will result in higher perceptions of their own value as a mate and the value of their short-term and long-term mates. It is also hypothesized that men who engage in risky behavior to increase their competitiveness will display fewer low mood symptoms than those who do not engage in risky behavior. Two hundred forty men between the ages of 18-36 years completed decision problems assessing risk preference and aversion, the Mate Value Inventory, and the Depression-Dejection subscale of the Profile of Mood States-Short Form. The results of a MANOVA analysis suggest that there were no significant differences between risky and non-risky males on their perception of their own mate value, the value of their short-term or long-term mates, and on low mood. The discussion
focuses on the possible reasons for the pattern of responses displayed by the participants and methodological concerns.
Introduction

The risk behavior literature is somewhat consistent in regards to two major conclusions: 1) that men engage in more risky behavior than women (e.g., Byrnes, Miller, & Schafer, 1999), and 2) risk preference declines with age, with adolescents being more risk seeking than any other age group (c.f., Gans, Blyth, Elster, & Gavera, 1990; Wilson & Daly, 1981). There has been a plethora of theories targeting these trends as risk became a popular topic in psychology, beginning in the 1960s (c.f., Elkind, 1967; Kahneman & Tversky, 1979; Zuckerman, Eyesenck, & Eyesenck, 1978). The researchers in this area offered suggestions as to the cause of the behavior and the resulting deleterious effects it has to the individual and to society as a whole. These explanations lead to a few basic questions; if risky behavior is uniformly harmful first, how did it originate and second, why does it continue? This study will attempt to examine risky behavior from a Darwinian approach suggesting that risky behavior originated as an adaptive response by men to gender specific sexual selection pressures, selection pressures that continue to effect the two genders differently (Bleige Bird, Smith, & Bird, 2001; Hawkes & Bleige Bird, 2002).

Zuckerman (1991) proposes that males have a sensation-seeking personality that eventually results in deleterious health concerns and/or dangerous activities. Recently, there has been resurgence in the risk literature, examining it from an adaptive perspective. Darwinian based theories of human beings’ tendency to take risks (e.g., sky diving, driving a car fast, etc.) suggest that men engage in risky behavior as an adaptive mechanism (Buss, 2003; Daly & Wilson, 1994). As humans developed in our ancestral environment they were faced with certain survival pressures and dangers affecting how they behaved. For example, as individuals competed for resources (i.e., food, land, etc.), developed within group hierarchies of power, and
competed for access to mates, they looked for intangibles that would help them effectively compete and be successful at each task to gain access to these resources. According to the theory, doing so would be adaptive. One of these intangibles is the quality of one’s genes (Hawkes & Bleige Bird, 2002) as it relates to improved likelihood of survival. Individuals with “stronger genes” (See Definition of Terms and Relevant Theoretical Constructs in Appendix A. p. 44) would be physically larger, bigger and stronger than those with “weaker genes”, providing them with an advantage when competing for resources or engaging in physical confrontations. Moreover, men with “stronger genes” were more successful at fathering healthy children than men were men with “weaker genes”. As a result, other males seeking an ally, or females seeking an effective mating partner sought individuals who were perceived to be physically stronger (i.e. with “strong genes”) (Baker Jr, & Maner, 2008). As the relative quality of one’s genes is not readily apparent to those searching, our ancestors looked for cues that may indicate the quality of a man’s genes (See Definition of Terms and Relevant Theoretical Constructs in Appendix A. p. 44) (Bleige Bird, Smith, & Bird, 2001; Hawkes & Bleige Bird, 2002). Risk taking behavior, observable by others, has been conceptualized as one example of such a cue, as suggested in Costly signaling theory (Hawkes, 1991) as explained below.

Parental investment theory (Trivers, 1972), a theory focused on the gender specific differential investment costs and benefits of raising offspring, when applied to women and mate selection, suggests that women invest more in offspring than do men resulting in women being the sex that chooses a mate. Because of these gender specific pressures, women look for cues signaling which man would be the best partner with whom to mate. The relative quality of a man’s genes has been proposed as a good indicator of a man’s success at fathering a healthy child and thus serves as a tool in choosing a mate (Trivers, 1972). As noted above, women
cannot readily judge the quality of a man’s genes by physical appearance alone, thus men engage in behavior (e.g., risk-taking) to display the quality of their genes to women so that they would be chosen as a mate. Costly signaling theory proposes that individuals strategically engage in costly or risky behaviors when the recognition of these behaviors by others serves some potential benefit for that individual. Thus, if a man engages in risky behavior and is not harmed then he must have good genes (Hawkes, 1991). As a result, *men’s risky behavior can be conceptualized as an adaptive mechanism for the purpose of being chosen as a mate.*

Evidence of this conceptualization of male risk-taking as an adaptive behavior has been offered via sociological based qualitative analyses (Bleige Bird, Smith, & Bird, 2001; Hawkes & Bleige Bird, 2002) and experimental (Baker Jr, & Maner, 2008) and questionnaire based (Farthing, 2005; Kelly & Dunbar, 2001) quantitative analyses, all of which suggest that women choose men who engage in risky behavior over men who do not engage in risky behavior (see complete literature review in Appendix B for a description of this evidence). To date, however, little research has examined whether males who do, or do not participate in risky behaviors, have different perceptions of their own value as a mate or the value of a potential mate that they believe they can acquire. Do males who participate in risky behavior perceive their own mate value in any particular way, differently than those who do not participate in risky behavior? Moreover, little research has examined the differences in value of a potential mate that risky men believe they can acquire as compared to men that are not risky. Further research in the area of male risky behavior may prove instructive in our understanding of why men participate in risk-taking behavior, which has the potential to be used by counseling health psychologists to create effective interventions to reduce the deleterious effects of risky behavior.
In our ancestral past male to male competition for resources could, and many times still does, result in physical confrontations and even death. Wilson and Daly (1981) offered the term Young Male Syndrome for this problem as it occurs most frequently among males during their peak reproductive ages. As a result, it was important for males to seek allies who would be effective at warding off foes. Additionally, as physical confrontations can result in death, it would be adaptive to compete through indirect (i.e., posture) means. Posture is defined as “to strike a pose for effect… (and) to assume an artificial or pretended attitude.” (Mirriam-Webster Dictionary, n.d.) Posturing, in this context, would be behavior meant to display strength with the intention of thwarting an attack from a foe. An example of a posture behavior could include the beating of a gorilla’s chest. The gorilla beats his chest as a demonstration of his strength to other male gorillas. The louder a gorilla beats his chest the less likely he will be attacked by a potential enemy. Effective posturing could potentially result in the benefits of “winning” a competition without the possible negative health ramifications of a physical confrontation. As noted above, individuals with “stronger genes” are typically bigger and stronger than individuals with “weaker genes” (See Definition of Terms and Relevant Theoretical Constructs in Appendix A. p. 44). As a result, males with “stronger genes” would likely defeat another male with “weaker genes” at a physical confrontation. This also enables males with “stronger genes” to be more effective at posturing because other males would not want to risk bodily injury or death in a physical confrontation with a male perceived to possess “strong genes”. As risky behavior has been conceptualized as an attempt to display gene quality, it would follow that males who engage in risky behavior would also be more physically intimidating and effective at posturing to thwart the possibility of a physical confrontation (Daly & Wilson, 1994).
Recently Darwinian theories have examined low mood as an adaptive response to environmental and social cues (e.g., Allen & Badcock, 2006; Keller & Nesse, 2005; Price, et al., 1994). Low mood refers to a cluster of symptoms associated with depression. However, low mood is considered less severe and more transient than clinical depression (Keller & Neese, 2005). The social competition theory of low mood (Price, et al., 1994) suggests that weaker individuals adopt a yielding or subordinate behavioral strategy to reduce risk when faced with competition from others. Additionally, the energy conservation theory of low mood (Allen & Badcock, 2006) suggests that weaker individuals demonstrate symptoms of depression (e.g., lethargy, fatigue, and isolation) when faced with competition from a stronger individual. These behaviors serve as an adaptive strategy to conserve resources to use later when they are more likely to be successful. If men engage in risky behavior as a strategy to display strong genes, and those with weaker genes adopt low mood symptoms as a strategy to reduce risk and conserve resources for a later time, then it might follow that men who engage in risky behavior might display less low mood symptoms than those who do not engage in risky behavior. To date, there has been no research examining the relationship between risk and low mood from a Darwinian perspective.

The main purpose of this study was to expand upon the body of literature examining the risky behavior of men. While this topic has been frequently studied during the last 50 years, only recently have males’ risky behavior been conceptualized as an adaptive response to evolutionary pressures (i.e., within-sex competition & mate selection). Moreover, to date little to no research has examined risky males’ perceptions of their own mate value, their perceptions of potential short-term partner and long-term partner mate values, and the relationship between risky
behavior and low mood. As a result, while this study is fundamentally rooted in theory, the hypotheses are exploratory.

Moreover, the risky behavior of men continues to be an important area of study. If researchers can elucidate the causes of this behavior in conjunction with the reasons it perseveres, despite the many deleterious results that stem from the behavior, effective interventions can be developed to reduce these negative health consequences. One such strategy to accomplish this goal is to examine men’s risky behavior as an adaptive mechanism. In doing so, researchers can highlight those components of risk that are necessary to serve its basic adaptive function yet are relatively innocuous and separate them from those behaviors that have negative consequences.

**Research Questions**

1. Do men who are risky differ in the estimates of their own mate value than men who are not risky?
2. Do men who are risky differ in the estimates of their short-term partner mate value than men who are not risky?
3. Do men who are risky differ in the estimates of their long-term partner mate value than men who are not risky?
4. Do men who are risky differ in their low mood than men who are not risky?

**Research Hypotheses**

1. Men who choose the riskier of two hypothetical alternatives will have more positive estimates of their own mate value than men who do not engage in risky behavior (i.e. choose the less risky of two alternatives).
2. Men who choose the riskier of two hypothetical alternatives will have more positive estimates of their short-term partner mate value than men who are not risky (i.e. choose the less risky of two alternatives).

3. Men who choose the riskier of two hypothetical alternatives will have more positive estimates of their long-term partner mate value than men who are not risky (i.e. choose the less risky of two alternatives).

4. Men who choose the riskier of two hypothetical alternatives will have less low mood than men who are not risky.
Method

Participants

The study used male volunteers from undergraduate university students at a midsized, Midwestern, public university. Participants in this study were entered into a drawing to win one of two $50 gift cards for a regional grocery/department store. The participant pool was limited to males between the ages of 18 – 30 to maximize mate interest (Buss & Schmitt, 1993) and maximize the potential for risk seeking of the participants (Zuckerman, Eysenck, & Eysenck, 1978). All participants were treated in accordance with the “Ethical Principles of Psychologists and Code of Conduct” (American Psychological Association, 1992).

A total of 330 participants began the study by logging on to the Qualtrics software; however, 40 participants were omitted immediately as they did not complete any of the questions. Forty more participants were omitted as they identified themselves as a female, thus violating one of the inclusion criteria. Five more participants were omitted as they reported being over the age of 30 years old, thus violating another of the inclusion criteria. Finally, six more participants were later omitted from the analysis as their responses were either multivariate (3) or univariate (3) outliers (See Appendix C). Thus, a total of 239 participants were included in the final analysis. This sample size exceeds the suggestion to have more participants per cell than there are dependent variables in a study utilizing a MANOVA analysis (Tabachnik & Fidell, 2007).

The average age of the participants was 21.31 years old (range 18 – 30 years old). The education level of the participants is as follows: 73 freshman (30.5%), 40 sophomore (16.7%), 37 juniors (15.5%), 39 seniors (16.3%), and 50 indicated “other” (20.9%). The ethnicity of the
participants is as follows: 220 Caucasian (92.1%), 11 African American (4.6%), 3 Hispanic (1.3%), and 5 indicated “other” (2.1%). The relationship status of the participants is as follows: 136 Single without partner (56.9 %), 81 single with partner (33.9 %), 13 married (5.4 %), 2 divorced (.8%), and 7 indicated “other” (2.9%).

