

The social risk hypothesis of depressed mood: Recent empirical studies

Nicholas B. Allen and Paul B.T. Badcock

University of Melbourne

Draft of presentation/chapter for the 9th Sydney Symposium, 2006,
“The evolution of the social mind: Evolutionary psychology and social cognition,”
Convened/edited by Joseph P. Forgas, Martie Haselton, & William von Hippel

Do Not Quote Without Permission

Contact details:

Nicholas B. Allen

Department of Psychology & ORYGEN Research Centre

University of Melbourne

Parkville VIC 3010

Australia

Phone: +61 3 9342 2819

Email: nba@unimelb.edu.au

The social risk hypothesis of depressed mood: Recent empirical studies

Nicholas B. Allen & Paul B.T. Badcock

University of Melbourne

Introduction

The social risk hypothesis advanced by Allen and Badcock (2003) sees depressed mood as an evolved, adaptive strategy that facilitates a risk-averse approach to social interaction. The mechanism is hypothesised to be designed such that it is activated when individuals perceive themselves to be in circumstances where humans, over the course of their evolutionary history, have been at risk of exclusion from social contexts that were central to solving important reproductive challenges. The function of the mechanism is to temporarily minimize social risk, and therefore, any threats of further social exclusion. Allen and Badcock (2003) suggest that two of the critical functions of the depressive response include: (1) an increase in cognitive sensitivity to indicators of social risk; and (2) a generalised reduction in an individual's propensity to engage in risky social behaviours. In this chapter we will summarise some recent empirical work that aims to provide an assessment of these proposals, particularly the latter, and explore the implications of this work for the ongoing development of the social risk model.

Depression and Increased Sensitivity to Social Risk

There exists a wealth of research to support the idea that depressed mood is associated with an increased sensitivity to indicators of social risk. For example, in a study requiring depressed vs. non-depressed participants to evaluate the potential risks and benefits associated with a range of domain-specific decision-making scenarios, Pietromonaco and Rook (1987) found that depressed individuals were considerably more sensitive to risks in the social domain. Furthermore, Mathews, Ridgeway and Williamson (1996) report that depressed individuals display attentional vigilance towards socially threatening words. Similarly, a strong, specific

relationship between depressed mood and attention toward socially threatening images has been demonstrated by Allen, Yap, Di Parsia, Adey, Foverskov and Simmons (2001). Others have found that mild-to-moderately depressed participants seek out, and are particularly vigilant and sensitive to, social information (Edwards & Weary, 1993; Weary & Edwards, 1994; Hildebrand-Saints & Weary, 1989; Gleicher & Weary, 1991). Also, depression has been found to be associated with an increased sensitivity to negative interpersonal and/or achievement related experiences (Cole, 1990; Persons et al., 1993; Joiner, 1995), and heightened and reduced anticipation of negative and positive life events, respectively (MacLeod & Byrne, 1996).

In a more direct test of this proposal, Badcock and Allen (2003) examined the effect of experimentally induced depressed mood upon reasoning about social risk through use of a novel version of the Wason card selection task (Wason, 1966; Wason & Johnson-Laird, 1972). The response on the Wason selection task acts as a measure of an individual's reasoning about the violation of a conditional rule. The tasks designed by Badcock and Allen required participants to detect violations of rules that predicted positive social outcomes from taking social risks (i.e., they were asked to detect the possibility of negative social outcomes). It was found that participants in an induced depressed mood state reasoned more adequately about risks related to social competition (i.e., were more able to detect violation of the rule “if I invest the resources in competing, then I will be successful”) than did those in a neutral mood state. This mood-facilitation effect was not observed for reasoning about other types of content. This provides some empirical support for the notion that depression is associated with inferential reasoning biases that result in greater sensitivity to (i.e. the likelihood of detection of) social risks.

Depression and Reduced Social Risk-Taking Propensity

An issue that we have explored in more detail in the studies that we will present here is the proposal that depression is associated with a reduction in an individual's propensity to engage in social risks, but does not affect risk propensity for other types of risk, such as physical

or financial ones. This hypothesis enjoys some previous support from a range of research findings. Forgas (1995; 2002), for example, has shown that while positive affect is linked with confident and assertive approach behaviours in interpersonal contexts, negative affect is associated with more avoidant and defensive social behaviours. Consistent with this view, he has demonstrated that individuals in a sad mood pay more attention to the requirements of interpersonal situations, and process their responses in a more careful, bottom-up fashion (Forgas, 1998a, 1998b, 2002). Further evidence for a link between depression and reduced social risk taking has been provided by Pietromonaco and Rook (1987). Administering a range of decision-making scenarios pertaining to a variety of different risk domains, they found that “depressed subjects reported less willingness than did the nondepressed subjects to take actions that might expose them to social risks (such as embarrassment or conflict)” (Pietromonaco & Rook, 1987, p. 405). In a similar vein, Yuen and Lee (2003) have shown that induced depressed mood is associated with reduced risk-taking tendencies generally, although they did not explore the differential association of depression with social and non-social risks.

Another relevant research area is found in studies of the structure of self-rated mood. Researchers have argued that while high levels of negative affect are associated with a variety of distressed states, low levels of positive, or appetitive, emotional states are depression-specific (Depue & Iacono, 1989; Joiner, Catanzaro, & Laurent, 1996; Clark & Watson, 1991). Relevant to the association between depression and risk taking in social contexts, Watson (2000) has demonstrated that positive affect is strongly associated with the desire to engage in social activity. In sum, these findings can be seen as providing some indirect support for the hypotheses that depressed mood is associated with a reduced propensity to engage in social risk-taking, possibly mediated via its influence on positive affect, which causes low levels of pleasure and energy, alongside reductions in an individual’s self-assurance and motivation to engage in social activities.

Recent Studies on Depression, Risk Cognition, and Risk Propensity

Study 1: Reasoning about social risk and risk propensity in clinical depression. We recently extended our work on the effect of depression on reasoning about social risks by comparing the Wason selection task responses of clinically depressed participants with those of anxious and non-psychiatric community controls. This study had a number of potential advantages over the previous one (Badcock & Allen, 2003). The use of a community sample (as opposed to the university student samples that have been used in the majority of previous research on the Wason task) is likely to minimize task familiarity. Moreover, comparing responses of depressed participants with those of an anxious control group enabled us to examine effects specific to depression. Notably, while the social risk hypothesis asserts that clinical-level depression is best understood as a pathology that deviates from the normal functioning of the adaptive mechanism, clinical populations remain an appropriate source of evidence because clinical phenomena should still conform to the predicted algorithmic organization of the mechanism (Allen & Badcock, 2003). In other words, the basic morphology of the relevant inputs, transformations, and outputs that characterise normative depressed mood should still be observable in clinically-significant depressed states, despite the fact that the mechanism is operating in a way where it no longer serves its ecologically adaptive function (Allen & Badcock, 2003). Arguably, then, evidence from clinical populations can be used to test predictions concerning the design of the mechanism, but not those regarding its ecological functions. With this in mind, the use of a clinical sample is not problematic with regard to the ability of the design to test the predictions of the social risk model.

Reasoning about social risks and risk-taking propensity were measured via the Wason selection task items utilised in Badcock and Allen (2003), along with three dichotomous-response risk-taking propensity measures added to the social risk and cheater-detection Wason selection tasks. After each task, participants were asked to select which behavioural strategy (i.e.

“take the risk” vs. “not take the risk”) they would be likely to adopt. According to the social risk hypothesis, depressed participants should provide significantly more risk-averse (i.e. “not-p”) responses than those in the anxious and healthy control groups for the two measures of reasoning about social risks. However, given Allen and Badcock’s (2003) proposal that depression is linked specifically with a reduced propensity to engage in risks associated with agency and/or affiliation, it was predicted that depressed participants would not differ significantly from either the anxious or control groups in terms of their responses for the cheater-detection risk-taking measure. A further aim of this study was to examine whether scores on a range of mood and symptoms questionnaires significantly predicted Wason selection task performance and/or participants’ responses on the dichotomous risk-taking measures.

Seventy three individuals were selected to form three groups: a clinical depression group $n = 27$, a clinical anxiety group $n = 15$, and a healthy/never mentally ill group $n = 31$. To minimise the confounding influence of comorbidity amongst clinically depressed participants, only individuals without comorbid depression were included in the anxious group. Figure 1 displays the percentage of depressed, anxious and control group participants responding correctly on the attachment, social competition, truth- and cheater-detection Wason selection tasks.

