RISK-AVOIDANCE AND ANXIETY PATHOLOGY

Carolyn Nicole Lorian

BSc Specialisation in Psychology

Submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy,

School of Psychology, University of New South Wales

June, 2011

COPYRIGHT STATEMENT

Signed .....
Carolyn N. Lorian

Date .....

AUTHENTICITY STATEMENT

Signed .....
Carolyn N. Lorian

Date .....

ORIGINALITY STATEMENT

'I hereby declare that this submission is my own work and to the best of my knowledge it contains no materials previously published or written by another person, or substantial proportions of material which have been accepted for the award of any other degree or diploma at UNSW or any other educational institution, except where due acknowledgment is made in the thesis. Any contribution made to the research by others, with whom I have worked at UNSW or elsewhere, is explicitly acknowledged in the thesis. I also declare that the intellectual content of this thesis is the product of my own work, except to the extent that assistance from others in the project's design and conception or in style, presentation and linguistic expression is acknowledged.'

Signed .....
Carolyn N. Lorian

Date .....

ACKNOWLEDGEMENTS

First and foremost, I would like to express my sincere gratitude to my supervisor, Dr Jessica Grisham, who has been an invaluable source of guidance, wisdom, ideas, encouragement, and support throughout my candidature. I am also thankful to my co-supervisor, Dr Julie Henry, for her helpful advice and suggestions in the development of this program of research.

I would also like to thank Dr Alison Mahoney at the Clinical Research Unit for Anxiety and Depression (CRUfAD), St Vincent's Hospital, and Associate Professor Nickolai Titov at the former VirtualClinic, St Vincent's Hospital (now eCentreClinic, Centre for Emotional Health, Macquarie University), for their assistance with data collection for this research and feedback during the preparation of this thesis.

Lastly, but certainly not least, my heartfelt gratitude goes to my dearest family and friends, without whose support none of this would have been possible. Particularly to my parents, Bo and Albert: Words cannot describe my gratitude for your unrelenting love, encouragement, and support. From our life in Perth through to our intercontinental adventures, thank you for teaching me the valuable meaning behind: *"No risk, no gain"*. To my amazing friends: Thank you for riding the roller coaster of my PhD years with me. Both personally and professionally, your patience, support, understanding, and welcomed distractions (countless diet cokes, hot chocolates, coffees, and glasses of wine!) have made my journey both bearable and enjoyable. Each of you have left your mark on this PhD.

A number of the studies reported in this thesis have been published, accepted for publication, or disseminated as conference presentations as outlined below:

Study 1:

Lorian, C. N., & Grisham, J. R. (2010). The safety bias: risk-avoidance and social anxiety pathology. *Behaviour Change, 27*(1), 1-13.

Lorian, C. N., & Grisham, J. R. (June, 2010). *The safety bias: risk-avoidance and social anxiety pathology*. Poster presented at the 6th World Congress of Behavioral and Cognitive Therapies (WCBCT), Boston, Massachusetts, U.S.A.

Lorian, C. N., & Grisham, J. R. (September, 2009). *The safety bias: risk-avoidance and social anxiety pathology*. Poster presented at the Australian Association of Cognitive Behaviour Therapy (AACBT) 32nd Annual Conference, Perth, Australia.

Study 3:

Lorian, C. N., & Grisham, J. R. (June, 2010) *Are clinically anxious individuals more risk-averse? An exploration of the safety-bias in anxiety disorders*. Poster presented at the 6th World Congress of Behavioral and Cognitive Therapies (WCBCT), Boston, Massachusetts, U.S.A.

Study 4:

Lorian, C. N., & Grisham, J. R. (2011). Clinical implications of risk aversion: an online study of risk-avoidance and treatment utilization in pathological anxiety. *Journal of Anxiety Disorders, 25,* 840-848.

Study 5:

Lorian, C. N., Titov, N., & Grisham, J. R. (2011). Changes in risk-taking over the course of an internet-delivered cognitive behavioral therapy treatment for generalized anxiety disorder. *Journal of Anxiety Disorders, In Press*.