Materials

The materials in this study included a demographics questionnaire (Appendix D), two decision problems (Appendix E), the Mate Value Inventory (MVI) (Appendix F), and the Depression-Dejection subscale of the Profile of Mood States-Short Form (POMS-SF) (Appendix G).

Demographics Questionnaire. Participants were asked to respond to a demographics questionnaire including questions about age, date of birth, gender, ethnicity, education level, relationship status, sexual identity, and previous experiences with depression.

Decision Problems. Participants were asked to complete two different decision problems in a forced choice format designed to measure risk preference. One decision problem was about a money resource problem (resource loss problem) and the other was a structurally equivalent control problem about planned medical treatments (medical loss problem). To ensure that framing effects did not confound the results only positively framed decision problems were included in this study. Framing effects are the way that information is framed, either positively or negatively, and can have a direct influence on risk preference of the participant and ultimately, can confound the results of the study (Kahneman & Tversky, 1979). The problems used in this study were identified as having no significant framing effects (Ermer, Cosmides, & Tooby, 2008; Wang, 1996c). For each problem, participants were asked to choose between a risky option.
(probabilistic) and a certain option (deterministic) with equal outcomes. The order of the problems was randomly assigned.

The loss of resources, as opposed to the gain of resources, was employed because previous results suggest that loss is more likely to trigger risk-seeking choices (Kahneman & Tversky, 1973; 1979). The resource loss problem is the variable of interest as money is a culturally valued resource identifying status of an individual in North American cultures (Ermer, Cosmides, & Tooby, 2008). Additionally, both money and social status are components that females desire when choosing a mate (Buss 1994).

**Resource Loss Problem:**

Imagine that you bought $60 worth of stock from a company that has recently filed a claim for bankruptcy. The company now provides you with two alternatives to recover some of your money.

If you choose alternative A, you will receive $20 of your money.

If you choose alternative B, you will take part in a random drawing procedure with exactly a one-third probability of receiving all of your money and two-thirds chance of receiving none of your money.

Which of the two alternatives would you favor?

**Medical Loss Problem:**

Imagine that 60 people are infected by a fatal disease. Two alternative medical plans have been proposed. Assume the exact scientific estimates of the consequences of the plans are as follows:

If you choose plan A, 20 people will live.

If you choose plan B, there is a one-third chance that everyone will live and a two-thirds chance that no one will live.

Which of the two plans would you favor?
The Mate Value Inventory (MVI; Kirsner, et al., 2003) is a 19 item, self-report questionnaire that measures the relative value an individual possesses as a potential mating partner. It asks participants to report their subjective personal and partner mate value by indicating how relevant a list of 19 desirable mating characteristics were to them in relation to their peers from 5 different perspectives: Personal Mate Value, Attainable Short-Term Partner Mate Value, Ideal Short-Term Partner Mate Value, Attainable Long-Term Partner Mate Value, and Ideal Long-Term Partner Mate Value. *Personal Mate Value* is a measure of an individual’s self perceived mate value. Attainable Short-Term Partner Mate Value is a measure of the mate value of the partner that participants believe they can realistically attract to a brief relationship. Ideal Short-Term Partner Mate Value is a measure of the mate value of the ideal partner participants would like to attract to a brief relationship. *Short-Term Partner Mate Value* will be the mean of Attainable Short-Term and Ideal Short-Term. Attainable Long-Term Partner Mate Value is a measure of the mate value of the best partner participants believe they can realistically attract for a long-term relationship. Ideal Long-Term Partner Mate Value is a measure of the mate value of the participant’s ideal partner for a long-term relationship. *Long-Term Partner Mate Value* was the average of these two measures. Participants were asked to indicate how relevant a list of characteristics are to them in relation to their peers on a likert-type scale from -3 (extremely low on this characteristic) through 0 (don’t care/average on this characteristic) to +3 (extremely high on this characteristic). The following is the list of characteristics participants were asked to respond to: ambitious, attractive face, attractive body, desires children, enthusiastic about sex, faithful to partners, financially secure, generous, good sense of humor, healthy, independent, intelligent, kind and understanding, loyal, responsible,
shares my values, shares my interests, sociable, emotionally stable. The order of the five perspectives was randomly assigned.

Internal consistency (Cronbach’s Alpha) estimates on each of the five perspectives suggest high internal consistency (Self-Rating = .86; Attainable STP = .93; Ideal STP = .92; Attainable LTP = .92; Ideal LTP = .91) (Kirsner et al., 2003). A recent follow-up study examining the psychometric properties of the MVI found similar results for each of the five versions (Kirsner, Figueredoro, & Jacobs, 2009). The MVI has been employed primarily in studies examining theories within the field of Evolutionary Psychology (Faer, Hendriks, Abed, & Figueredo, 2005; Figueredo, Vasquez, Brumbach, & Schneider, 2007).

Depression-Dejection subscale of the Profile of Mood States-Short Form. The Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1981) is a well-known self-report measure, which assesses transient mood states and current psychological distress. The POMS consists of a list of 65 adjectives. Participants are asked to indicate the degree to which each adjective describes themselves during the last week using a 5-point likert scale format. Scoring of the POMS yields a global distress score referred to as Total Mood Disturbance as well as scores for six subscales: Fatigue-Inertia, Vigor-Activity, Tension-Anxiety, Depression-Dejection, Anger-Hostility, and Confusion-Bewilderment. Completion of the POMS can take up to 20 minutes to complete (Shacham, 1983). Thus, an abbreviated form of the POMS (Cella et al., 1987; Shacham, 1983) was developed.

The POMS-Short Form (POMS-SF; Shacham, 1983) contains 37 of the original 65 adjectives used on the POMS. Twenty eight of the original items were eliminated on the basis of their impact on subscale internal consistency and face validity. Total Mood Disturbance and
subscale scores form the POMS-SF were highly correlated with Total Mood Disturbance and subscale scores of the POMS (all $r_s > .95$). Internal consistency estimates (Cronbach’s Alpha) of the POMS-SF scales ranged from .80 to .91, whereas internal consistency estimates of the original POMS scales ranged from .74 to .91.

The Depression-Dejection subscale of the POMS-SF (Shacham, 1983) is a measure of transient depressed mood consisting of eight of the original 15 adjectives from the Depression-Dejection subscale of the POMS. Internal consistency estimates (Cronbach’s Alpha) for the Depression-Dejection subscale of the POMS-SF range from .92 to .95, depending on the sample population (e.g., breast cancer patients, renal transplant survivors, bone marrow transplant candidates). The healthy adult sample’s internal consistency estimate for the Depression-Dejection subscale was .95 (Curran, Andrykowski, & Studts, 1995). The Depression-Dejection subscale of the POMS-SF is a measure of a mood state (i.e., depressed mood) and not a measure of Major Depressive Disorder as defined by the DSM IV. The purpose of using this subscale is to measure low mood as opposed to depression defined as “extreme low mood” (Keller & Nesse, 2005) (See Definition of Terms and Relevant Theoretical Constructs in Appendix A. p. 44).

**Procedure**

Participants were recruited via email sent to all male university students at a midsized, Midwestern, public university. The questionnaires were presented on Qualtrics, an integrated web-based environment. Students were tested individually at their own convenience via computer. Once online, the participants were given an introductory statement (Appendix E).

The participants who consented and continued were presented with the demographics questionnaire (Appendix A) first. After completing the demographics questionnaire, the
participants were presented with the first of two decision problems, followed by the second (Appendix B). The order of the decision problems was randomly presented to control for order effects. After completing the two decision problems, the participants were presented with the MVI (Appendix C). The order of the five perspectives of the MVI were randomly presented to control for order effects. After completing the MVI, the participants were presented with the Depression-Dejection subscale of the POMS-SF (Appendix D). The order of the adjectives was randomly presented to control for order effects. After completing the questionnaires, the participants were presented with the debriefing statement (Appendix G), which includes contact information for the principle investigator, his sponsor, and the student counseling center. The participants were then thanked for their participation in the study. Two participants were randomly chosen to win one of two $50 gift cards for a regional grocery/department store and notified via email.

Variables

Independent Variable and Operational Definition

1. Risky Behavior - Dichotomous variable (Yes or No). This was determined by self-report on the Resource Loss Decision Problem. Specifically, a choice of the riskier of the two hypothetical alternatives (“If you choose alternative B, you will take part in a random drawing procedure with exactly a one-third probability of receiving all of your money and two-thirds chance of receiving none of your money.”) was considered risky behavior.

Dependent Variables and Operational Definition

1. Personal Mate Value - Measured by participants’ mean score on the Personal perspective of the MVI.
2. Short-Term Partner Mate Value - Measured by participants’ mean scores on the Attainable Short-Term Partner Mate Value and the Ideal Short-Term Partner Mate Value perspectives of the MVI.

3. Long Term Partner Mate Value - Measured by participants’ mean scores on the Attainable Long-Term Partner Mate Value and the Ideal Long-Term Partner Mate Value perspectives of the MVI.

4. Low Mood - Measured by participants’ mean score on the Depression-Dejection subscale of the POMS-SF.

Results

*Data Screening, Assumptions, and Internal Consistency of Scales.* Prior to conducting the analyses the data was screened and the assumptions evaluated. The data set was examined for multivariate outliers through the use of Mahalanobis distance test of significance. Three cases were deleted from the analysis for exceeding the Mahalanobis critical score, $x^2 = 18.47$ (degrees of freedom = 4, $\alpha = 0.01$). The data set was then examined for univariate outliers through 3.29 standard deviations from the mean (Tabachnick & Fidell, 2007). Three more cases were removed from the data set with scores more than 3.29 standard deviations above the mean, two for the variable POMS-SF depression-dejection and one for the variable personal mate quality. The assumption of multivariate normality was met given that the data was not significantly skewed (all scores below .52) or kurtotic (all scores below -.86). The assumption of homogeneity of covariance matrices was met Box's $M = 10.56$, $p > 0.05$. The assumption of linearity was met between the dependent variables. The assumption of multicollinearity was met in that the set of dependent variables in the analysis do not provide redundant information. The internal consistency (Cronbach’s alpha) for Personal
perspective of the MVI is .839. The internal consistency (Cronbach’s alpha) for Attainable Short-Term Partner Mate Value and the Ideal Short-Term Partner Mate Value perspectives of the MVI is .945. The internal Consistency (Cronbach’s alpha) for Attainable Long-Term Partner Mate Value and the Ideal Long-Term Partner Mate Value perspectives of the MVI is .937. The internal consistency (Cronbach's alpha) for Depression-Dejection subscale of the POMS-SF is .905.

Primary Analysis. Multivariate Analysis of Variance (MANOVA) techniques served as the method for analyzing the data. MANOVA is useful because it allows the analysis of multiple dependent variables simultaneously (Tabachnick & Fidell, 2007). This was appropriate as there were four different dependent variables of interest in this study. Additionally, the use of MANOVA techniques reduced the probability of making type 1 errors, which are inflated when conducting Univariate Analyses of Variance with multiple dependent variables (Leary, & Altmaier, 1980).