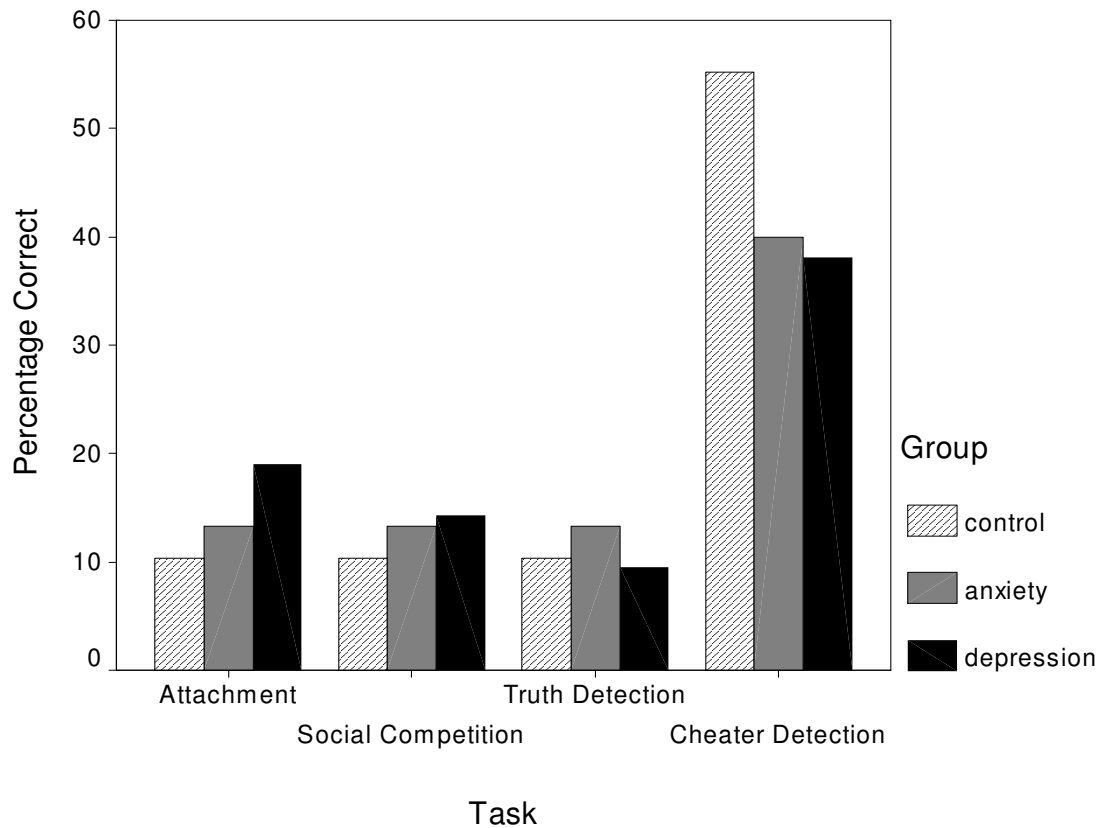


Figure 1. Percentage of Participants Selecting the Correct Response for the Attachment, Social Competition, Truth-Detection and Cheater-Detection Selection Tasks, as a Function of Mood.

Results failed to support the hypothesis that a significantly greater proportion of depressed participants would select the correct attachment task card combination than participants in the anxious and control groups. Contrary to prediction, chi-square analyses also revealed no significant differences between the depressed versus anxious and depressed versus control groups in terms of correct vs. incorrect responses for the social competition task. There was also no significant difference between the groups in performance on the truth-detection and cheater-detection tasks. However, a major limitation to this data is that with the exception of the cheater-detection task, at least two of the expected frequencies for all chi-square analyses

violated the minimum acceptable criterion of five scores within each cell, calling the power of these results into question.

To test the hypotheses that participants in the depressed group would provide significantly more risk-averse responses for the attachment and social competition dichotomous risk-taking measures than participants in the anxious and control groups, and that a similar effect would not be observed for the cheater-detection risk-taking measure, a series of Pearson chi-square analyses was conducted. Figure 2 displays the percentage of depressed, anxious and control group participants selecting the risk-averse option for the attachment, social competition, and cheater-detection risk-taking tasks.

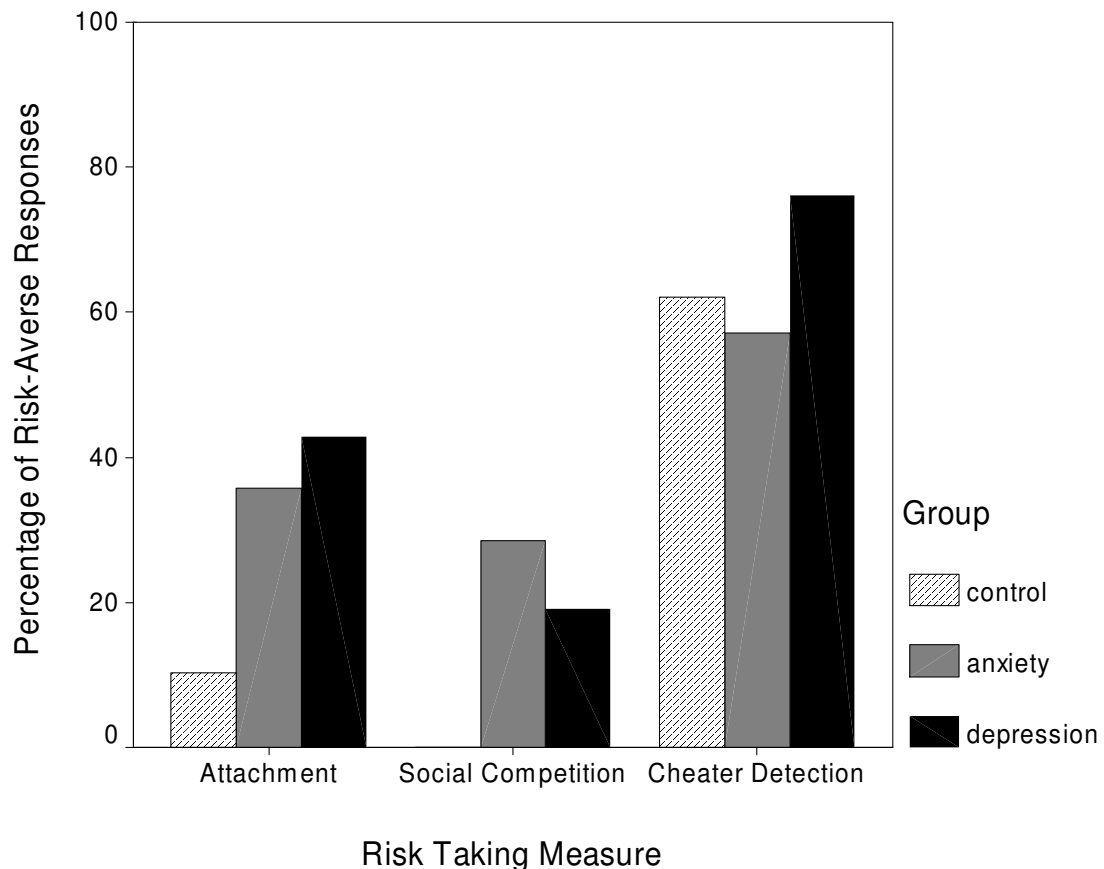


Figure 2. Percentage of Participants Selecting the Risk-Averse Response for the Attachment, Social Competition and Cheater-Detection Risk Taking Measures, as a Function of Mood.

Although there were no significant differences between the risk taking propensity of depressed and anxious groups, a significantly greater proportion of depressed participants selected the risk-averse option for both the attachment ($\chi^2 [1, n = 51] = 7.412, p < .01$) and social competition ($\chi^2 [1, n = 57] = 7.995, p < .01$) measures than did the control group, providing partial support for the hypothesis. For both analyses, however, at least one cell indicated an expected count below the minimum acceptable criterion of five, rendering the power of these results questionable. Finally, and as hypothesised, there was no significant differences between the depressed versus anxious and depressed versus control groups in terms of responses for the cheater-detection risk-taking measure.

To determine whether there were any significant relationships between participants' responses on the various questionnaire scales of mood and symptoms, including the Beck Depression Inventory (BDI), The Positive Affect Negative Affect Scales (PANAS-X) and the Mood and Anxiety Symptom Questionnaire (MASQ) and the indices of reasoning and risk propensity, the scales were first subjected to a principle components analysis (PCA). PCA enabled us to statistically differentiate between depression- and anxiety-related symptomatology and derive a more efficient description of the dimensions underlying participants' responses on these questionnaires. Thus, we were able to analyse relationships between such dimensions and participants' responses on the Wason selection tasks and dichotomous risk-taking measures. Notably, analysing these relationships is also important given the low power of the group-based chi-square analyses described above. PANAS-Negative Affect, and the General Distress (Mixed), General Distress (Anxiety), and Anxious Arousal scales of the MASQ were identified as markers of the Negative Affect symptom factor, and the MASQ-High Positive Affect and PANAS-Positive Affect scales were markers of the Positive Affect symptom factor. Between group analyses revealed that although both the depression and anxiety groups were elevated on

the negative affect symptoms dimension, only the depressed group was characterized by low levels of positive affect. Given these findings, and previous literature proposing that low positive affect is a depression-specific dimension of mood and symptomatology (Depue & Iacono, 1989; Joiner, Catanzaro, & Laurent, 1996; Clark & Watson, 1991), we hypothesized that correlational analyses would reveal that only the positive affect symptom dimension would predict facilitated reasoning and risk inhibition on the social risk reasoning tasks.

The hypothesis that participants scoring low on the depression-specific symptom dimension of positive affect would more readily exhibit facilitation for the attachment and social competition Wason selection tasks was not supported. However, as predicted, negative affect was also not significantly related to participants' responses on either of these tasks.