ABSTRACT

There is mounting evidence to suggest that people with anxiety disorders exhibit a risk-avoidant decision-making bias, the *safety bias*, in which these individuals consistently make choices to avoid situations or stimuli that are perceived to be 'risky'. While this strategy may be beneficial in some circumstances, the pervasive tendency to avoid perceived risks has more recently been implicated in the development and maintenance of anxiety pathology. This thesis sought to empirically investigate the hypothesised relationship between risk-avoidance and pathological anxiety – particularly social phobia (SP), generalised anxiety disorder (GAD), panic disorder with (PDAg) or without agoraphobia (PD), and obsessive-compulsive disorder (OCD) – in several clinical and non-clinical samples, using self-report and behavioural indices of risk-taking. Furthermore, this thesis contributed to the existing body of research by examining the clinical implications of risk-avoidance for treatment-seeking and as a cognitive-behavioural therapy (CBT) treatment outcome variable.

Study 1 replicated and extended previous research by investigating the association between risk-avoidance, social anxiety symptomatology, and a dispositional vulnerability to anxiety (behavioural inhibition sensitivity, BIS) in an undergraduate sample. Results showed a significant association between risk-avoidance and social anxiety in social and recreational domains and on a behavioural decision-making task. Hierarchical regression analyses indicated that risk-avoidance may be a partial mediator of the relationship between BIS and social anxiety, providing preliminary evidence that risk-avoidance is a possible aetiological contributor to social anxiety pathology. Studies 2 and 3 investigated whether risk-avoidant preferences generalised to clinical online and treatment-seeking samples. Results demonstrated that anxious individuals reported reduced risk propensity relative to non-clinical control participants across a number of behavioural domains and on a novel behavioural risk-taking task (Study 2). Furthermore, aspects of risk-avoidance were shown to

contribute uniquely to anxiety disorder symptoms, even when controlling for a robust dispositional vulnerability, neuroticism (Study 3).

Study 4 examined the potential clinical implications of risk-avoidance by examining the relationship between risk-aversion and treatment-seeking preferences in an online sample of individuals meeting diagnostic criteria for SP, OCD or GAD. Individuals with SP and GAD (but not OCD) reported greater risk-aversion when compared to non-clinical control participants. Furthermore, willingness to seek treatment was found to be positively associated with aspects of risk-avoidance, suggesting that risk-aversion may contribute to the decision to seek treatment. Finally, studies 5 and 6 further explored the clinical implications of risk-avoidance by investigating self-reported domain-specific risk-taking as a treatment outcome in an Internet-delivered CBT (iCBT) program for GAD and face-to-face group CBT (CBGT) treatment for SP and PDAg. Patients in all treatment groups showed significantly decreased tendencies towards risk-avoidance in the social and recreational domains. In Study 5, mediation analyses revealed risk-taking to be a significant mediator for treatment outcome for depressive symptomatology; however, this was not the case for measures of GAD symptomatology and overall impairment. In Study 6, results suggested that reductions in risk-avoidance in some behavioural domains were significantly associated with improvements in SP, PDAg and depressive symptoms. These results imply that risk-avoidance is sensitive to change and may be a potential target for CBT treatment protocols. Together, the findings of this program of research support the existence of a pervasive and complex, risk-avoidant decision-making bias in those with pathological anxiety, and further provides evidence for the theoretical and clinical implications of risk-avoidance in the development, maintenance, and treatment of anxiety disorders.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS ii