First, an omnibus MANOVA was run to determine if there were any overall significant differences between the groups. Overall significance was determined by examining the Wilks’ Lambda Matrix (Λ). Wilks’ Λ is the most widely used multivariate statistic (Larrabee, 1982). A one-way MANOVA revealed that there was not a significant multivariate main effect for risky behavior Wilks’ λ = .997, F (4, 176) = .152, p>.05, partial eta squared = .003. As a result of non significant findings for the omnibus MANOVA, no follow-up analyses were conducted. The mean values for the variables are as follows: Personal Mate Value = 5.7 (Risky = 1.78, Non-risky = 1.8), Short-Term Partner Mate Value = 5.7 (Risky = 5.62, Non-risky = 5.56), Long-Term Partner Mate Value = 6.03 (Risky = 6.08, Non-risky = 6.01), and Low Mood = 1.8 (Risky = 1.78, Non-Risky = 1.80).
Discussion

Results

The current study examined whether there were differences between risky males and non-risky males on their perceptions of their own mate value, short-term partner and long-term partner mate values, and low mood. The hypotheses for the current study draw upon evolutionary psychology theories of risky behavior (e.g., Costly Signaling Theory, c.f. Bleige Bird, Smith, & Bird, 2001; Hawkes, 1991; Hawkes & Bleige Bird, 2002), mate selection (Farthing, 2005; Kelly & Dunbar, 2001), within group competition (Daly & Wilson, 1994; Alexander, 1979), and depression (e.g., Energy Conservation Theory, c.f., Allen & Badcock, 2006; Stink Costs Model, c.f., Leahy, 1997; Incentive Disengagement Theory, c.f., Klinger, 1976). Specifically, the hypotheses were as follows: (1) Risky males will perceive their own mate value as higher than non risky males, (2) Risky males will perceive the value of their short-term partner’s mate value as higher than non risky males, (3) Risky males will perceive the value of their long-term partner’s mate value as higher than non risky males, and (4) Risky males will have less low mood than non risky males. In this study we examined risk through a forced choice format between two differently framed resource loss options with identical mathematical probabilities (Kahneman & Tversky, 1979). No significant differences were found between risky and non risky males on perceptions of their own mate value, short-term partner and long-term partner mate values, and low mood in the current study.

It has been suggested that the risky behavior of males is an adaptive response to gender specific evolutionary pressures (i.e., within-sex competition & mate selection). For example, Costly Signaling Theory proposes that individuals strategically engage in costly or risky behaviors when the recognition of these behaviors by others serves some potential benefit for
that individual (Bleige Bird, Smith, & Bird, 2001; Hawkes, 1991; Hawkes & Bleige Bird, 2002). Previous research has suggested this explanation through methodology that includes both qualitative (e.g., Bleige Bird, Smith, & Bird, 2007) and quantitative (e.g., Kelly & Dunbar, 2001; Farthing, 2005) methods. Bleige Bird, Smith, and Bird (2007) examined the hunting strategies of men and women of the Marriam tribe in Australia. The authors noted that males who engaged in a more risky hunting strategy had access to a higher quality of female. They concluded that the risky behavior was thus a strategy by men with this goal in mind. However, there are two concerns regarding the authors’ explanation of this behavior. First, the correlation of these two events does not determine that one event causes another. The men could be choosing a risky hunting strategy for reasons other than the authors noted or examined. Second, this explanation infers that the males of the Marriam tribe consciously and intentionally engaged in the risky behavior for the purpose of gaining access to a higher quality mate; however, there is no data to support this inference.

Quantitative methodology typically involves asking participants to complete questionnaires measuring their attraction to hypothetical individuals engaging in hypothetical risky and non-risky acts. For example, Kelly and Dunbar (2001) asked female volunteers to rate their attraction toward males engaging risky or non-risky acts through reading vignettes of hypothetical scenarios. Farthing (2005), asked both males and females to indicate their interpersonal attraction to males engaging in heroic or non-heroic risky and non-risky acts. In all situations the attraction ratings of the volunteers are directed at an external target.

The current study deviates from previous quantitative research in that the male volunteers are asked to rate questions regarding their own mate quality and the quality of short-term and long-term mates. In each of these domains the target becomes internal and the participant is
asked to indicate ratings of himself. As noted in the purpose of this study, little to no research has used this methodology in the past making this study and the hypotheses exploratory, while fundamentally rooted in theory. The lack of significant results in this study may be the result of something inherent about this methodology that prohibits male volunteers from responding differently when they are the target independent of whether they are risky or not. For example, this methodology may be asking males to be both aware of the evolutionary pressures that they face and respond in a manner that suggests they are consciously and intentionally overcoming these pressures.

Error Management Theory (Haselton & Buss, 2000) proposes that cognitive biases are predictably demonstrated when the costs of making Type I (false positives) and Type II (false negatives) errors are asymmetrical. The authors suggest that the cost for a male to under assume a female’s sexual interest (Type II error), and thus a missed sexual encounter, is more costly than to over assume a female’s sexual interest (Type I error) and later be denied. Conversely, it is more costly for a female to over assume a male’s commitment intent (Type I error), and later be left to care for an offspring without the aid of a partner, than it is to under assume a male’s commitment intent (Type II error).

In the current study the males’ ratings of their own mate value, short-term partner and long-term partner mate values are all relatively high in relation to the scale. Specifically, mean ratings independent of risk of 5.70 for personal mate value (risky = 5.74 and non risky = 5.69), 5.7 for short-term partner mate value (risky = 5.62 and non risky = 5.56), and 6.03 for long-term partner mate value (risky = 6.08 and non risky = 6.01) on a scale with a highest possible rating of 7 suggest the possibly of inflated numbers. It is possible that the cost of over assuming their own personal mate value (Type I error) may be less costly than under assuming their own personal
mate value (Type II error). For example, if a man over assumes his own personal mate value (Type I error) he may be more likely to gain access to a mate than if he under assumed his mate value (Type II error) and thus avoid potential mates of high quality. Furthermore, it may be more costly for males to under assume the quality of his mates for short term and long term mating (Type II error) than to over assume their quality (Type I error).

Elkind, (1967) posited that adolescents create an “imaginary audience” that is continuously attending to their behaviors resulting in perceptions of uniqueness and invulnerability (Adolescent Egocentrism). It is also possible that this cognitive bias may result in inflated perceptions of their own mate quality and the quality of their short-term and long-term mates. Following the logic offered by Elkind (1967), if I am like others then why are they paying attention to me, and if they are paying attention to me there must be something special about me, this could lead directly to I am a special mate and thus have access to special mates as partners. Noting that 72% of the sample in this study is under the age of 22, it is possible that many participants displayed byproducts of Adolescent Egocentrism (Elkind, 1967) by inflating their scores on these questionnaires.

Recently, it has been suggested that individuals’ risky behavior is not only related to their own gender’s unique mate selection pressures (c.f., Trivers, 1976) but the outcome of those behaviors for self in relation to a competitor (Hill & Buss, 2010). The authors suggest that individuals will chose the more risky of two options when that option gives them the potential for greater outcome than their competitors. For example, females look for cues that suggest men can and are willing to care for their offspring (Trivers, 1976) when choosing a mate. As a result, males engage in strategies to acquire those resources females seek (Trivers, 1976). Financial resources have been suggested to be one of those cues that females seek and males attempt to
acquire (Buss, 1994). Thus, males will chose to be risky with their financial decisions if they have less money than competitors and thus have more to gain by being risky in relation to competitors. However, the authors (Hill & Buss, 2010) suggest that this risk strategy is specific to resource acquisition not resource loss scenarios. In general, when an individual gains a resource critical to survival and reproductive success it increases the probability that the individual will survive and reproduce successfully. “However, the often cascading nature of losses renders the fitness impact of losses asymmetrically negative.” (Hill & Buss, 2010, pg. 221) For instance, if a male loses financial resources he may not only lose those resources but may also lose his mate and his social standing. As a result, it is possible that the methodology of this study to use a financial resource loss problem for the purpose of assessing risky behavior may not have been a good choice. Seventy eight percent of the male participants in this study chose the non-risky option. It is possible that the male participants intentionally chose the less risky option in this scenario because financial resources are a cue used to evaluate their future access to mates and thus reproductive success (Buss, 1994). Future research may use both resource acquisition and resource loss scenarios with resources that are both relevant and irrelevant to mate selection and reproductive success.
Limitations

The current study contained a number of limitations that need to be addressed before conclusions can be drawn regarding males risky behavior and their perceptions of their own mate quality, their perceptions of the quality of their short-term and long-term mates, and their low mood. For example, the current study used one forced-choice format question to examine risky behavior. This methodology was derived from Prospect Theory (Kahneman & Tversky, 1979). As noted previously, this methodology to study risky behavior has been used across many domains including psychology (Kahneman & Tversky, 1979), economics (Kahneman, Slovic, & Tversky, 1982), American politics (Patty, 2006), and public policy (McDaniel & Sistrunk, 1991), among others. Additionally, the high frequency with which this methodology has been used during the last 40 years, and the breadth of domains in which the methodology has been employed, provides confidence in its validity and reliability in the domain of risk behavior. Despite the long history of this methodology being adequate to examine risky behavior, using one question may increase error in this study, providing results that do not accurately measure risky behavior as intended. For example, participants may respond differently to this question for many reasons (e.g., fatigue, etc.) than they would to other forced-choice format questions leading the author to make inferences that are erroneous. Hill and Buss (2010) overcame this possible methodological error by increasing the number of forced-choice questions (13) asked while still employing methodology based upon Prospect Theory. This may reduce error in the inferences made of the risky behavior of participants through examining the average of the participants’ responses across multiple questions. Future research examining males risky behavior and their perception of their mate quality, short-term and long-term mate quality, and low mood could use multiple forced-choice questions allowing more accurate inferences.
As noted previously, the current study examined the risky behavior of males via responses on a forced-choice format question. It is possible that the results do not accurately reflect decisions that occur in real world social and economic outcomes (Hill & Buss, 2010). Future research is needed to make more definitive conclusions regarding male risky behavior using more real rather than hypothetical scenarios with various methodologies (e.g., survey, experimental, qualitative, etc.). Additionally, as suggested earlier, questions with a greater variety of scenarios and resources may more accurately represent decisions in the real world where individuals are asked to make decision across many scenarios with many different targets.

It should be noted that approximately 30% of the participants in the current study chose to stop responding to questions somewhere throughout the procedure. While this amount of attrition cannot be attributed to one specific cause, some possible concerns can be offered. One possible cause for this amount of attrition can be the tool used to acquire participants’ responses. The current study asked participants to respond to questionnaires presented on Qualtrics, an integrated web-based software environment. The participants were tested at their own convenience, at a computer of their choice, and a location of their choice. This methodology may have resulted in an increase in distractions and alternatives to devote their time, resulting in the participants withdrawing from the study. Additionally, participants were offered an entry into a drawing for one of two $50 gift cards for a regional grocery/department store as an incentive to participate in the current study. The participants may have assumed that beginning the study enters them into the drawing and thus withdraw after responding to a few of the questions as opposed to completing the study in its entirety. Furthermore, it should be noted that there were a total of 113 different questions participants were asked to respond to. It is possible that many participants felt fatigued after responding to many of the questions and thus chose to withdraw
from the study before completing the study in its entirety. Future research would benefit from using different methodologies with possibly fewer questions to reduce the amount of attrition.

Conclusion

The current study attempted to address a fundamental flaw in the majority of risk theories previously proposed (see chapter II for more detail), that males’ risky behavior is fundamentally maladaptive. This was addressed through examining males’ risky behavior from a Darwinian perspective. Specifically, males’ risky behavior is an adaptive strategy to overcome gender specific evolutionary pressures (i.e., mate selection and within-sex competition). As noted previously, the hypotheses for the current study draw upon evolutionary or Darwinian psychology theories. Despite the lack of significant results found in the current study, and the limitations described, it should be noted that responses of the male participants are in the direction that each of the four hypotheses predicted. Specifically, while not significantly different from one another, risky males did perceive themselves as having higher mate quality \((m = 5.74)\) than non-risky males \((m = 5.69)\). Risky males had higher perceptions of the quality of their short-term mates \((m = 5.62)\) than non-risky male \((m = 5.56)\). Risky males had higher perceptions of the quality of their long-term mates \((m = 6.08)\) than non-risky males \((m = 6.01)\). And, risky males had less low mood \((m = 1.78)\) than non-risky males \((m = 1.80)\).