By contrast, analyses revealed that Positive Affect significantly enhanced prediction for both the attachment and social competition risk-taking propensity measures, indicating that this predictor was reliably, negatively, and independently associated with participants' selection of the risk-averse option for both social risk measures. Negative Affect did not significantly enhance prediction of risk-averse responses for either. These results support the hypothesis that participants scoring low on positive affect would be more likely to select the risk-averse option for both the attachment and social competition risk-taking measures. Finally, neither Positive nor Negative Affect predicted the risk-averse response to the cheater detection task.

In sum, contrary to expectation, results of this study indicated that the depressed group did not differ significantly from the other two groups in terms of the proportion of correct responses on either of the social risk selection tasks. In addition, the positive affect symptom dimension was not found to significantly predict correct performance on these tasks. Accordingly, these findings failed to support our proposal that depression is associated with an increased cognitive (inferential) sensitivity to social risk.

It is worthwhile noting that while the present study appeared to replicate the findings of Cosmides and Tooby (1992), such that participants' accuracy on the cheater-detection task was noticeably greater than for the truth-detection task (with 45% and 10% of participants responding correctly, respectively), participants performed at substantially lower levels for the cheater detection condition than those involved in Cosmides and Tooby's (1992) own studies, where more than 75% of participants exhibited facilitation for this task. While the reason for this discrepancy is not entirely clear, it is likely that the use of a community sample, many of whom had not received university education, produced different findings to the undergraduate samples typically used in previous Wason task research. Of course, since more than half of the participants did not select the correct response, the present findings may also call into question ability of the Wason task to elicit evolved reasoning capacities in a community sample, a possibility that further undermines the validity of the current study as a test of the link between depression and reasoning biases.

There are a number of other factors to bear in mind that may have contributed to the lack of support for the relationship between depression/depressive symptoms and reasoning about social risks. First, the social risk tasks may not have adequately encapsulated social risks. That is, the likelihood of interpersonal rejection on the one hand, and failure and humiliation on the other, may not have been sufficiently represented by these tasks to elicit facilitation among depressives. However, while such an explanation may indeed hold true for the attachment task, it seems at odds with the previously established relationship between depressed mood and correct performance on the social competition task (Badcock & Allen, 2003).

Second, the use of a clinically depressed sample may have confounded the expected relationship between depressed mood and facilitation on the actuarial tasks. It is well known that clinical depression is associated with cognitive dysfunction (e.g., Airaksinen, Larsson, Lundberg & Forsell, 2004), and given the use of cognitive reasoning tasks to gauge sensitivity to social

risk, it is possible that deficits in executive function may have adversely affected depressed participants' performance. Such an explanation is consistent with the finding that only 38% of depressed participants responded correctly on the cheater-detection task, markedly below the 75% rate of correct completion reported by Cosmides and Tooby (1992).

Perhaps a stronger line of reasoning emerges from research demonstrating a relationship between clinical-level depression and reduced social problem-solving skills (e.g., Watkins & Baracaia, 2002). As noted previously, while recent research has demonstrated that mild depressed states facilitate social reasoning (Badcock & Allen, 2003) and performance on theory of mind tasks (Harkness, Sabbagh, Jacobson, Chowdrey & Chen, 2005), these advantages are absent or reversed in clinical populations (Lee, Harkness, Sabbagh & Jacobson, 2005). Such research suggests a curvilinear relationship between depressive severity and the likelihood that depressive biases in information processing facilitate social problem-solving (Allen & Badcock, *in press*). In short, then, the previously established link between clinical depression and reduced social problem-solving may well explain why depressives failed to outperform controls on the two social risk tasks.

Finally, the absence of a significant effect for the actuarial tasks may partially undermine the social risk hypothesis as an integrative, ultimate explanation of depression. That is, the lack of depressive facilitation for these tasks may well mean that depression is not significantly associated with increased sensitivity to social risks. However, it should be noted that such an interpretation contradicts a considerable wealth of indirect support for this notion (see Allen & Badcock, 2003). Either way, considering the present deficiency of empirical studies investigating the relationship between depression and Wason selection task performance, the above explanations must be suggested tentatively.

A further aim of this investigation was to preliminarily explore relationships between depression and participants' responses on three rudimentary measures of risk-taking propensity.

Here results were generally consistent with the hypotheses. As expected, participants in the depressed group were found to provide significantly more risk-averse responses for the two actuarial tasks than those in the control group. Moreover, low positive affect was found to be significantly, independently, and specifically related to risk-averse responses on these measures, across the three groups. This finding suggests that as participants' levels of positive affect increased, they were less likely to select the risk-averse option for both actuarial risk-taking measures. Also, negative affect did not reliably enhance prediction of participants' responses on any of the risk-taking measures, and positive affect was not significantly associated with responses on the cheater-detection measure. Since low positive affect is a defining feature of depression (e.g. Clark & Watson, 1991; Watson, Clark & Carey, 1988), these findings appear to indicate that depression specifically reduces an individual's propensity to undertake agency- and affiliation-oriented risks. Furthermore, given the absence of a significant relationship between negative affect and risk-averse responses, results suggest that reduced social risk-taking is particular to depressed mood.

A potential limitation, however, arises from the rudimentary measures of risk-taking propensity added to the selection tasks. Indeed, since these measures were not pilot-tested, or correlated with an alternate measure of risk-taking propensity, their validity remains uncertain. While the significant relationship observed between positive affect and the social risk-taking measures does provide some evidence for their validity, further work targeting the psychometric properties of these measures is advisable. Alternatively, future studies might examine the proposed link between depression and reduced social risk-taking by using previously validated measures of risk-taking propensity.

In summary, the findings of this first study failed to support the proposition that depression is associated with an increased sensitivity to indicators of social risk. While such results appear to contradict the social risk hypothesis forwarded by Allen and Badcock (2003),

issues related to sample choice, task validity, and the potential mediator of congruent life events necessitate further research that examines the influence of these factors upon task performance. Conversely, results did indicate an association between depression and a reduced propensity to engage in social risks, and in this way, the study provides partial support for Allen and Badcock's (2003) model. However, in light of the questionable validity of the risk-taking measures used in this study, further research, using a more valid assessment of risk-taking propensity, is required. Such an endeavour becomes the focus of the following two studies.

Study 2: The relationship between mood and risk propensity. The aim of Study 2 was to extend the preceding study through use of a larger, non-clinical sample, and a more extensive, validated assessment of risk propensity. Moreover, given the argument that depression has its roots in social contexts (Allen & Badcock, 2003), the Social Risk Hypothesis predicts that low positive affect (as a depression-specific dimension of mood) should be associated with a reduced propensity to engage in social risks, but should not affect propensities for other types of risk, such as physical or financial ones. To test these hypotheses, the current study investigated relationships between mood and risk-taking in a variety of hazard domains, using two measures of risk propensity developed by Rohrman (2004).

While defining risk propensity remains a contentious area, the idea that risks may be differentiated according to different hazard types has previously been forwarded by numerous researchers (e.g. Jackson, Hournay, & Vidmar, 1972; MacCrimmon & Wehrung, 1986; Horvath & Zuckerman, 1993; Weber, Blais, & Betz, 2002), and has led to the view that risk propensity is an unstable trait that varies as a function of risk domain (Harrison, Young, Butow, Salkeld, & Solomon, 2005). Consistent with this argument, risk perception research conducted by Rohrman (1994, 1999) has revealed that motivations for undertaking risks vary across a number of different hazard types, and has contributed, moreover, to the identification of four distinct risk

domains: risks associated with physical accidents or injury, risks associated with health or physical illnesses, financial risks and social risks (Rohrmann, 2004). On the basis of these distinctions, Rohrmann (2004) has developed two related measures of risk propensity, the Risk Scenarios Questionnaire (RSQ) and Risk Propensity Questionnaire (RPQ), respectively.

In the RSQ, participants are provided with short, domain-specific vignettes involving good reasons for taking and for avoiding a risky course of action, and for each vignette, are required to indicate on a ten-point Likert scale how likely it is that they would take the risk. The inventory includes 20 items, comprising 4 to 6 items per hazard domain. By contrast, the RPQ requires participants to rate their own risk propensity for each hazard domain directly, and finally, to provide a general risk propensity rating in comparison to other people. Again, responses are provided using a ten-point Likert scale. To measure risk propensity across the four domains, Rohrmann (2005) recommends that both instruments be used together.

To date, research concerning the influence of mood on risk propensity has focussed chiefly upon financial or organisational contexts (e.g. Isen & Geva, 1987; Isen & Patrick, 1983; Leith & Baumeister, 1996; Mittal & Ross, 1998), and only two previous research endeavours have allowed for a direct, empirical assessment of the link between depression and social risk-taking. Much like the current project, Pietromonaco and Rook (1987) and Hockey, Maule, Clough and Bdzola (2000) analysed relationships between mood and participants' responses for a range of hypothetical decision-making scenarios, pertaining to a variety of hazard domains. However, various caveats deserve consideration.