The results of study may be viewed as evidence that it is not adaptive for men to be risk takers; however, it is important not to jump to such conclusions based upon the results of one study. As noted above, there are a few limitations in the current study that must be accounted for when interpreting the results. Moreover, it is possible that the results of the study measure a male’s awareness of the adaptive nature of his risky behavior, which has not been measured to this point and differs from whether or not the behavior itself is adaptive. Future research is
needed to further elucidate the relationship between these variables and to provide more information in attempting to answer this important question.
References


Appendices

Appendix A: Definition of Terms and Relevant Theoretical Constructs

Appendix B: Literature Review

Appendix C: Consort Table

Appendix D: Demographic Questionnaire

Appendix E: Decision Problems

Appendix F: Mate Value Inventory (MVI)

Appendix G: Depression Dejection Subscale of the Profile of Mood States-Short Form

Appendix H: Introductory Statement

Appendix I: Consent for Participation

Appendix J: Debriefing Statement

Appendix K: IRB Approval Letter
Appendix A

Definition of Terms and Relevant Theoretical Constructs

*Risky Behavior:* Risky behavior as used in this manuscript refers to risk directed cognitions, risk preference, as well as risky acts. For the purposes of this study, the operational definition of risky behavior will be measured by participants’ choice on the Resource Loss Decision Problem (Kirsner, et al., 2003).

*Mate Value:* Mate value has been defined as an individual’s genetic quality or fitness (Kirsner, Figueredo, Jacobs, 2003). It can be conceptualized as the relative value an individual possesses as a potential mating partner. The greater the mate value of an individual the more they would be sought after to be a partner to mate with.

*Personal Mate Value:* Personal mate value is defined as an assessment of a person’s self-rated mate value (Kirsner, Figueredo, Jacobs, 2003). For the purposes of this study, the operational definition of personal mate value will be measured by participants’ mean score on the Personal perspective of the Mate Value Inventory (MVI) (Kirsner, et al., 2003).

*Short-Term Partner Mate Value:* Short-term partner mate value is defined as the average of a person’s assessment of the relative quality of a short-term mate that they can realistically attain and a short-term mate that they ideally would like to attain (Kirsner, Figueredo, Jacobs, 2003). For the purposes of this study, the operational definition of short-term partner mate value will be measured by participants’ mean scores on the Attainable Short-Term Partner Mate Value and the Ideal Short-Term Partner Mate Value perspectives of the MVI (Kirsner, et al., 2003).
**Long-Term Mate Value:** Long-term partner mate value is defined as the average of a person’s assessment of the relative quality of a long-term mate that they can realistically attain and a long-term mate that they ideally would like to attain (Kirsner, Figueredo, Jacobs, 2003). For the purposes of this study, the operational definition of long-term mate value will be measured by participants’ mean scores on the Attainable Long-Term Partner Mate Value and the Ideal Long-Term Partner Mate Value perspectives of the MVI (Kirsner, et al., 2003).

**Low Mood:** Low mood refers to a cluster of symptoms that are usually associated with depression. However, the onset of the symptoms is an adaptive reaction to environmental and social cues normally triggered by threats to an individual’s fitness. The severity of these symptoms are typically proportional to the level of the threat and subside once the threat is removed (Keller & Neese, 2005). Low mood is considered less severe and more transient than clinical depression. For the purposes of this study, the operational definition of low mood will be measured by participants’ mean score on the Depression-Dejection subscale of the POMS-SF (Shacham, 1983).

**Gene Quality:** Gene quality as used in this manuscript refers to the relative overall phenotypic condition (“broadly speaking, the ability to accrue and allocate energy to adaptive tasks effectively and efficiently” Scheib, Gangestad, & Thornhill, 1999, pg. 1913) and the possession of heritable disease resistance (Duchaine, Cosmides, & Tooby, 2001). Good, or strong, gene quality increases an offspring’s vigor and viability (Scheib, Gangestad, & Thornhill, 1999).

**Strong/Weak Genes:** Strong/weak genes as used in this manuscript refers to the relative gene quality of the individual. Strong genes would refer to higher gene quality, whereas weak genes would refer to lower gene quality.
Costly Signaling Theory: Costly Signaling Theory proposes that individuals strategically engage in costly or risky behaviors when the recognition of these behaviors by others serves some potential benefit for that individual (Bleige Bird, Smith, & Bird, 2001; Hawkes, 1991; Hawkes & Bleige Bird, 2002). Thus, males may engage in risky behavior as a strategy to display their gene quality to both women and men (Hawkes, 1991).

Parental Investment Theory: Parental Investment Theory posits that males and females have different selection pressures based upon the amount of their respective parental investment. As a result of the different selection pressures that the two genders face, they look for different cues in a mate that relate to these specific pressures (Trivers, 1972).

Young Male Syndrome: Young Male Syndrome is the term offered to describe the high frequency of physical altercations and murder of young males by other young males (Wilson & Daly, 1981). Wilson and Daly (1981) suggest that the high rate of frequency occurs as a result of within group male competition, which is based on a sociobiological theory of male competition.

Posturing: Posture is defined as “to strike a pose for effect… (and) to assume an artificial or pretended attitude.” (Mirriam-Webster Dictionary, n.d.) Posturing, in the context of this manuscript, would be behavior meant to display strength with the intention of thwarting an attack from a foe.
Risky Behavior

Gender differences in risky behavior, risk perception and attitudes towards risky behavior have been a well studied phenomenon for many years (c.f., Byrnes, Miller, & Schafer, 1999). For example, a meta analysis reviewed over 150 published articles on the topic of risk taking, concluding that “male participants are more likely to take risks than female participants” (Byrnes, Miller, & Schafer, 1999, p. 377). These gender differences in risky behavior also result in a disparity between the health of the two genders. Brief examples include, men are more frequently the victims of accidents than are women (CDC, 2004). Men are three times more likely than women to be involved in fatal accidents (U.S. Department of Transportation, 2004). Men engage in riskier sexual practices than women (Leigh, Temple, & Trocki, 1993).

The risk taking literature also highlights another highly predictive factor, adolescence. Adolescents are more likely to drink and drive than other age groups (Jonah & Wilson, 1984). Moreover, they also drive more recklessly (faster, closer to other vehicles, and use seatbelts less frequently) (Jonah, 1986). Adolescents are more likely to use illegal drugs (U.S. Bureau of the Census, 1987) with rates declining for individuals in their 20’s (Gans, Blyth, Elster, & Gaveras, 1990). Rates of adolescents who have engaged in criminal activity have estimates between 25% (Levine & Kozak, 1979) to 75% (Farrington, 1989) depending on the definition of criminal behaviors. Individuals in their adolescence also suffer the health consequence of these risky behaviors. Reports indicate that over one-half of adolescents who are fatally injured in car accidents have been found to have blood alcohol content above the legal limit (Beirness, Haas,
Walsh, & Donelson, 1985). Finally, the frequency of homicide of adolescent males has come to be known as the Young Male Syndrome as young males have been found to commit the highest frequency of homicides (Wilson & Daly, 1981).

These gender differences in risky behavior have resulted in the development of many theories, a few of which will be discussed in this manuscript. It has been suggested that theories of risk explain risky behaviors from either a single factor or multifactorial (i.e., interaction of multiple factors) approach (Lopes, 1987). Single factor explanations suggest individual differences between those who regularly take risks and those who avoid risks while ignoring other possibilities or the interaction of variables that may cause these differences. Gender based explanations of risky behavior are good examples of a single factor approach in that gender is the single variable that is examined in relation to risk. Others include psychological (personality, developmental), sociocultural, and biological models used to describe the variance in risky behavior.

Multifactorial explanations examine the interaction between differences among groups of individuals and the context. Multifactorial models that include expectation and value are a good example of this category. For example, theories that predict that individuals take risks because they believe they will not only successfully complete the behavior but also value the result of the behavior in the context provided (Atkinson, 1983). A multifactorial model would suggest that gender differences of risky behavior would vary as a result of the context in which the behavior is conducted. For example, if women thought they could successfully engage in risky behavior and valued that behavior more than men, then they would be more likely than men to engage in the risky behavior (Byrnes, Miller, & Schafer, 1999).
Theories of Risky Behavior

Zuckerman (1991) posited a single factor theory of risky behavior that emphasizes stable personality traits. In this theory, he proposes that males have a sensation-seeking personality that explains some of the differences between those who engage in risky behaviors from those who do not. Sensation Seeking is defined as “the need for varied, novel, and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experiences” (Zuckerman, 1979a) (p. 10). Implied in this theory is the notion that individuals who engage in risky behavior do so purposefully in order to experience a novel situation. Adolescents on average have higher levels of sensation seeking (Zuckerman, Eysenck, & Eysenck, 1978) as measured by the Sensation Seeking Scale (SSS). Mean values on the sensation seeking scale (SSS) are highest at 16 years of age and decrease with increasing age (Zuckerman, Eysenck, & Eysenck). Moreover, while this trend occurs for both genders, differences are found in the SSS subscales of Disinhibition, Thrill and Adventure Seeking, Boredome Susceptibility and Experience Seeking. Females show decreases across all age categories (i.e., 16 to 19, 20’s, 30’s, 40’s, 50’s, & 60’s) in each of the four subscales, while males report decreases across all age categories in only two of the subscales (Disinhibition; Thrill and Adventure Seeking) (Zuckerman, et al., 1978).

A variety of studies have examined the relationship between sensation seeking and risk taking behaviors. Sensation seeking has been positively correlated with alcohol (Schwart, Burkhart, & Green, 1978; Zuckerman, Bone, Neary, Mangelsdorff, & Brustman, 1972), marijuana, and LSD use (Satinder & Black, 1984). Moreover, scores on the SSS are positively correlated with the number of different drugs that drug abusers use (Spotts, & Shontz, 1984).
Indirectly, sensation seeking is implied by adolescent reports of “out of curiosity” as the strongest motive for trying drugs (Levine & Kozak, 1979).

Sensation seeking has been suggested as a causal variable in dangerous driving practices (Zuckerman & Neeb, 1980) and adolescents who drink and drive (Arnett, 1990a). Positive attitudes toward taking risks were positively associated with number of traffic violations and accidents (Goldstein and Mosel, 1958). Additionally, sensation seeking has been offered as a causal variable for adolescents who engage in risky sexual practices (Zuckerman, Tushup, & Fenner, 1976). Male and female prisoners who have higher reports on the SSS engage in more criminal acts (Farley, 1973; Farley & Farley, 1972).