First, the studies outlined here report conflicting results. Specifically, while Pietromonaco and Rook (1987) showed that depressed individuals exhibited significantly lower tendencies to take social risks than non-depressed participants, a finding that did not extend to other hazard types, Hockey et al. (2000) failed to identify any such relationship. As the literature stands, then, any conclusions regarding the impact of mood upon risky social behaviours would

be premature. Second, neither study provided a statistically rigorous treatment of the relationship between depression and risk-taking across different hazard types. In the Hockey et al. (2000) study, all domains were collapsed into a single category, and the influence of mood investigated in terms of risk-taking in general. As such, any significant association between depression and social risk-taking would likely have been confounded by the inclusion of scenarios pertaining to other hazard types, domains that Allen and Badcock (2003) have argued lie beyond the scope of the adaptive mechanism. Furthermore, while Pietromonaco and Rook (1987) demonstrated that depression-related risk-aversion was particular to social contexts, their analyses of relationships between mood and decision-making in alternate contexts are arguably inconclusive. Standing alone, the absence of significant findings does not provide sufficient evidence for the absence of an effect (Tryon, 2001). Arguably, any comprehensive assessment of the influence of mood on risk propensity across different hazard types demands both a standard hypothesis testing framework, and tests for statistical equivalence, where the researcher aims to determine whether relationships between variables are trivial (i.e., reject the hypothesis that there is a relationship). This latter procedure represents an important contribution of the current research study.

A secondary aim of this investigation was to investigate whether the predicted relationship between positive affect and social risk-taking is moderated by self-esteem. Numerous empirical and theoretical contributions suggest that self-esteem represents a crucial component of the proposed depressive mechanism. For example, low self-esteem and a sense of worthlessness have long been seen as central to depression (Becker, 1979; Robson, 1988), and are evident in descriptions of self-devaluation amongst depressed people (Beck, 1967). Moreover, Tarlow and Haaga (1996) have demonstrated that diminished self-esteem is specifically related to low levels of positive affect and depressed mood, as opposed to anxiety. In a recent review of the literature, Roberts and Monroe (1999) have argued that self-esteem is

linked with both depressive vulnerability and symptoms. They suggest that difficulties in self-esteem regulation interact with attachment insecurities to produce depressed states, while low levels of self-esteem are a symptom or correlate of depression. In support of this view, a number of studies conducted by Roberts and colleagues have indicated that instead of causing depression directly, attachment insecurity leads to depression through its influence on self-esteem (Roberts & Monroe, 1992; Roberts & Kassel, 1997; Roberts, Gotlib, & Kassel, 1996). It has also been suggested that an individual's internal judgements of social rank and position are reflected in self-esteem, and that social comparisons that lead to evaluations of personal inferiority or inadequate social rank are associated with the onset of depressive phenomena (Gilbert, Allan, & Trent, 1995; Gilbert, 1992; Price, Sloman, Gardner, Gilbert, & Rohde, 1994).

Furthermore, there is evidence that self-esteem is specifically related to feedback from interpersonal contexts. For example, Leary, Tambor, Terdal and Downs (1995) have argued that self-esteem operates as a "sociometer," an internal subjective gauge of an individual's level of social inclusion that monitors others' reactions and alerts the individual to the likelihood of exclusion or ostracism. The argument that self-esteem is predicted by positive and negative social experiences has also attracted empirical support (e.g., Leary et al., 1995; Harter, 1993; Joiner & Metalsky, 1995). For instance, Baumeister, Dori and Hastings (1998) collected first-person accounts of events that raised and lowered self-esteem, and found that events that raised self-esteem tended to relate to the achievement of social belongingness, whereas those that lowered self-esteem featured failures to connect with others.

Third, and finally, a direct link has been established between self-esteem and goal achievement. It has been found that high self-esteem increases one's willingness to pursue goals and facilitates persistence when an individual encounters obstacles or setbacks (Kernis, 1995). Others have demonstrated that self-esteem exerts a powerful influence upon personal reactions to success and failure (DePaulo, Brown, Ishii, & Fisher, 1981), and that low self-esteem is associated

with feelings of powerlessness over one's environment (Drake, Price & Drake, 1996), and reduced expectations of personal success (Coopersmith, 1967). Finally, there is some evidence to suggest that self-esteem is specifically associated with socially embedded goals. In relation to this point, it has been demonstrated that self-esteem is highly correlated with an individual's performance in socially-valued domains (Harter & Marold, 1991), and that individual differences in self-esteem affect upward/downward social comparisons and competitive interpersonal behaviours (Wells & Marwell, 1976; Baumeister, Smart & Boden, 1996).

In summary, then, a variety of research findings indicate that self-esteem is likely to be related to social risk-taking. Not only is self-esteem associated with the onset and symptoms of depression, it is also linked to interpersonal contexts and numerous psychological factors associated with both the pursuit and achievement of socially-embedded goals. In short, if self-esteem alerts an individual to threats of social exclusion, as Leary et al. (1995) and Allen and Badcock (2003) have suggested, and given the argument that high self-esteem is linked to competitive social behaviours and expectations of personal success (e.g., Price et al., 1995; Baumeister et al., 1996; Coopersmith, 1967), it is predicted that individuals high in both self-esteem and positive affect will be more likely to engage in risky social behaviours.

The suggestion here, however, is that low self-esteem will not influence social risk-taking directly, but rather, by virtue of its interaction with mood (and specifically, positive affect). The reason for this is twofold. First, the social risk hypothesis asserts that the depression mechanism is only activated when an individual's perceived ability to successfully negotiate social reproductive challenges, which is reflected phenomenologically in self-esteem, reaches a critically low value (Allen and Badcock, 2003). In other words, depressed mood, and the reduction in risk propensity that it is argued to engender, should be associated with a critically low value of self-esteem, rather than low self-esteem per se. Arguably, such a value is likely to vary according to individual differences and across a range of social contexts (Badcock & Allen,

2003; Allen & Badcock, 2003). A second, related issue is that reduced social risk-taking is seen as the central feature of the depressive response, as opposed to low self-esteem itself. With these considerations in mind, and given the argument and evidence that depressed mood is uniquely characterized by low positive affect (Depue & Iacono, 1989; Clark & Watson, 1991; Watson, Clark & Carey, 1988), the social risk hypothesis predicts that instead of being related to risk-taking directly, self-esteem should moderate the relationship between positive affect and an individual's risk propensity in the social domain.

Thus, the primary aim of this study was to test the prediction that depressed mood, defined in terms of low positive affect, would be associated with a reduced propensity to engage in social risks. To examine this prediction, participants were administered a self-esteem measure, a mood questionnaire, and the Risk Scenarios Questionnaire and Risk Propensity Questionnaire developed by Rohrman (2004). Furthermore, participants completed a five-factor personality inventory to enable us to control statistically for individual personality differences.

We predicted that positive affect would reliably predict responses on measures of social risk-taking. Moreover, this relationship was expected to be positive and highly specific, such that relationships between positive affect and participants' propensities to engage in financial, accident- and health-related risks would be trivial. We also explored whether self-esteem moderated the anticipated relationship between positive affect and social risk-taking, with the expectation that as self-esteem increased, so too would the strength of the relationship between the mood predictor and an individual's tendency to take social risks.

Participants in the study were a sample of 153 (42 men and 111 women) undergraduate students enrolled in the first year psychology course at the University of Melbourne. They completed a number of self-report questionnaires including the Positive Affect Negative Affect Schedule (PANAS; Watson, Clark & Tellegen, 1988), the Zuckerman-Kuhlman Personality

Test-III (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993), the Rosenberg Self-Esteem Scale (Rosenberg, 1965), the Risk Scenarios Questionnaire (RSQ; Rohrmann, 2004), and the Risk Propensity Questionnaire (RPQ; Rohrmann, 2004). The RSQ is a 20-item questionnaire assessing risk-taking propensity, and is divided into four domains of risk-taking (social, financial, accident- and health-related risks). Participants are presented with 20 hypothetical vignettes, each relating to one of the above domains. These “real-life” dilemmas involve good reasons for taking and/or avoiding a risky course of action, and on a scale ranging from 1 (definitely not) to 10 (for sure), participants are required to indicate how likely it is that they would take the risk. The RPQ is a four-item questionnaire requiring participants to rate their own propensity to engage in social, health-related, accident-related, and financial risks, respectively. For each holistic rating, participants are provided with a brief description of the relevant risk domain, and are asked to score their propensity for accepting such risks using a scale ranging from 1 (extremely low) to 10 (extremely high). For the purpose of this investigation, both the RSQ and RPQ were treated as a single questionnaire. While research regarding the reliability of the two questionnaires is still underway, Rohrmann (2004) has provided some preliminary, factorial evidence for the convergent and discriminant validity of the RSQ and RPQ scales using Australian, German and Swiss student samples.

Given the relative lack of psychometric data on the RSQ and RPQ, a principal component’s analysis (PCA) with varimax rotation was first conducted to characterise participants’ responses on these questionnaires. Generally, results of the PCA were found to be consistent with expectations regarding variable loadings of items on each of the factors. As such, the four components were interpreted as follows: Factor 1 involved accident-related risks; Factor 2 involved social risks; Factor 3 involved financial risks; and Factor 4 involved health-related risks. For use in subsequent analyses, the regression approach calculated each participant’s scores for the respective components.

To examine whether participants' mood, self-esteem and positive affect by self-esteem scores were significantly and independently related to responses on the four risk-taking factors, a series of four multiple regression analyses were performed, with responses on the four factors as respective dependent variables, and positive and negative affect, self-esteem, and the positive affect by self-esteem interaction as predictors. Furthermore, each analysis included participants' ZKPQ Sociability, Neuroticism/Anxiety, Impulsivity/Sensation Seeking, Aggression/Hostility and Activity scores to control statistically for the effect of individual personality differences. Next, equivalence tests were conducted to test the hypothesis that relationships between positive affect and the financial, accident-related and health-related risk-taking factors would be trivial. As hypothesised, results indicated that both positive affect and the positive affect by self-esteem interaction term were significantly, positively and independently related to participants' responses on the social risk-taking component. Given the absence of a significant main effect for self-esteem, these findings suggest that the relationship between positive affect and social risk-taking is moderated by self-esteem. Moreover, the personality dimensions of impulsive sensation seeking also significantly enhanced prediction, while main effects for negative affect and aggression/hostility only approached significance. By contrast, all independent variables failed to reliably and independently predict responses for the financial risk taking scale. Only the ZKPQ Aggression/Hostility and Impulsive Sensation Seeking scales exhibited a significant, positive and independent relationship with the health-related risk-taking component. With regard to the accident-related risk-taking component, only ZKPQ Impulsivity/Sensation Seeking and Activity reliably and independently predicted participants' responses. Taken together, results of all regression analyses were consistent with the hypotheses that positive affect, and the positive affect by self-esteem interaction term, would be significantly, positively, and uniquely associated with social risk-taking propensity. Moreover, with the exception of equivalence tests for social risk-taking responses, all 95% equivalence confidence intervals for positive affect were

within the specified equivalence bounds, confirming the expectation that relationships between positive affect and participants' scores for the financial, accident-related and health-related risk-taking factors would be trivial (i.e., rejecting the hypothesis that there is a relationship between positive affect and these variables).

Further analyses revealed that positive affect significantly predicted participants' social risk-taking responses at moderate and high levels of self-esteem alone (see figure 3).

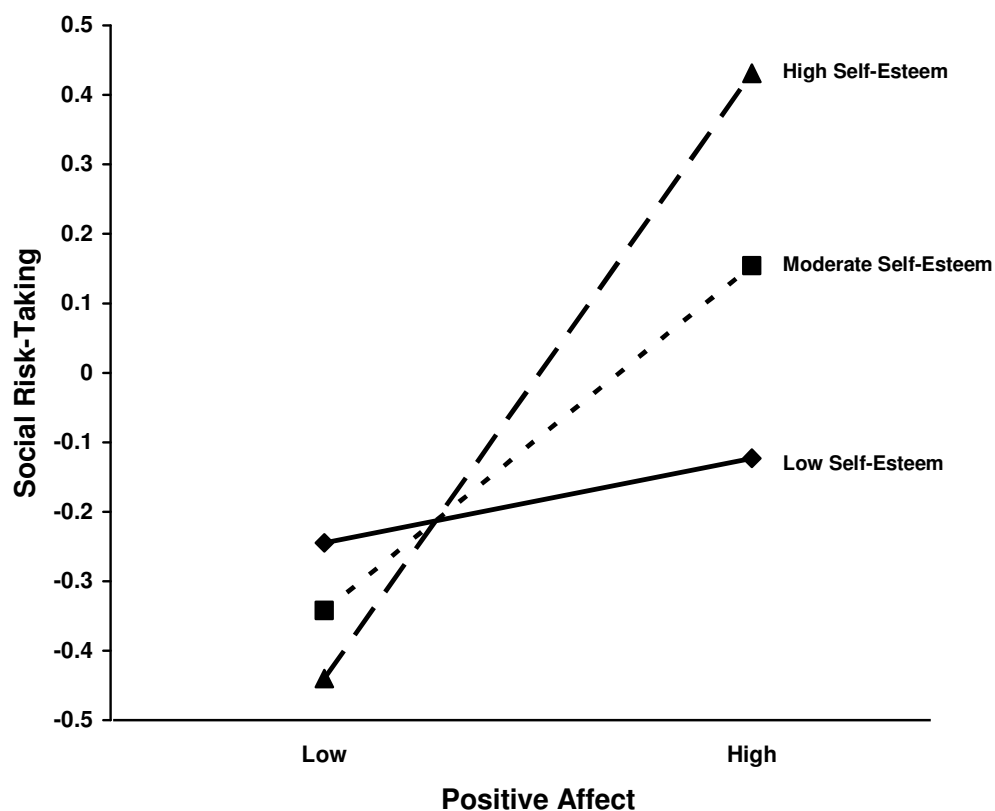


Figure 3. Interaction Plot of the Relationship between Positive Affect and Social Risk-Taking at Low, Moderate and High Conditional Values of Self-Esteem.

In sum, the primary aim of this study was to test Allen and Badcock's (2003) evolutionary proposition that depressed mood (as measured by low positive affect) instigates a reduced propensity to engage in social risk-taking, but does not affect risk-taking in other hazard domains. Furthermore, we examined the suggestion that this relationship would be moderated

by self-esteem. Finally, it was expected that self-esteem would not affect relationships between positive affect and risk-taking in other hazard domains. After controlling for the effects of individual personality differences, negative affect and self-esteem, results indicated a significant, positive relationship between positive affect and social risk-taking. Also, as expected, relationships between positive affect and participants' responses for the financial, accident- and health-related risk-taking components were found to be trivial. Given that low positive affect is a defining feature of depression (e.g. Clark & Watson, 1991; Watson, Clark & Carey, 1988), such results suggest that depressed mood specifically reduces an individual's propensity to engage in social risk-taking.

Notably, these findings are somewhat inconsistent with previous work demonstrating a link between heightened positive affect and risk aversion (Isen & Geva, 1987; Isen & Patrick, 1983; Mittal & Ross, 1998). However, a number of caveats warrant consideration. First, Isen and Patrick (1983) have shown that people high in positive affect exhibit caution in high-risk situations but risk-seeking in low-risk situations, suggesting that the influence of mood on risk propensity may well vary according to the nature, and personal relevance, of the risk at hand (Mittal & Ross, 1998). Clearly, this is an area that warrants further empirical consideration. A second, related issue is that such studies have typically focussed upon risks embedded in financial or organisational contexts (Mittal & Ross, 1998). Arguably, and in light of the current contention that depressed mood is specifically associated with reduced risk-taking in social contexts, the research conducted by Isen and others is not necessarily at odds with Allen and Badcock's (2003) model.

With particular reference to social contexts, results of the current study are clearly consistent with the work by Forgas (1995; 1998a, 1998b, 2002), indicating a link between sad mood and avoidant interpersonal behaviours; and Pietromonaco and Rook (1987), who have demonstrated a relationship between depression and risk-aversion in such contexts.

Furthermore, the present findings build upon those reported in Study 1, where positive affect reliably predicted participants' responses on two dichotomous-response social risk-taking measures.

Finally, after controlling for participants' personality and negative affect scores, a significant, independent interaction was identified between positive affect, self-esteem and the social risk-taking factor. Furthermore, post-hoc probing of interactions revealed that as participants' self-esteem increased, so too did the strength of the positive relationship between positive affect and social risk propensity. Importantly, self-esteem alone failed to reliably predict responses on any of the risk factors, and relationships between the positive affect by self-esteem interaction term and the financial, accident- and health-related risk-taking factors were found to be trivial. These results suggest that self-esteem moderates the relationship between positive mood and in particular, social risk-taking.

Despite these strong findings, a number of issues remain to be clarified by further research. One such issue is the relationship between trait versus state aspects of low positive affect and social risk taking propensity. The current study utilised questionnaire measures that necessarily conflate trait and state variance in mood. An experimental study, involving the administration of the RSQ and RPQ following a sad vs. neutral mood induction procedure, for example, would enable us to examine the effects of depression on risk-taking propensity without the inherent limitations of correlational research.

Study 3: The influence of state and trait depressed mood on risk propensity. This final study had a number of aims. The first was to replicate the preceding findings by analysing relationships between participants' current levels of mood, and responses for the social, financial, accident- and health-related risk-taking scales of the Risk Scenarios and Risk Propensity Questionnaires developed by Rohrmann (2004). Another limitation emerging from Study 2 relates to the exclusive reliance on a correlational design to explore relationships

between mood and risk propensity. As noted by Tabachnick and Fidell (1996), revealing significant relationships among variables does not imply that these relationships are causal.

Rather, such relationships could stem from a variety of sources, including currently unmeasured ones (Tabachnick & Fidell, 1996). Thus, experimental work is required before causal inferences can be made.

An increasingly popular technique in the analysis of depression is the application of a range of experimental procedures that induce temporary moods. In the current study, a musical mood induction was used. Here, participants are exposed to mood-suggestive music, and are asked to employ this music to assist their own efforts to get into a depressed, elated, or neutral mood (Martin, 1990). This technique has been frequently employed in the past (e.g. Sutherland, Newman & Rachman, 1982; Clark & Teasdale, 1985; Clark, Teasdale, Broadbent & Martin, 1983); and was selected for a number of reasons. First, research indicates that the intensity of the induced mood is comparable to that of clinical depression (Clark, 1983). Furthermore, the musical mood induction procedure is quick to administer; successfully increases depression without manipulating related emotional states (such as anxiety); and enjoys a high success rate, inducing the required mood in more than 75% of participants (Martin, 1990).