There are also a number of studies that have examined the correlation between adolescent male sensation seeking and biological or physiological mechanisms. For example, scores on the SSS have been found to be correlated with Average Evoked Potential (AEP) augmenting-reducing. AEP augments stimuli to the brain, both visual and auditory, by either increasing the intensity of the stimulus (augmenting) or decreasing the intensity of the stimulus (reducing). Measuring an individual’s AEP is a strategy to measure the tendency of a brain to respond to salient stimuli. Studies have shown scores on the SSS to be positively correlated to augmenting (Lukas & Siegel, 1981). Moreover, younger individuals tend to be augmenters while older individuals tend to be reducers (Buchsbaum, 1974). Augmenting has been found to be related to such risky behaviors as criminal behaviors (Blackburn, 1978) and adolescent delinquency (Silverman, Buchsbaum, & Stierlin, 1973). Additionally, augmenting is correlated to drug use (Zuckerman, 1984).
Another physiological mechanism that has been investigated is the relationship between the neurotransmitter dopamine and Monamine Oxidase (MAO). MAO is an enzyme that indirectly moderates the sensitivity of neurons by degrading neurotransmitters such as dopamine. The dopaminergic neurotransmitter system, in the mesolimbic dopamine pathway, is often known as the “feel good neurotransmitter” pathway. The more MAO enzymes the less neurotransmitters that are in the synapse requiring that more neurotransmitters be released to create an action potential. As risky behavior often results in the release of dopamine, this results in the individual feeling good and thus rewarding the behavior. Thus, the more degradation of dopamine in the synapse, by MAO, the more risky behavior is needed to feel the effects of the dopamine. It has been suggested that MAO levels are negatively correlated with SSS scores (Murphy, Belmaker, Buschsbaum, Wyatt, Martin, & Ciaranello, 1977). Additionally, males with low MAO levels have been more likely to use drugs and engage in criminal acts (von Knorring, Oreland, & Winbald, 1983), become alcoholics (Major & Murphy, 1978), and become marijuana users (Stillman et al., 1978). Studies attempting to relate MAO enzymes with adolescent risky behavior have been mixed. One study suggested that MAO increases with age (Robinson, Davis, Nies, Ravaris, & Sylvester, 1971), as would be expected under the assumption that risky behavior decreases with age and are thus negatively correlated with one another, while another study found no differences in MAO levels as a result of age (Murphy, Wright, Buchsbaum, Nichols, Costa, & Wyatt, 1976). Also, males have lower levels of MAO as compared to women (Robinson et al., 1971).

Sex hormones have also been indicated to be correlated to risky behaviors and sensation seeking. Testosterone, a sex hormone found to be higher in men than women, has been related to both permissive sexual attitudes and an increased variety of sexual experiences (Daizman &
Moreover, similar to risky behaviors, testosterone levels decline with age after the 20s (Harman, 1978). However, these findings have also been mixed. For example, there appears to be no correlation between testosterone levels and aggression in a normal population; however, testosterone is positively correlated to the violence level in criminal activity in a prison population (Rose, 1978). Additionally, levels of androgen and estrogen, a sex hormone found to be higher in females, are related to lower scores on the SSS (Daitzman, Zuckerman, Sammelwitz, & Ganjam, 1978). It should be noted, however, that there were only seven female participants in the aforementioned study suggesting that these results should be examined with caution.

Another single factor theory proposed to explain these risky behaviors, founded on Piaget’s theory of cognitive development, is termed adolescent egocentrism (Elkind, 1967). Piaget proposed that individuals enter the formal operations stage, (i.e., the ability to consider thoughts as objects) in early adolescence (12 to 13) and complete this stage by the time they reach mid adolescence (15 to 16). However, research has suggested that this may not always be the case (Flavell, 1985). It has been shown that adults lack rational thought at times, which appears to be more pronounced during adolescence (Kuhn, Phelps, & Waters, 1985). When the formal operations stage is not completed it has been suggested to result in egocentrism (Elkind, 1967).

Adolescent egocentrism is defined as an inability to differentiate between self and others (Elkind, 1967). As such, adolescents may have difficulty differentiating their thoughts from others’ thoughts, leading them to believe that others thoughts are similar to their own. Moreover, because adolescents are preoccupied with themselves they may in turn believe that others are preoccupied with them as well. This is suggested to cause adolescence to create an “imaginary
audience” (Elkind, 1967) that is attending to their behaviors. Elkind (1967) hypothesizes that because adolescents believe that they have an imaginary audience that is continuously monitoring their behavior they must be unique. This belief may cause adolescence to conclude that they are somehow invulnerable to things that are dangerous for others. The logic being, if I am like others then why are they paying attention to me? And if they are attending to me, that must mean that I am immune to many things that others are not. So, adolescents may think that they can engage in risky behaviors without be negatively affected by it. Research examining this internal belief has been scarce and, when conducted, is inferred by perception of risk to self by adolescent self reports. For example, it has been suggested that adolescents have a lower estimate of the likelihood that they will get into an accident as compared to their estimates of their peers and that of older adults (Finn & Bragg, 1986). Additionally, criminal behavior is negatively correlated with the perception of negative consequences for those behaviors (Erikson, Gibbs, & Jensen, 1977).

Arnett (1992) has suggested a multifactorial model of risky behavior that addresses the interaction of several social variables. These social variables, offered by Arnett (1992a, 1992b), include such categories as broad socialization (social variables that do not limit behavior and thus allow a greater variety of behaviors) and narrow socialization (social variables that limit behaviors) positing a relationship between culture and risky behavior in adolescent males. He offered that adolescent males have a propensity for sensation seeking and adolescent egocentrism, which are then moderated by socialization factors. The display of male adolescent risky behavior is a direct result of the amount of restraint imposed by these socialization factors; more restraint (narrow) results in less display of risky behavior, less restrain results in more display of risky behavior.
Socialization factors that have been indicated by Arnett (1992) include family, neighborhood and community, social institutions such as the legal system and school system, the media, and ethnic, tribal or national traditions. When these socialization factors apply greater pressures for adolescent males to adhere to conservative norms (narrow socialization) their risky behavior will decrease. Conversely, if the socialization factors do not apply pressure for adolescent males to adhere to conservative norms or the norms are less conservative (broad socialization), adolescent males will express their predisposition for sensation seeking and egocentrism and engage in risky acts.

Examining further one can apply the narrow or broad socialization to the adolescent male engagement of risky behaviors to highlight how they moderate those behaviors. For example, if a family applies specific rules on an adolescent (i.e., curfew, restriction of transportation, etc.) they have less of an opportunity to engage in risky acts (Arnett, 1989). Smaller communities may project a fear of social judgment and sense of community, which serves to decrease risky acts (Mott & Haupin, 1987). Additionally, the media may portray images of restraint or indulgence, leading adolescents to have different perceptions of acceptable behavior (Bandura, 1973). Finally, strict conservative laws that apply harsh punishment for engaging in risky behavior may serve to decrease those behaviors, as opposed to communities that have more liberal laws or do not apply a punishment for engaging in risky behavior. It is easy to see how socialization could impact the engagement in risky behavior.

Another single factor model of masculine socialization stems from Brannon’s (1976) “blueprint for manhood”. This very influential and often-cited model of masculine ideology has been defined as the “endorsement and internalization of cultural belief systems about masculinity and male gender, rooted in the structural relationship between the two sexes” (Pleck, Sonenstein,
& Ku, 1993, p. 88). He offered four basic expectations of males living in the United States: the big wheel (high social status and successful), give ‘em hell (aggressive, violent, and daring), the sturdy oak (confident and self-reliant), and no sissy stuff (separation from stereotypical feminine behavior, including openness and vulnerability). This blueprint has resulted in the development of many of the most frequently used measures of masculinity (Brannon Masculinity Scale; Brannon & Juni, 1984) and masculine ideology (Male Role Norms Scale; Thompson & Pleck, 1986). Recently, risky behaviors have been examined through the lens of evolution (c.f., Bleige Bird, Smith, & Bird, 2001; Hawkes, 1991; Hawkes & Bleige Bird, 2002).

**Evolutionary Psychology**

“Consequently, any learned behavior is the joint product of “innate” equipment interacting with environmental inputs and, therefore, cannot be solely attributed to the action of the environment on the organism.” (Tooby & Cosmides, 2005) (p, 31).

Darwin (as cited in Trivers, 1972) proposed a theory of natural selection that animals either effectively adapt to environmental pressures or do not. Those species that do adapt are selected for, and continue, while those that do not, are selected against, and become extinct. However, while examining the variations between species he noticed that several animal species have characteristics that could be assumed to have a negative impact on their ability to survive, yet they continue to survive despite these characteristics. For example, a peacock’ plumage may be assumed to be maladaptive for natural selection pressures. The plumage, being bright and easily noticed, would be likely to attract potential predators and thus this characteristic would be selected against and either the plumage genes would not be passed on after time or the plumage
serves a different adaptive purpose altogether. As a result, Darwin proposed the theory of sexual selection.

Darwin’s theory of sexual selection (as cited in Trivers, 1972) posits that animals have an inherited drive to propagate their genes. As a result, members of the same species are in constant competition with one-another for resources that improve the healthy transmission of their genes from one generation to the next; stated another way, have healthy offspring. A “good” mate is one of those resources that Darwin identified as a source of competition. As potential mates are a limited resource, members of a species would compete for the best mate that they can acquire. As such, those characteristics that potential mates find desirable would continue while characteristics that are not would eventually no longer be displayed, because they would not be chosen and their genes would not continue. This, he proposed, was the purpose of the peacocks’ plumage. Basically, because there are threats to successful mating, including the development of healthy offspring, animals must look for cues that signal a potential mate’s gene quality. Thus, female peacocks would look for signals of a male peacock’s gene quality to increase the probability of successful mating. The plumage serves as that signal; the brighter the plumage the better the genes, and the more they are selected to mate with.

Parental investment is a related concept in Darwin’s theory of sexual selection that suggests females are the choosier sex (Trivers, 1972). Specifically, Trivers (1972) suggested that there are gender differences in the pressures that the two genders experience based upon parental investment. Similar to other species, females have a limited number of eggs that they produce, which decrease across age. As a result, there is no direct relationship between the number of sexual partners they have and the number of offspring that results. Meaning, as females are limited by the number of eggs they produce, more partners does not necessarily equate to more
offspring. Conversely, the number of sperm that males produce is much less limited relative to female eggs, so that a direct relationship does exist between the number or amount of sexual partners and the probability of having offspring. Additionally, females, at the minimum, must invest 9 months in their offspring during the gestation period, while males do not have a biological requirement to invest past the initial sexual encounter.

According to evolitional theory, these differences in parental investment result in specific gender differences in the process of selecting a mate. First, because females invest more in offspring than do males, they are the choosier sex and decide who they will mate with. In doing so, they look for characteristics that relate to these pressures of the differential investment in offspring. For example, females look for signals displaying factors related to the survival of offspring. A few of these factors include gene quality, resources, and willingness to invest those resources. Females look for signals that indicate good gene quality in order to increase the probability of successful mating and genetic quality of offspring. Additionally, they look for signals that males have adequate resources to provide for them and their offspring, and are willing to invest those resources. Males, on the other hand, increase the probability of passing on their genes by having multiple sexual encounters with females with good genes. As a result men are also looking for signals indicating good gene quality; however, they are also looking for signals that may indicate a female’s willingness to be a sexual partner.

Evolutionary Psychology and Risky Behavior

Male within-sex competition has been proposed as another sexual selection pressure (Daly & Wilson, 1994), and been proposed to be the greatest selection pressure in recent human evolution (Alexander, 1979). The theory posits that males compete with each other for access to
potential mates through direct (physical confrontation) and indirect (posturing) means. Those who are larger and stronger, (observable evidence of stronger genes), become more dominant and have access to more mates. As males compete with one another for the access to mates, the possibility of injury or even death from physical confrontation becomes a real concern. However, if males form alliances with each other, this can result in greater dominance, less injury, and more access to mates than solitary males. It would then be advantageous for men to choose other men with stronger genes as an alliance partner to further increase their dominance.

Evolutionary psychological theory posits that male adolescent engagement in risky behavior has been suggested to be strategically performed to display characteristics that women are looking for in a mate as a result of sexual selection pressures. At first this hypothesis may seem counterintuitive. Why would males risk the possibility of being injured or even death for the purpose of passing on their genes? However, as suggested by David Buss (2003) it may be adaptive for males to be willing to take risks if the reward is greater than the risk, especially during their peak reproductive age. An example was offered by Harris, Jenkins, and Glasser (2006), “Suppose that running a 5% risk of death can move an organism’s fertility from the 50th percentile for their sex to the 90th. For this male, this might pay a Darwinian dividend, whereas for females the cost would be more likely to outweigh the benefits” (p. 18).

A few theories within sexual selection have been offered to account for why it may be adaptive for adolescent males to engage in risky behavior. One such theory (Costly Signaling Theory; Bleige Bird, Smith, & Bird, 2001; Hawkes, 1991; Hawkes & Bleige Bird, 2002) proposes that the engagement in risky behavior may provide resources for men that women look for when choosing a mate. For example, males engage in competition with each other for resources. Thus, behaviors that increase the likelihood of attaining other relationships with men
and thwarting the possibility of physical violence towards them and increasing their social
dominance would be an adaptive behavior. Males who did not acquire these alliances reduced
their mating chances and their fitness (e.g., ability to compete for resources). Males who are
higher in social dominance have been suggested to have higher mate value, which has been
studied and corroborated across several cultures (e.g., Buss, 1994; Kenrick & Simpson, 1997).
Additionally, it has been suggested that men who controlled resources married younger women,
moved more women, and produced offspring earlier (Low, 1998).

Costly Signaling Theory proposes that individuals strategically engage in costly or risky
behaviors when the recognition of these behaviors by others serves some potential benefit for
Thus, males may engage in risky behavior as a strategy to display their gene quality to both
women and men (Hawkes, 1991). The risky behavior of a human male may serve a similar signal
to human females as the plumage of a male peacock does to female peacocks. Thus, men may
engage in risky behaviors to demonstrate their quality to potential mates. Conversely, the risky
behavior of males may serve as a signal of his value as an ally or his formidability as a foe to
other men, and thus help men compete with other men for resources (Baker Jr, & Maner, 2008).

Hawkes and Bleige Bird (2002) were interested in the reason why hunting behavior
persists, in hunter-gatherer-gardener societies, despite its relatively inefficient manner in
obtaining food. They proposed that hunting behavior not only provides food but displays men’s
ability to successfully hunt, or relative quality, to others. The theory posits that those individuals
who hunt successfully, and thus demonstrate high quality genes, reap the benefits of higher
social prestige and access to higher quality mates (Hawkes & Bleige Bird).
Bleige Bird, Smith, and Bird (2007) examined the hunting and foraging behaviors of the Meriam tribe (a Melanesian people of Torres Strait, Australia). The authors identified a gender specific strategy in the acquisition of food. Specifically, more men would spearfish and hunt turtles than women; whereas more women would gather shellfish than men. Gathering shellfish is a relatively efficient manner to obtain food as it takes less caloric effort and reaps larger caloric rewards than the hunting strategy. Conversely, spearfishing and hunting turtles takes much caloric effort and can often not reap any caloric reward as it is difficult to catch the prey. The authors concluded that men engage in the riskier food acquisition strategy because the successful catch of their prey resulted in access to higher quality women, as indicated by tribal members (Bleige Bird, Smith, & Bird).

It has been suggested that these gender specific risky behaviors serve the purpose of mate selection and the demonstration of mate quality to women. (Farthing, 2005; Kelly & Dunbar, 2001). For example, hunting prey and sharing his prey with the group may not only demonstrate a man’s physical prowess but his willingness to share those resources. Thus women would be more attracted to men who engage in those risky behaviors as compared to men who did not. These conclusions have been corroborated by women in both hypothetical (Kelly & Dunbar) and real world settings (Bliege Bird, Smith, & Bird, 2007).

Kelly and Dunbar (2001) examined women’s attraction to men who either engaged in brave (risky) or non-brave (not risky) acts of either altruistic intention or not by providing vignettes of men to female participants. The results indicated that women were significantly more attracted to men who engaged in brave (risky) acts as compared to men who did not. However, these results were moderated by length of relationship. Specifically, women’s attraction for short-term mating partners that engaged in risky behaviors was greater than their
attraction toward long term mating partners that engaged in risky behaviors. However, the results suggested that women were not significantly more attracted to men who engaged in heroic acts (both risky and altruistic) as compared to men who engaged in only risky or altruistic acts. The authors concluded that women may have specific strategies that they engage in based upon the nature of the relationship (Kelly & Dunbar).

Farthing (2005) was interested in further examining the role heroic and non-heroic acts would have on attraction to a potential mate. Both men and women were provided vignettes of either women or men engaging in heroic or non-heroic physically risky behaviors and asked to indicate their level of attraction to the individuals depicted. The results suggest that both men and women were more attracted to risk-takers as compared to risk avoiders with the amount of attraction toward the target being greater for women than men (Farthing), similar to previous findings (Kelly & Dunbar, 2001). However, these results were moderated by type of behavior. Specifically, both women and men were more attracted to risk avoiders than risk takers if the act was non-heroic.

Similar to previous suggestions (Kelly & Dunbar, 2001), Farthing (2005) posited that individuals may engage in specific strategies when seeking a mate that may explain these unexpected results. He proposed that while individuals are more attracted to those who engage in risky behaviors, if those behaviors hold no inherent practical value, then individuals would not want their mate to risk the bodily harm that may befall them from engaging in those behaviors. Thus, for women who are interested in a man for the purpose of long-term mating, she would be more concerned about their personal safety than their attempts to display their gene quality by engaging in more risky behaviors. The research questions regarding male’s perceptions of their
own short-term and long-term mate value offered in this manuscript, are based upon Farthing’s (2005) conclusions.

The Offspring Risk Hypothesis (Harris, Jenkins, & Glasser, 2006) posits that it is not necessarily men who engage in risky behavior as a mating strategy but women who engage in less risky behavior to reduce risk to herself and her offspring. The authors posited that women may have a greater tendency to see their environment as risky and thus engage in behaviors that are less risky as a result. Because women have more parental investment in offspring and as a result are the primary caretakers, they are concerned for the offspring that can not defend itself against risk in the environment. As such, it would be adaptive to remove themselves and their offspring from risky situations in which they can be hurt.

*Evolutionary Psychology and Depression*

Major depressive disorder is a common psychological disorder, suggested by the results of the National Comorbidity Survey. The results of the survey indicated that 46% of men and 58% of women reported having at least one Major Depressive Episode in their lifetime (Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993). A Center for Disease Control survey for 2006 and 2008 indicated that approximately 10% of the population was then affected by depression and 4.1% of the population met criteria for a Major Depressive Episode (CDC, 2010). As a result many theories with varying empirical support have been offered to account for the etiology and treatment of depression the exploration of which is beyond the scope of this paper (see Corey, 2005 for review). Recently, there has been an effort to explain depression from a Darwinian, or evolutionary approach (Allen & Badcock, 2006). From this perspective, depression has been suggested to be an adaptive response to an individual’s environment (Neese, 2000).
Darwinian explanations of depression are important for three main reasons (Allen & Babcock, 2006; Gilbert, 1998). First, an evolutionary perspective of depression provides insight into the possible causes of depressive symptoms that individuals may experience. If individuals have evolved to experience depression in response to certain adaptive concerns, these symptoms may serve specific adaptive functions (Allen & Babcock, 2006). Second, an evolutionary explanation of depression counters the traditional view of depression as fundamentally dysfunctional (Gilbert, 1998). If depression had an adaptive role in our ancestry, then it is likely that depression had a reproductive benefit for the individual and their kin. Third, evolutionary psychology provides a robust heuristic through which to generate testable hypotheses about the role of affect.

A Darwinian explanation, suggests that affective states are shaped by the natural selection pressures of certain situations (Nesse, 2000). Specifically, depressive symptoms are consistently triggered in response to adverse situations (Monroe & Simons, 1991). This indicates that depressive symptoms may not be maladaptive but may prove to serve an adaptive purpose in those situations that trigger them. Some evolutionary theories of depression have been offered which hypothesize domain-specific functions of depressive symptoms (c.f. Allen & Badcock, 2006).

*Evolutionary based theories of depression.*

Evolutionary based theories of depression center around topics of energy conservation, interpersonal attachment, and social competition. Theories of resource and energy conservation, for example, assert that low mood causes the individual to conserve their resources when the outcome of their behavior is likely to result in failure. As a result, the individual conserves their
energy to use in future situations where success is more likely (Allen & Badcock, 2006). Some of these energy and resource conservation theories of depression include the Stink Costs Model which suggests that low mood is a result of individuals who persevere despite little reward (Leahy, 1997) or the Incentive Disengagement Theory which proposes that depression causes individuals to disengage from unobtainable incentives or goals (Klinger, 1976).

The Social Risk Hypothesis (Babcock & Allen, 2003) is an attachment based theory of depression suggesting that mate retention and reciprocal alliance formation are important social selection pressures that have shaped our evolution (Buss, 1999). This model hypothesizes that behaviors designed to maintain or improve bonds with a caregiver are triggered when those bonds are threatened (Gilbert, 1992). Thus, depression is a result of the loss or weakening of those bonds and relationships. Depressive symptoms additionally serve as indicators of distress and a call for help from allies and caregivers (Frijda, 1994) and motivate the sufferer to avoid the further deterioration of those relationships (Ingram et al., 1998). The Social Risk Hypothesis (Babcock & Allen, 2003) theory was recently tested in its entirety for the first time through the use of structural equation modeling with the authors finding support for most but not all of the hypotheses derived from the theory (Dunn, Whelton, & Sharpe, 2012). Dunn, Whelton, and Sharpe (2012) suggest that social comparison (i.e., less favorable views of oneself), attachment (less confidence in a secure attachment), and primarily defeat (greater perceived experiences of defeat) leads to depression, which then in turn leads to interpersonal sensitivity and submissiveness.

Social Competition theories of depression are based on the hypothesis that an individual’s access to resources is dependent upon his or her social rank (Buss, 1999). Thus, humans are motivated to compete with one another for social rank in order to gain access to these resources.
Price offered this explanation upon examining ritual fighting behaviors. He suggested that the stronger competitor would adopt an escalating strategy to increase his chances of success; whereas, a less strong competitor would adopt a de-escalating strategy that indicates yielding or subordinate behavior. The de-escalating behavior by the weaker competitor is an adaptive strategy to remove the risk of harm or possible death by signaling to the stronger competitor that he is withdrawing from the competition. Price conceptualized depression as a de-escalating signal of the weaker competitor to the stronger competitor for this purpose (Price, et al., 1994). It may be asked, however, how these explanations of adaptive depression or low mood relate to pathological depression.

Low mood vs. depression

An important distinction, in the evolutionary view of psychopathology, is the difference between symptoms that are normal and useful and those that are defective. For example, fever, nausea, and somatic pain are aversive states that serve an adaptive purpose (Nesse & Williams, 1994), whereas chronic pain is a result of defective neural mechanisms. There has been a similar effort to distinguish between pathological depression and a more adaptive reaction, referred to as “low mood” (Keller & Nesse, 2005). Low mood refers to the cluster of symptoms usually associated with depression (i.e., depressed mood, anhedonia, crying, self-reproach, fatigue, pessimism, psychomotor retardation, somatic disturbances, and shifts in cognitive style). Normal low mood is triggered by threats to an individual’s fitness (e.g., ability to compete for resources), with the severity of symptoms proportional to the level of threat. Once the threat subsides, the symptoms also subside.
Conversely, depression can be conceptualized as “extreme low mood” (Keller & Nesse, 2005). This extreme low mood can be either pathological or normal and adaptive depending on the context. Licino et al. (2002) illustrated this through a hypothetical scenario of a woman and a male fiancée who is unfaithful. In this example, the woman catches her fiancée cheating on her and becomes very upset for two weeks, experiencing several depressive symptoms (i.e., crying, sadness, guilt, pessimism, difficulty eating and sleeping), followed by her behavior returning to normal. Despite her meeting the criterion for a Major Depressive Disorder Diagnosis according to the DSM, such behaviors are not abnormal and possibly adaptive given her situation. However, if the same woman experienced these symptoms without a significant precursor, her behaviors would be considered pathological. Thus, the importance of context in an individual’s behavior and reaction is important to distinguish between what is adaptive and pathological. It has been suggested that specific symptoms, associated with low mood and depression, serve specific adaptive strategies as well (Keller & Nesse, 2005).