Thus, the current study tested whether depression was causally associated with reduced social risk-taking by exposing participants to one of two musical mood induction procedures (depressed vs. neutral), followed by administration of the Risk Scenarios and Risk Propensity Questionnaires (Rohrman, 2004). First, we hypothesized that after controlling statistically for the mood induction and negative affect, positive affect would reliably and independently predict responses on measures of social risk-taking. Again, this relationship was expected to be positive and highly specific, such that relationships between positive affect and participants' responses for the financial, accident- and health-related risk-taking scales would be trivial. Second, it was expected that participants exposed to a depressed mood induction procedure would score

significantly lower on measures of social risk propensity than those exposed to a neutral mood induction. We also predicted that the effect of the induced moods upon participants' responses for the financial, accident- and health-related risk-taking scales would be trivial.

Analyses of participants' mean self-report mood ratings indicated that the mood induction procedure appeared to have been initially effective at differentiating the two mood conditions and that the procedure successfully induced depression without affecting participants' anxiety levels. To test the hypotheses that positive affect would be significantly, positively and independently related to responses on measures of social risk-taking propensity, but not significantly related to financial, accident- and health-related risk-taking, a series of multiple regression analyses were performed. Results again supported the hypothesis that individual differences in self-rated positive affect at the beginning of the experiment were significantly, positively and uniquely associated with participants' social risk-taking propensity. Moreover, equivalence tests confirmed the expectation that relationships between positive affect and the financial and health-related RSQ scales were trivial, although this was not found to be the case for the accident-related scale. These results provided replication of those reported in Study 2.

By contrast, analyses of participants' mean ratings for both the social risk-taking scales failed to support the hypothesis that participants exposed to the depressed musical mood induction condition would exhibit significantly lower mean scores on measures of social risk-taking propensity than those in the neutral mood condition. Moreover, results of equivalence tests indicated that effect sizes for all scales were non-trivial. In general, then, results of between-group analyses were inconsistent with the hypotheses.

Thus, despite apparently successful manipulations of mood, results failed to support the hypothesis that participants exposed to the depressed mood induction would score significantly lower on measures of social risk propensity than those exposed to a neutral mood induction. Rather, no significant between-group differences were observed for any of the risk propensity

measures. Such results are clearly inconsistent with Allen and Badcock's (2003) social risk hypothesis. Notably, there is also an apparent discrepancy between the current findings and those of Pietromonaco and Rook (1987), where depressed mood was found to be significantly associated with reduced social risk-taking in particular. It bears mentioning, however, that Pietromonaco and Rook (1987) did not examine the effects of depression on risk-taking experimentally, but grouped participants on the basis of BDI scores. With this in mind, and given the widespread paucity of work regarding the causal relationship between depression and risk-taking in explicitly social contexts, the current results render the nature of this relationship somewhat unclear.

One possible explanation is that reduced social risk-taking may only result from more stable, naturally-occurring depressed mood states, rather than the sort produced in an artificial laboratory setting. Indeed, this might explain why participants' mood states prior to experimentation were a reliable predictor of social risk propensity, whilst induced mood states were not. Said otherwise, the depressed mood induced by the musical procedure may not have been sufficiently intense or stable to produce the expected results. In a similar vein, Hockey et al. (2000) have pointed out that the fact that the BDI measures a more stable and motivationally distinctive affective state than transient fluctuations in mood may explain the significant association between depression and reduced social risk-taking observed by Pietromonaco and Rook (1987). With this in mind, experimental mood manipulations may not represent an ideal research avenue for an empirical test of Allen and Badcock's (2003) model. Another possibility is that future research requires alternate, more effective mood manipulation procedures, such as mood-suggestive films or stories (Westermann, Spies, Stahl & Hesse, 1996). Clearly, this is an issue that necessitates further investigation. Also, the possibility that the lack of experimental support for the social risk hypothesis reflects methodological limitations, such as insufficient power, should not be disregarded.

General Discussion

The aim of the current research endeavour was to test two proposals emerging from a recent, evolutionary model of depressed mood forwarded by Allen and Badcock (2003). According to their social risk hypothesis, depressed mood represents an adaptive response to threats of exclusion from important social contexts that, throughout the course of evolution, would have been critical to maintaining an individual's fitness prospects. Specifically, Allen and Badcock (2003) have proposed that depressed mood is precipitated by the sort of experiences that indicate to the individual that his or her ability to successfully participate in important, socially-relevant endeavours is critically low, thereby increasing the perceived likelihood of social exclusion. Such experiences may include, for example, the loss or dissolution of significant interpersonal relationships, perceptions of a lack of control in social situations (such as is the case with entrapment-related experiences), and the perceived loss of social rank or status (Allen & Badcock, 2003). Furthermore, they have argued that the evolved function of the depression mechanism is to temporarily minimise social risk (and thus, further threats of exclusion) by virtue of three broad classes of action. With regard to social behaviour, the mechanism affects communicative behaviour (signalling to reduce further threats and elicit reliable forms of support) and resource-acquisition behaviours (a general reduction in the motivation to engage in risky social behaviours) (Allen & Badcock, 2003). Finally, the proposed mechanism is thought to affect social-perceptual processes by initiating an increase in an individual's cognitive sensitivity to indicators of social risk (Allen & Badcock, 2003). The goal of the current research project was to provide some empirical evidence relevant to the latter two of these functions.

Taken as a whole, the results of these studies provide consistent support for the hypothesis that depression is associated with a reduction in an individual's propensity to

undertake social risks. This was initially evident in experiment 1, involving recruitment of clinically depressed and anxious groups and non-psychiatric community controls, and analysis of three rudimentary risk-taking measures designed by the investigators. Since low positive affect has long been recognised as a defining feature of depression (e.g. Clark & Watson, 1991), support for this proposal was further strengthened by study 2, revealing a significant, positive relationship between positive affect and a social risk propensity dimension derived from two previously validated measures of domain-specific risk-taking tendencies. This relationship was also replicated by results presented in study 3. Furthermore, study 2 provided some evidence for its specificity, in that relationships between positive affect and risk-taking in alternate hazard domains were found to be trivial.

The findings presented in these studies have a range of potential implications with respect to evolutionary conceptions of depressed mood. First, it is worthwhile noting that the findings do not fit particularly well with Nettle's (2004) individual difference model of clinical depression. According to Nettle (2004), depressive vulnerability is attributable to excessively high levels of neuroticism. Furthermore, a central tenet of his argument is the proposition that increasing neuroticism would have been selected for in the evolutionary environment because it promotes striving behaviours in interpersonal contexts, and causes people to seek out desirable social outcomes and avoid negative ones. On the basis of these arguments, one might expect neuroticism to be in some way related to risk propensity, particularly in the social domain. However, regression analyses of relationships between participants' neuroticism scores derived from the ZKPQ and their responses for the social, financial, accident- and health-related risk-taking scales failed to indicate a significant association between neuroticism and any of these variables. Notably, while evidence for a connection between low positive affect and reduced social risk-taking points to the centrality of social contexts to depressive phenomena, and thus lends some support to the attachment view of depression, these results also conflict with some of

the predictions emerging from this model. In particular, the current findings emphasise the previously established link between low mood and social withdrawal (Goldberg and Huxley, 1992), and are therefore inconsistent with the notion that depressed mood motivates a person to re-establish lost relationships or seek out new ones (e.g. Averill, 1968).

On the other hand, the argument that depression represents an adaptive strategy that reduces risk-taking is not new, and is particularly emphasised by the resource conservation views (Allen & Badcock, 2003). Nesse (2000), Leahy (1997), and Klinger (1975), for example, all maintain that depressed states exemplify a risk-management strategy that inhibits risk-taking in low pay-off and high-threat environments. The findings presented above not only provide support for this line of reasoning, but also introduce an important caveat by suggesting a high level of specificity between depression (i.e. low positive affect) and reduced risk-taking in social contexts in particular. Also, results were partially supportive of the social competition model spearheaded by Price and colleagues (Price et al., 1994). According to this view, one of the adaptive operations of the depression mechanism is to inhibit competitive, confident and/or assertive interpersonal behaviours. From this perspective, the current demonstration of a significant relationship between low positive affect and reduced social risk propensity might not be surprising. However, an important addendum is required. Whilst the social competition view that depression has evolved from more primitive subordinate strategies successfully explains many of its features and has led to some supportive research findings (e.g., Gilbert & Allan, 1998; Badcock & Allen, 2003), it neglects to explicitly examine the ways in which the proposed rank-oriented strategy has been adapted to accommodate the full diversity of human social relationships (Fiske, 1991; Haslam, 1994), and in particular, those not directly related to the negotiation of status hierarchies. To elaborate, it is worthwhile considering Wiggins and Trapnell's (1996) argument that all forms of interpersonal relatedness are reducible to the fundamental dimensions of agency (or power) and communion (affiliation). While the social

competition model clearly anticipates reduced social risk-taking amongst depressives in the former domain, the model fails to extend this prediction to the latter. More specifically, despite the fact that this perspective could no doubt be extended or adapted to accommodate the negotiation and/or management of affiliation-oriented relationships, reduced social risk-taking in this domain is neither directly nor explicitly predicted by the model (Allen & Badcock, 2003). Conversely, the social risk hypothesis emphasises that depressive phenomena constitute a defensive psychobiological response to increased risk within either one of these domains, and as such, should be associated with reduced risk-taking in both (Allen & Badcock, 2003). Since the social risk propensity items used in the current research project represented risks associated with either agency or affiliation (e.g. asking someone out on a date vs. applying for a job), the demonstration of significant, positive relationships between positive affect and participants' responses for all social risk-taking scales appears to provide strongest support for Allen and Badcock's (2003) model.