**Symptom specific strategy**

Keller and Nesse (2005) suggests that the depressed individual displays these symptoms (i.e., sadness, crying, self-reproach, fatigue, pessimism, changes in appetite, and changes in sleep patterns) to serve specific fitness relevant strategies for the individual. Provided below is an illustration of the specific symptoms associated with low mood and depression, with an explanation of the adaptive strategies each may serve.

*Sadness.* Sadness may motivate an individual to avoid actions that may result in future losses. Additionally, individuals can preemptively avoid scenarios by imagining an emotional response to hypothetical situations (Keller & Nesse, 2005).
Crying. Crying may elicit empathy and comfort from observers (Labbot et al., 1991), solicit help (Keller & Nesse, 2005) and strengthen bonds with partners, family, and allies (Frijda, 1986).

Self-Reproach. Similar to sadness, worthlessness and guilt may motivate individuals to avoid actions that lead to loss in the future. However, worthlessness and guilt may lead to an understanding of how one’s actions resulted in the outcome. Additionally, this may represent to others culpability and avoid the disruption of relational bonds (Keller & Nesse, 2005).

Fatigue. Fatigue may signal two different strategies for the individual. First, the depletion of resources may result in avoiding competitive situations with others that can result in failure and possible injury or loss of life (Keller & Nesse, 2006). Second, fatigue may result in conserving resources to use in future situations when success is more likely (Keller & Nesse, 2005).

Pessimism. Thinking that the likelihood of favorable outcomes is unlikely may reduce efforts toward a goal that is unreachable (Klinger, 1975).

Changes in Appetite. In our ancestral times foraging may expose individuals to risky situations that could cause harm or injury. A decrease in appetite may decrease foraging behaviors and reduce exposure to uncertain risky situations (Keller & Nesse, 2005).

Changes in Sleep Patterns. Similarly, our ancestors experienced risk that we may not currently. For example, an inability to sleep may help to protect individuals from animal or human attacks (Keller & Nesse, 2005).
Critique of Evolutionary based Theories of Depression

It has been suggested that depression can be considered adaptive. If this is correct then it follows that depression should be effective and efficient at achieving the functions it is posited to be adaptive for. Based upon this, it is possible to derive two basic hypotheses. First, if symptoms of depression are adaptive responses to social concerns, then individuals with depression should be efficient at solving those social problems. Meaning, if a person develops symptoms of depression to adapt to social concerns then it should be effective at reducing those social problems. Second, individuals with depression should be effective at obtaining resources (i.e., support from allies and caregivers) from their social contacts (Nettle, 2004). However, these hypotheses are often not supported by the literature.

Moreover, if these hypotheses are accurate then the social cognition of individuals with depression should also be an effective strategy. The research in this area is inconclusive. There has been some research that has demonstrated that depressed individuals are less likely to commit the fundamental attribution error (Yost & Weary, 1996) and depressives outperform nondepressives on a task targeting social problems (Lane & DePaulo, 1999). However, other research contradicts these hypotheses. For example, depressives are slower and less accurate than controls at reading non-verbal social cues (Persad & Polivy, 1993) and show impaired social skill (Libet & Lewinsohn, 1973). Moreover, individuals with depression performed worse than controls on interpersonal problem solving skills (Watkins & Baracaia, 2002).

It should be noted that there are also several critiques of the symptom specific strategy hypothesis. For example, arousal of the sympathetic nervous system may be an adaptive mechanism in depression, but it interferes with eating and sleeping behavior. The suggested
strategy of crying to illicit empathy and strengthen interpersonal bonds seems to be countered by other findings that indicate interpersonal rejection often results from the display of depressive symptoms (Segrin & Abramson, 1994). These inconsistencies suggest the need for more research in this area to help delineate the variables that predict either a strengthening of interpersonal relationships or interpersonal rejection in relation to depressive symptoms.

**Risky Behavior and Depression**

When reexamining the social competition (Price, et al., 1994) and energy conservation (Allen & Badcock, 2006) theories of low mood, it becomes easy to see one common component that they share. Low mood symptoms are proposed to be an adaptive de-escalating strategy by an individual who either cannot compete or believes that they will lose if they do compete. Specifically, hypotheses derived from the social competition (Price, et al.) theory of low mood suggest that depression symptoms serve to indicate yielding behavior by a weaker competitor to a stronger competitor to reduce the risk of harm. Hypotheses derived from the energy conservation (Allen & Badcock) theory of low mood suggest that depression symptoms serve as a strategy by a weaker competitor to conserve energy when failure is likely. Thus, another way to state this commonality is that these theories propose that individuals with low mood are weaker competitors or have weaker genes.

Costly signaling theory (Hawkes, 1991) proposes that the risky behavior of males is an adaptive strategy to display the quality of their genes. The more they engage in risky behavior and are not hurt, the stronger genes that they have. The implication is that they must have “stronger” genes than those who either do not engage in risky behavior or do so, but get hurt. Taking this explanation of risky behavior into account and viewing it in relation to the social
competition (Price et al., 1994) and energy conservation (Allen & Badcock, 2006) theories of low mood one can easily derive a hypothesis about the mood of those who engage in risky behavior. Specifically, that those individuals who engage in risky behavior are likely to have less low mood symptoms than those who do not engage in risky behavior, as they will likely be stronger competitors and have stronger genes. Despite a theoretical connection between risky behavior and low mood, it can be difficult to accurately measure risky behavior. Prior studies in evolutionary psychology have had methodological problems. As a result, there has been a recent attempt to use methodology from outside the evolutionary psychology field to more accurately measure risky behavior (Ermer, Cosmides, & Tooby, 2008). This methodology includes the forced-choice decision format between two options with identical mathematical probabilities, as used in prospect theory (Kahneman & Tversky, 1979).

**Prospect Theory and Risky Behavior Methodology**

Prospect theory is a cognitive model of risk that is based upon decisions between two choices (Kahneman & Tversky, 1979). It has become one of the most influential behavioral theories of choice in the social sciences, particularly psychology and economics (Kahneman & Tversky, 1979). Historically, it evolved in reaction to strict behavioral theories and models and thus placed it in the middle of the cognitive revolution (Simon, 1985). The theory has been so widely used and influential, Daniel Kahneman won the Nobel Prize in economics in 2002 for his work with Amos Tversky on the prospect theory.

Prospect theory posits that risk preference or aversion is based upon two components or phases (Kahneman & Tversky, 1979). The first is the editing phase, which constitute as framing effects. Framing effects as posited in prospect theory suggests that an individual’s likelihood of
taking risks depends on how information is provided or “framed”, either positively or negatively. For example, when a risky option is framed in a positive way, individuals will typically choose the risky option. However, when a risky option is framed or presented negatively, individuals will not choose the risky option. The second phase is the evaluation phase. In the evaluation phase prospect theory predicts risk aversion in the domains of gains and risk taking in losses. For example, information is presented as a certainty of gains or a mathematical probability of incurring loss. The participant is asked to choose between these two options (see below).

The methodology used in prospect theory is a forced choice format between two differently framed options with identical mathematical probabilities. The most famous example (e.g., most often used) asks people to make different choices about medical treatment when the options are framed as “survival” or “mortality” (Tversky & Kahneman, 1981). Specifically, people are more averse to taking risks in the “gain frame” when the option is framed in the possibility of living (survival), than in the “loss frame” when the option is framed in the possibility of dying (mortality) (McNeil, Sox, & Tversky, 1982). This methodology to study risky behavior of the forced choice format between two differently framed options with equal probability of occurrence has been widely used across many domains of study including psychology (Kahneman & Tversky, 1979), economics (Kahneman, Slovic, & Tversky, 1982), American politics (Patty, 2006), and public policy (McDaniel & Sistrunk, 1991), among others.

Prospect theory and the methodology to examine it has also been used to study risk from an evolutionary psychology perspective (Ermer, Cosmides, & Tooby, 2008; Hill & Buss, 2010) as it provides an elegant description of the relationship between environmental contingencies in the form of gains and losses and individual risk propensity. Additionally, the frequency of which the methodology has been used during the last 40 years, and the breadth of domains the
methodology has been utilized in, provides confidence in its validity and reliability in studies of risk behavior. Other attempts to study risky behavior from an evolutionary perspective suffer from various methodology concerns (c.f., Apicella et al., 2008; and Farthing, 2005 for some examples).

Since examining risky behavior from an evolutionary perspective has been a relatively new phenomenon, little to no psychometric data exists on the instruments used. For example, there has been a recent attempt to create an instrument examining the domains of risk from an evolutionary perspective (Kruger, Wang, & Wilke, 2007). While this instrument has demonstrated good reliability ratings so far, to date there have not been enough studies to determine if this will truly be a reliable measure or not. Moreover, many studies have used questionnaires created exclusively for a single study (c.f., Farthing, 2005; Kelly & Dunbar, 2001) and thus rely primarily on face validity in their creation. For the purposes of this study, this methodology was chosen as each of the aforementioned attempts to study risky behavior from an evolutionary psychology perspective have either narrow behaviors the authors measure, narrow decisions the authors measure, or the study attempts to categorize the type of risky behavior as opposed to measuring the behavior. For example, when specific questionnaires are created to fit the target behavior they are attempting to measure, and then operationally define that target behavior as risky, it becomes difficult to use the same questionnaire across other behaviors. Additionally, attempts to categorize risky behavior into domains is also problematic for the purposes of this study as it is not the objective of the current study and does not accurately address the research questions. As a result, the forced choice format between two differently framed options with identical probabilities as a methodology to measure risky behavior, as offered by Prospect Theory (Kahneman & Tversky, 1979) and utilized in evolutionary
psychology (Ermer, Cosmides, & Tooby, 2008), appears to be the most parsimonious, valid, and reliable measure that addresses the research questions of the current study.

Summary and Conclusions

Authors in the field of evolutionary psychology suggest that risky behavior is an adaptive purposeful strategy used by males in competition with other males to display the strength of their genes, with the purpose of being chosen by females as a mate (c.f., Bleige Bird, Smith, & Bird, 2001; Hawkes, 1991; Hawkes & Bleige Bird, 2002). It follows that if males attempt to acquire a mate by engaging in risky behavior, and engage in this behavior effectively, then they would rate themselves as a valuable mate in relation to other males who do not do so. However, some literature suggests that risky behavior as an effective mating strategy is dependent upon the length of mating commitment females are intending to obtain (Kelly & Dunbar, 2001; Farthing, 2005). Farthing (2005) suggested that females interested in a short-term mate are more attracted to risk taking males than females interested in a long-term mate, who may want males to reduce their risky behavior in order to avoid potentially dangerous situations. This study will examine the concepts of risky behavior and mate selection by analyzing the differences between risk taking and non-risk taking males on their personal mate value and the short-term mate value and long-term mate value of a potential partner they believe they can acquire, as measured by the MVI (Kirsner, et al., 2003).

Authors within evolutionary psychology also suggest that low mood is an adaptive response to reduce harm (Price, et al., 1994) or to conserve energy (Allen & Badcock, 2006) by those who are unable to effectively compete with others. However, to date the author is unaware of any attempt to link risky behavior of males and low mood. This study attempts to create this link by
examining if differences in low mood exist between risky males and non-risky males, as measured by the POMS-SF Depression Dejection subscale (Shacham, 1983).

Application to Counseling Psychology

Recently, there has been an attempt to define the parameters of counseling psychologists in the field of clinical health psychology (Nicholas & Stern, 2011). One of these parameters focus on the problems addressed within our field (Nicholas & Stern) and emphasizes the health disparities across various populations (Tucker, Ferdinand, et al., 2007). As, the risky behavior of males often results in deleterious health ramifications it is important for counseling health psychologists to conduct further research in this area to elucidate the cause of such behaviors. Furthermore, insight into these behaviors can be used to develop effective interventions that focus on preventative measures, another important component within counseling health psychology (Tucker, Herman, et al., 2007).

A strength-based approach to client concerns is identified as a core value and training context within counseling psychology (Council of Counseling Psychology Training Programs, 2006). This study attempts to continue this strength-based focus via examining male risky behavior as an adaptive response to gender specific concerns as opposed to the maladaptive explanations offered by previous studies (c.f., Elkind, 1967; Zuckerman, 1991). Moreover, this study attempts to examine the effect of male risky behavior on low mood, a construct that is viewed as an adaptive reaction to environmental and social cues (c.f., Bleige Bird, Smith, & Bird, 2001; Hawkes, 1991; Hawkes & Bleige Bird, 2002). This views depressive symptoms through a normative or non-pathological lens resulting in a strength-based focus (the third
parameter within counseling health psychology; Nicholas & Stern, 2011), as opposed to a pathological focus commonly associated with Major Depressive Disorder.
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Assessed for eligibility (N=330)

- Excluded (n=40)
  Did not complete any of the questions

- Excluded (n=40)
  Did not meet inclusion criteria (Female)

- Excluded (n=5)
  Did not meet inclusion criteria (over 30)

- Excluded (n=6)
  Univariate or multivariate outliers

239 cases eligible for analysis
APPENDIX D

DEMOGRAPHIC QUESTIONNAIRE

Gender (circle one): MALE    FEMALE    OTHER

Grade Level (circle one): FRESHMAN    SOPHOMORE    JUNIOR
                        SENIOR    OTHER

Age: __________

Date of Birth: __________

Race/Ethnicity (circle one): White
                          AFRICAN-AMERICAN or Black
                          HISPANIC or Latino
                          American Indian or Alaskan Native
                          OTHER

Relationship Status (circle one): SINGLE w/o partner
                                    Single with Partner    MARRIED
                                    DIVORCED    OTHER

Sexual Identity (circle one): Heterosexual     Gay
                                Bisexual     Other

Have you ever been diagnosed with depression or Major Depressive Disorder:

Yes    No
APPENDIX E
DECISION PROBLEMS

Please indicate below which of the two options you would choose.

*Resource Loss Problem:*

Imagine that you bought $60 worth of stock from a company that has recently filed a claim for bankruptcy. The company now provides you with two alternatives to recover some of your money.

If you choose alternative A, you will receive $20 of your money.

If you choose alternative B, you will take part in a random drawing procedure with exactly a one-third probability of receiving all of your money and two-thirds chance of receiving none of your money.

Which of the two alternatives would you favor?

*Medical Loss Problem:*

Imagine that 60 people are infected by a fatal disease. Two alternative medical plans have been proposed. Assume the exact scientific estimates of the consequences of the plans are as follows:

If you choose plan A, 20 people will live.

If you choose plan B, there is a one-third chance that everyone will live and a two-thirds chance that no one will live.

Which of the two plans would you favor?
APPENDIX F
MATE VALUE INVENTORY (MVI)

Describe yourself as accurately as possible.

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Attractive body……. -3  -2  -1  0  1  2  3
Desires children….. -3  -2  -1  0  1  2  3
Enthusiastic about sex -3  -2  -1  0  1  2  3
Faithful to partners.. -3  -2  -1  0  1  2  3
Financially secure…  -3  -2  -1  0  1  2  3
Generous……………  -3  -2  -1  0  1  2  3
Good sense of humor  -3  -2  -1  0  1  2  3
Healthy…………….. -3  -2  -1  0  1  2  3
Independent……….. -3  -2  -1  0  1  2  3
Intelligent……….. -3  -2  -1  0  1  2  3
Kind and Understanding -3  -2  -1  0  1  2  3
Loyal………………. -3  -2  -1  0  1  2  3
Responsible……….. -3  -2  -1  0  1  2  3
Shares my values….. -3  -2  -1  0  1  2  3
Shares my interests... -3  -2  -1  0  1  2  3
Sociable…………… -3  -2  -1  0  1  2  3
Emotionally stable… -3  -2  -1  0  1  2  3
Describe the characteristics of what you would consider an ideal partner for a brief relationship or fling.

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Describe the characteristics of a long-term (several years or more) romantic partner who would be ideally suited for you.

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Given what you have to offer, describe the qualities of the best partner that you think you can realistically attract for a long-term (several years or more) romantic relationship.

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Ambitious………… -3 -2 -1 0 1 2 3
Attractive face…… -3 -2 -1 0 1 2 3
Attractive body…… -3 -2 -1 0 1 2 3
Desires children….. -3 -2 -1 0 1 2 3
Enthusiastic about sex -3 -2 -1 0 1 2 3
Faithful to partners.. -3 -2 -1 0 1 2 3
Financially secure… -3 -2 -1 0 1 2 3
Generous………… -3 -2 -1 0 1 2 3
Good sense of humor -3 -2 -1 0 1 2 3
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Shares my values….. -3 -2 -1 0 1 2 3
Shares my interests... -3 -2 -1 0 1 2 3
Sociable…………… -3 -2 -1 0 1 2 3
Emotionally stable… -3 -2 -1 0 1 2 3
APPENDIX G
DEPRESSION-DEJECTION SUBSCALE OF THE PROFILE OF
MOOD STATES - SHORT FORM (POMS-SF)

Below is a list of words that describe feelings that people have. Please read each one carefully.
Then circle ONE answer to the right that best describes HOW YOU HAVE BEEN FEELING
DURING THE PAST WEEK INCLUDING TODAY.

The numbers refer to these phrases:

0 = Not at all
1 = A little
2 = Moderately
3 = Quite a Bit
4 = Extremely

Unhappy ....... 0 1 2 3 4
Sad ............. 0 1 2 3 4
Blue .......... 0 1 2 3 4
Hopeless ....... 0 1 2 3 4
Discouraged ...... 0 1 2 3 4
Miserable ....... 0 1 2 3 4
Helpless ....... 0 1 2 3 4
Worthless ....... 0 1 2 3 4
APPENDIX H
INTRODUCTORY STATEMENT

Thank you for your participation in this study. This study concerns behavior choice, mate choice, and mood states. We greatly appreciate the time you spent answering each question. Please follow the instructions on each page of the study and respond to each question to the best of your ability. You may discontinue your participation at any time with no penalty.
Study Title  Behavior Choice, Mate Values, and Mood States

Study Purpose and Rationale
The purpose of this study is to conduct research to examine how male’s behavior choice effects mate values and mood states. The reason for conducting this research is to provide information to the psychological community on the relationships between behaviors, mate values, and mood states. In doing so, counselors, psychotherapists, and other health professionals can better understand these relationships to facilitate healthy decision making.

Inclusion/Exclusion Criteria
To be eligible to participate in this study you must be a male Ball State University student, over the age of 18 years old, and be able to read at the sixth-grade level.

Participation Procedures and Duration
For this project, you will be asked to complete three questionnaires concerning a) your behavior choice, b) your mate values, and c) your mood during the last week. This study will be completed in one sitting. It will take approximately 45 minutes to complete the questionnaires.

Data Confidentiality or Anonymity
All data will be maintained as confidential and no identifying information such as names will appear in any publication or presentation of the data at any time.

Storage of Data
Digital copies of data will be stored on a password-protected computer of the principle researcher. Data will be kept for two years and then discarded. The data will also be entered into a software program and stored on the researcher’s password-protected computer for two years and then deleted. Only the principle researcher and faculty advisor will have access to this data.

Risks or Discomforts
The only anticipated risk from participating in this study is that you may not feel comfortable answering some of the questions. You may choose not to answer any question that makes you uncomfortable and you may quit the study at any time.

Who to Contact Should You Experience Any Negative Effects from Participating in this Study
Counseling services are available to you through the Counseling Center at Ball State University (765-285-1376) if you develop uncomfortable feelings during your participation in this research project. You will be responsible for the costs of any care that is provided [note: Ball State students may have some or all of these services provided to them at no cost]. It is understood that in the unlikely event that treatment is necessary as a result of your participation in this research project that Ball State University, its agents and employees will assume whatever responsibility is required by law.

Benefits
One benefit you may gain from participating in this study is to feel as though you have contributed to the knowledge base in psychology particularly in helping counselors understand why males engage in risky behavior.

Compensation/Inducements
Your participation in this study will fulfill partial research requirements of the CPSY department.

Voluntary Participation
Your participation in this study is completely voluntary and you are free to withdraw your permission at anytime for any reason without penalty or prejudice from the investigator. Please feel free to ask any questions of the investigator before signing this form and at any time during the study.

**IRB Contact Information**

A) For questions about your rights as a research subject, please contact Research Compliance, Office of Academic Research and Sponsored Programs, Ball State University, Muncie, IN 47306, (765) 285-5070, irb@bsu.edu.

Consent

I, agree to participate in this research project entitled, “Behavior Choice, Mate Values, and Mood States.” I have had the study explained to me and my questions have been answered to my satisfaction. I have read the description of this project and give my consent to participate. I understand that I will receive a copy of this informed consent form to keep for future reference.

To the best of my knowledge, I meet the inclusion/exclusion criteria for participation (described on the previous page) in this study.

**Researcher Contact Information**

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APPENDIX J
DEBRIEFING STATEMENT

Thank you for your participation in this study. We greatly appreciate the time you spent answering each question. This statement provides you with more information about the study you just competed. There was certain information concerning the study that was not given to you due to the fact that it may have impacted your responses and skewed our results. Please take time to read the following information to understand these aspects, if you wish.

The purpose of this research was to investigate the relationship between male risky behavior, perception of personal mate value, long term mating potential and short term mating potential, and low mood. We will investigate this question through the responses of participants like yourself. General hypotheses are as follows:

We expect to find that males who either engage in risky behavior or not have different perceptions of their own mate value. Additionally, we expect to find that males who tend to engage in risky behavior have differences in their mood states than males who do not.

Please do not discuss this study with others until this study is completed. Our efforts will be compromised if this occurs. If you would like more information, a report of the results of the study, or need to contact the researcher regarding your participation in this study please contact:

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APPENDIX K

Institutional Review Board

DATE: September 28, 2012
TO: John Meter, M.A.
FROM: Ball State University IRB
RE: IRB protocol # 311740-2
TITLE: RISKY BEHAVIOR, MATE VALUE, AND LOW MOOD: IS IT ADAPTIVE FOR MEN TO BE RISK TAKERS?
SUBMISSION TYPE: Amendment/Modification
ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: September 28, 2012

The Institutional Review Board reviewed your protocol on September 28, 2012 and has determined the procedures you have proposed are appropriate for exemption under the federal regulations. As such, there will be no further review of your protocol, and you are cleared to proceed with the procedures outlined in your protocol. As an exempt study, there is no requirement for continuing review. Your protocol will remain on file with the IRB as a matter of record.

Editorial notes:
1. Modification Approved.

While your project does not require continuing review, it is the responsibility of the P.I. (and, if applicable, faculty supervisor) to inform the IRB if the procedures presented in this protocol are to be modified or if problems related to human research participants arise in connection with this project. Any procedural modifications must be evaluated by the IRB before being implemented, as some modifications may change the review status of this project. Please contact please contact John Mulcahy at (765) 285-5106 or jmulcahy@bsu.edu if you are unsure whether your proposed modification requires review or have any questions. Proposed modifications should be addressed in writing and submitted electronically to the IRB (http://www.bsu.edu/irb) for review. Please reference the above IRB protocol number in any communication to the IRB regarding this project.

Reminder: Even though your study is exempt from the relevant federal regulations of the Common Rule (45 CFR 46, subpart A), you and your research team are not exempt from ethical research practices and should therefore employ all protections for your participants and their data which are appropriate to your project.