It is worthwhile pointing out that numerous proximate explanations have been offered for a link between depression and reduced social risk-taking. Pietromonaco and Rook (1987) briefly review these arguments in their own study. First, they assert that a history of problematic social encounters among depressives (Coyne, 1976), alongside their reduced sensitivity to the receipt of positive social feedback (Howes & Hockanson, 1979), is likely to sensitise them to social risks. Second, such sensitivity is likely to be exacerbated by realistic self-appraisals of limited social skills (Libet & Lewinsohn, 1973; Lewinsohn, Mischel, Chaplin, & Barton, 1980). Third, depressive sensitivity to, and avoidance of, social risks may be partly attributable to a self-regulation strategy that protects fragile feelings of self-worth from additional exposure to embarrassment, rejection or conflict (Pietromonaco & Rook, 1987). That is, depressives are likely to avoid social risks because they are motivated to protect their low self-esteem. Last, Pietromonaco and Rook (1987) note that cognitive and motivational processes similar to the

above have also been identified in research on certain personality dispositions related to depression, namely loneliness (Horowitz & French, 1979; Jones, 1982), shyness (Buss, 1980; Jones & Russell, 1982), and introversion (Norman & Watson, 1976; Graziano, Feldesman, & Rahe, 1985).

Such explanations are by no means incompatible with the evolutionary models advanced by us and others. Rather, while the above represent proximate arguments for reduced social risk-taking among depressives, the social risk hypothesis provides an ultimate explanatory framework that successfully integrates them. For example, given the proposal that depressed mood represents an adaptive response to important social disruptions, Allen and Badcock's (2003) argument clearly predicts a past history of problematic interpersonal encounters amongst depressives. Furthermore, reduced sensitivity to positive social feedback and a pessimistic, error-avoidant appraisal of limited social skills are arguably important features of a cautious, risk-minimising approach to interpersonal contexts (Allen & Badcock, 2003). Such features are likely to operate adaptively by contributing to the inhibition of confident and/or assertive social behaviours in the face of threats of social exclusion.

Finally, in light of the argument that self-esteem alerts an individual to threats of social exclusion (Leary et al., 1995; Allen & Badcock, 2003), the motivation to protect low self-esteem can be readily interpreted as the proximate result of an underlying adaptive strategy that promotes social inclusion (see Leary et al., 1995). It follows, then, that low self-esteem may act as a leading indicator of the possibility of social exclusion, but reduced social risk-taking only results once the depressive mechanism (i.e., low positive affect) is activated. This conjecture is consistent with the current finding that self-esteem moderates the relationship between positive affect and social risk-taking, instead of being related to social risk-taking directly. Specifically, these findings appear to indicate that if the motivation to protect self-esteem does in fact influence an individual's risk propensity, but only in a context where positive affect is still high.

In sum, the finding presented in this paper not only provide empirical support for aspects of the social risk hypothesis, but in a more general sense provide an example of how evolutionary hypotheses can motivate a program of research. The investigation of the relationship between mood and domain specific biases in social reasoning and risk taking propensity would not have been contemplated without the social risk hypotheses. Although these studies have provided support for some of the specific hypotheses that result from the higher level social risk hypothesis (Buss, 1999), and failed to support others, they will provide a basis for further empirical studies and, ultimately, important refinements (or refutation) of the model.

REFERENCES

- Airaksinen, E., Larsson, M., Lundberg, I., & Forsell, Y. (2004). Cognitive functions in depressive disorders: Evidence from a population-based study. Psychological Medicine, *34*, 83-91.
- Allen, N.B., & Badcock, P.B.T. (2003). The social risk hypothesis of depressed mood: Evolutionary, psychosocial, and neurobiological perspectives. Psychological Bulletin, *129*, 887-913.
- Allen, N.B. & Badcock, P.B.T. (In Press). Darwinian models of depression: A review of evolutionary accounts of mood and mood disorders. *Progress in Neuropsychopharmacology and Biological Psychiatry*.
- Allen, N.B., Yap, A.K., Di Parsia, P., Adey, S., Foverskov, S., & Simmons, J. (2001). Prepulse inhibition and affective startle modulation in clinical depression and anxiety [Abstract]. Psychophysiology, *38*, S12.
- Averill, J.R., 1968. Grief: Its nature and significance. *Psychol. Bull.*, *70*, 721-748.
- Badcock, P.B.T., & Allen, N.B. (2003). Adaptive social reasoning in depressed mood and depressive vulnerability, Cognition and Emotion, *17*, 647-670.
- Baumeister, R.F., Dori, G.A., Hastings, S. (1998). Belongingness and temporal bracketing in personal accounts of changes in self-esteem. Journal of Research in Personality, *32*, 222-235.
- Baumeister, R., Smart, L., & Boden, J. (1996). Relation of threatened egotism to violence and aggression: The dark side of high self-esteem. Psychological Review, *101*, 5-33.
- Beck, A.T. (1967). Depression: Clinical, experimental, and theoretical aspects. New York: Hoeber.

Becker, J. (1979). Vulnerable self-esteem as a predisposing factor in depressive disorders. In R.A. Depue (Ed.), The psychobiology of the depressive disorders: Implications for the effects of stress. New York: Academic Press.

Buss, D.M. (1999). Evolutionary Psychology: The New Science of the Mind. Needham Heights, MA: Allyn & Bacon.

Clark, D.M. (1983). On the induction of depressed mood in the laboratory: Evaluation and comparison of the Velten and musical procedures. *Advances in Behaviour Research and Therapy*, 5, 27-49.

Clark, D.M., Teasdale, J.D., Broadbent, D.E., & Martin, M. (1983). Effect of mood on lexical decisions. Bulletin of the Psychonomic Society, 21, 175-178.

Clark, D.M., & Teasdale, J.D. (1985). Constraints of the effects of mood on memory. Journal of Personality and Social Psychology, 48, 1595-1608.

Clark, L. A., & Watson, D. (1991). Tripartite model of anxiety and depression: Psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology*, 100(3), 316-336.

Cole, D.A. (1990). Relation of social and academic competence to depressive symptoms in childhood. *Journal of Abnormal Psychology*, 99, 422-429.

Coopersmith, S. (1967). The antecedents of self-esteem. San Francisco: Freeman.

Cosmides, L., & Tooby, J. (1992). Cognitive adaptations for social exchange. In L. Cosmides, J. Tooby & J. Barkow (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 163-228). New York: Oxford University Press.

Coyne, J.C., 1976. Depression and the response of others. Journal of Abnormal Psychology, 85, 186-193.

DePaulo, B., Brown, P., Ishii, S., & Fisher, J. (1981). Help that works: The effects of aid on subsequent task performance. Journal of Personality and Social Psychology, *41*, 478-487.

Depue, R.A., & Iacono, W. (1989). Neurobehavioural aspects of affective disorders. In M.R. Rosenweig & L.W. Porter (Eds.), Annual review of psychology. Palo Alto: Annual Reviews.

Drake, R.E., Price, J.L., & Drake, R.E. (1996). Helping depressed clients discover personal power. Perspectives in Psychiatric Care, *32*, 30-35.

Edwards, J.A., & Weary, G. (1993). Depression and the impression-formation continuum: Piecemeal processing despite the availability of category information. Journal of Personality and Social Psychology, *64*, 636-645.

Fiske, A.P., 1991. Structures of social life: The four elementary forms of social relationship. Free Press: New York, N.Y..

Forgas, J.P. (1995). Mood and judgment: the affect infusion model (AIM). Psychological Bulletin, *117*, 39-66.

Forgas, J.P. (1998a). Asking nicely? Mood effects on responding to more or less polite requests. Personality and Social Psychology Bulletin, *24*, 173-185.

Forgas, J.P. (1998b). Happy and mistaken? Mood effects on the fundamental attribution error. Journal of Personality and Social Psychology, *75*, 318-331.

Forgas, J.P. (2002). Feeling and doing: Affective influences on interpersonal behaviour. Psychological Inquiry, *13*, 1-28.

Gilbert, P. (1992). Depression: The evolution of powerlessness. New York: Guilford.

Gilbert, P., Allan, S., & Trent, D. (1995). Involuntary subordination or dependency as key dimensions of depressive vulnerability. Journal of Clinical Psychology, *51*, 740-752

Gleicher, F., & Weary, G. (1991). The effect of depression on the quantity and quality of social inferences. Journal of Personality and Social Psychology, 51, 140-148.

Harkness, K. L., Sabbagh, M. A., Jacobson, J., Chowdrey, N., & Chen, T. (2005). Sensitivity to Subtle Social Information in Dysphoric College Students: Evidence for an Enhanced Theory of Mind. Cognition and Emotion, 19, 999-1025.

Harrison, J. D., Young, J. M., Butow, P., Salkeld, G., & Solomon, M. J. (2005). Is it worth the risk? A systematic review of instruments that measure risk propensity for use in the health setting. Social Science & Medicine, 60, 1385-1396.

Harter, S. (1993). Causes and consequences of low self-esteem in children and adolescents. In R.F. Baumeister (Ed.), Self-esteem: The puzzle of low self-regard (pp. 87-116). New York: Plenum.

Harter, S., & Marold, D.B. (1991). A model of the determinants and mediational role of self-worth: Implications for adolescent depression and suicidal ideation. In G. Goethals & J. Strauss (Eds.), The self: An interdisciplinary approach (pp. 66-92). New York: Springer-Verlag.

Haslam, N., 1994. Categories of social relationship. Cognit., 53, 59-90.

Hilderbrand-Saints, L., & Weary, G. (1989). Depression and social information gathering. Personality and Social Psychology Bulletin, 15, 150-160.

Hockey, G.R.J., Maule, A.J., Clough, P.J., & Bdzola, L. (2000). Effects of negative mood states on risk in everyday decision making. Cognition and Emotion, 14, 823-855.

Horvath, P., & Zuckerman, M. (1993). Sensation seeking, risky appraisal and risky behaviour. Personality and Individual Differences, 14, 41-52.

Isen, A. M., & Geva, N. (1987). The influence of positive affect on acceptable level of risk: The person with a large canoe has a large worry. Organizational Behavior and Human Decision Processes, 39, 145-154.

Isen, A. M., & Patrick, R. (1983). The effects of positive feelings on risk taking: When the chips are down. Organizational Behavior and Human Performance, 31, 194–202.

Jackson, D., Hournay, L., & Vidmar, N. (1972). A four-dimensional interpretation of risk-taking. Journal of Personality, 40, 483-501.

Joiner, Jr., T.E. (1995). The price of soliciting and receiving negative feedback: Self-verification theory as a vulnerability to depression theory. Journal of Abnormal Psychology, 104, 364-372.

Joiner, T.E., Jr., Catanzaro, S.J., & Laurent, J. (1996). Tripartite structure of positive and negative affect, depression, and anxiety in child and adolescent psychiatric inpatients. Journal of Abnormal Psychology, 105, 401-409.

Joiner, T.E., & Metalsky, G.I. (1995). A prospective test of an integrative interpersonal theory of depression: A naturalistic study of college roommates. Journal of Personality and Social Psychology, 69, 778-788.

Kernis, M. (1995). Efficacy, agency, and self-esteem. New York, NY: Plenum Press.

Klinger, E., 1975. Consequences of commitment to and disengagement from incentives. Psychological Review, 82, 1-25.

Leary, M.R., Tambor, E.S., Terdal, S.K., & Downs, D.L. (1995). Self-esteem as an interpersonal monitor: The sociometer hypothesis. Journal of Personality and Social Psychology, 68, 519-530.

Leahy, R.L., 1997. Depression and resistance: An investment model of decision-making. The Behavior Therapist, 20, 3-6.

Lee, L., Harkness, K. L., Sabbagh, M. A., & Jacobson, J. A. (2005). Mental state decoding abilities in clinical depression. Journal of Affective Disorders, 86, 247-58.

MacCrimmon, K.R., & Wehrung, D.A. (1986). Taking risks: The management of uncertainty. London: Collier MacMillan.

MacLeod, A.K., & Byrne, A. (1996). Anxiety, depression, and the anticipation of future positive and negative experiences. *Journal of Abnormal Psychology, 105*, 286- 289.

Martin, M. (1990). On the induction of mood. *Clinical Psychology Review, 10*, 669-697.

Mathews, A., Ridgeway, V., & Williamson, D. A. (1996). Evidence for attention to threatening stimuli in depression. *Behaviour Research and Therapy, 34*(9), 695-705.

Mittal, V., & Ross, Jr. W.T. (1998). The impact of positive and negative affect and issue framing on issue interpretation and risk taking. *Organizational Behavior and Human Decision Processes, 76*, 298-324.

Nesse, R.M., 2000. Is depression an adaptation? *Archives of General Psychiatry, 57*, 14-20.

Nettle, D., 2004. Evolutionary origins of depression: a review and reformulation. *Journal of Affective Disorders, 81*, 91-102.

Persons, J.B., Burns, D.D., Perloff, J.M., & Miranda, J. (1993). Relationships between symptoms of depression and anxiety and dysfunctional beliefs about achievement and attachment. *Journal of Abnormal Psychology, 102*, 518-524.

Pietromonaco, P.R., & Rook, K.S. (1987). Decision style in depression: The contribution of perceived risks versus benefits. *Journal of Personality and Social Psychology, 52*, 399-408.

Price, J.S., Sloman, L., Gardner, R., Gilbert, P., & Rohde, P. (1994). The social competition hypothesis of depression. *British Journal of Psychiatry, 164*, 309-315.

Roberts, J.E., & Kassel, J.D. (1997). Labile self-esteem, stressful life events, and depressive symptoms: Prospective data testing a model of vulnerability. *Cognitive Therapy and Research, 21*, 569-589.

Roberts, J.E., & Monroe, S.M. (1999). Vulnerable self-esteem and social processes in depression: Towards an interpersonal model of self esteem regulation. In T. Joiner & J.C. Coyne

(Eds.), Advances in interpersonal approaches: The interactional nature of depression.

Washington, DC: American Psychological Association.

Roberts, J.E., Gotlib, I.H., & Kassel, J.D. (1996). Adult attachment security and symptoms of depression: The mediating roles of dysfunctional attitudes and low self-esteem. Journal of Personality and Social Psychology, 70, 310-320.

Robson, P.J. (1988). Self-esteem: A psychiatrist's view. British Journal of Psychiatry, 153, 6-15.

Rohrman, B. (2004). Risk Attitude Scales: Concepts and Questionnaires. Project Report, Department of Psychology, University of Melbourne <Available at <http://www.rohrmannresearch.net/pdfs/rohrmann-racreport.pdf>>.

Rosenberg, M. (1965). Society and the adolescent self-image. Princeton, NJ: Princeton University Press.

Sutherland, G., Newman, B., & Rachman, S. (1982). Experimental investigations of the relations between mood and intensive unwanted cognitions. British Journal of Medical Psychology, 55, 127-138.

Tabachnick, B.G., & Fidell, L.S. (1996). Using Multivariate Statistics, Third Edition. New York, NY: HarperCollins Publishers.

Tarlow, E.M., & Haaga, D.A.F. (1996). Negative self concept: Specificity to depressive symptoms and relation to positive and negative affectivity. Journal of Research in Personality, 30, 120-127.

Tryon, W.W. (2001). Evaluating statistical difference, equivalence, and indeterminacy using inferential confidence intervals: An integrated alternative method of conducting null hypothesis statistical tests. Psychological Methods, 6, 371-386.

Wason, P. (1966). Reasoning. In B.M. Foss (Ed.), *New horizons in psychology*. Harmondsworth: Penguin.

Wason, P., & Johnson-Laird, P. (1972). *The psychology of reasoning: Structure and content*. Cambridge, MA: Harvard University Press.

Watson, D. (2000). Mood and Temperament. New York City, NY: Guilford Press.

Watson, D., Clark, L.A., & Carey, G. (1988). Positive and negative affectivity and their relation to anxiety and depressive disorders. Journal of Abnormal Psychology, *97*, 346-353.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. Journal of Personality and Social Psychology, *54*, 1063–1070.

Watkins, E., & Baracaia, S. (2002). Rumination and social problem-solving in depression. Behaviour Research and Therapy, *40*, 1179-1189.

Weary, G., & Edwards, J.A. (1994). Social cognition and clinical psychology: Anxiety, depression, and the processing of social information. In R.S. Wyer, Jr. & T.K. Srull (Eds.). Handbook of Social Cognition. (pp. 289-338). Hillsdale, NJ: Erlbaum.

Weber, E.U., Blais, A., & Betz, N.E. (2002). A domain-specific risk-attitude scale : measuring risk perceptions and risk behaviours. Journal of Behavioural Decision Making, *15*, 263-290.

Wells, L.E., & Marwell, G. (1976). Self esteem. Beverly Hills, CA: Sage.

Westermann, R., Spies, K., Stahl, G., & Hesse, F.W. (1996). Relative effectiveness and validity of mood induction procedures: A meta-analysis. European Journal of Social Psychology, *26*, 557-580.

Wiggins, J.S., Trapnell, P.D., 1996. A dyadic-interactional perspective on the five-factor model. In J.S. Wiggins (Ed.), *The five factor model of personality* (pp.88-162). Guilford Press: New York, N.Y.. (pp. 88-162).

Yuen, K.S.L., & Lee, T.M.C. (2003). Could mood state affect risk-taking decisions? Journal of Affective Disorders, *75*, 11-18.

Zuckerman, M., Kuhlman, D.M., Joireman, J., Teta, P., & Kraft, P. (1993). A comparison of three structural models for personality: the Big Three, the Big Five, and the Alternative Five. Journal of Personality and Social Psychology, *65*, 757-768.