ABSTRACT iv

LIST OF TABLES xiii

LIST OF FIGURES xv

1. INTRODUCTION TO RISK-AVOIDANCE AND ANXIETY PATHOLOGY 1

Introduction to Risk-Avoidance and Anxiety Pathology 2

What is Risk? 4

About Risk-Taking and Risk-Avoidance 4

Models of Emotion and Risk-Taking 10

Somatic Marker Hypothesis 11

Anticipatory Affect 12

Affect-as-Information and the Affect Heuristic 13

Dual-Process Models 14

Risk-as-Feelings 14

Review of Studies of Risk and Anxiety 17

Anxiety and Cognitive Processes 17

Anxiety and Risk Perception 19

The Link between Dispositional Vulnerabilities to Anxiety and Risk-Taking 21

The Link between Anxiety and Risk-Taking 24

Risk-Avoidance as a Transdiagnostic Factor 30

Clinical Implications of Risk-Taking and Anxiety Research 31

Risk-Avoidance, Anxiety and Treatment-Seeking 31

Anxiety and Risk-Avoidance as a Treatment Outcome 33

Limitations of Previous Risk-Taking and Anxiety Research 35

Implications for the Program of Research 37

2. RISK-AVOIDANCE AND SOCIAL ANXIETY PATHOLOGY 40

STUDY 1: Risk-Avoidance and Social Anxiety Pathology

Introduction 41

Behavioural Inhibition System and Anxiety Pathology 41

BIS, Risk-Avoidance and Anxiety Pathology 43

Measures of Risk-Taking 44

Method 46

Participants 46

Measures 46

Procedure 49

Results 49

Participant Characteristics 49

Correlation Analyses 49

Mediation Analysis 52

Discussion 54

Implications for the Program of Research 59

3. AN ONLINE STUDY OF RISK-AVOIDANCE AND CLINICAL ANXIETY 60

STUDY 2: Risk-Avoidance and Anxiety in a Clinical Sample

Introduction 61

Method 63

Participants 63

Measures 65

Procedure 68

Results 69

Participant Characteristics 69

Comparison of Self-report Risk-Taking Scores between the Anxious and Control Groups 69

Comparison of CCT Scores between the Anxiety Disorder and Control Groups 70

Association between Risk-Taking and Symptom Measures 73

Discussion 76

Implications for the Program of Research 81

4. RISK-AVOIDANCE IN AN ANXIOUS TREATMENT-SEEKING SAMPLE 82

STUDY 3: Risk-Avoidance in an Anxious Treatment-Seeking Sample

Introduction 83

Method 85

Participants 85

Measures 86

Procedure 88

Results 89

Participant Characteristics 89

Comparison of Risk-Taking Scores between the Anxiety Disorder and Control Groups 90

Association between Risk-Taking and Symptom Measures in the Anxiety Disorder Group 91

Association between Risk-Taking and Other Measures in the Anxiety Disorder Group 92

Does Risk-Avoidance Predict Symptoms of Anxiety Pathology? 94

Discussion 97

Implications for the Program of Research 101

5. CLINICAL IMPLICATIONS OF RISK-AVOIDANCE AND ANXIETY: TREATMENT-SEEKING 103

STUDY 4: An Online Study of Risk-Avoidance and Treatment-Seeking in Pathological Anxiety

Introduction 104

Method 106

Participants 106

Measures 108

Procedure 111

Results 113

Participant Characteristics 113

Comparison of Risk-Taking Scores between the Anxiety Disorder and Control Groups 114

Association between Risk-Taking and Symptom Measures 118

Barriers to Treatment 118

Treatment-Seeking and Risk-Avoidance 119

Discussion 121

Implications for the Program of Research 126

6. TREATMENT IMPLICATIONS OF RISK-AVOIDANCE: CHANGES IN RISK-TAKING 128

Introduction 130

STUDY 5: Changes in Risk-Taking Over the Course of an Internet-delivered Cognitive-Behavioural Therapy (CBT) Treatment for Generalised Anxiety Disorder (GAD)

Introduction 132

Method 133

Participants 133

Measures 133

Procedure 136

Results 137

Participant Characteristics 137

Pre-Treatment Differences 138

Treatment Completion 139

Treatment Outcome 139

Risk-Taking as a Possible Mediator 144

Discussion 151

STUDY 6: No Risk, No Gain: Changes in Risk-Taking over Cognitive-Behavioural Group Therapy (CBGT) for Anxiety

Introduction 156

Method 156

Participants 156

Measures 157

Procedure 158

Results 159

Participant Characteristics 159

Pre-treatment Scores 159

Treatment Completion 160

Treatment Outcome 160

Changes in Risk-Taking 161

Association between Risk-Taking and Treatment Outcomes 165

Discussion 167

Implications for the Program of Research 171

7. GENERAL DISCUSSION 172

Summary of Findings 173

Theoretical Considerations of Risk-Avoidance and Anxiety 176

Risk-Avoidance vs. Disorder-Specific Avoidance 176

Risk-Avoidance and the Development of Anxiety Pathology 180

Risk-Avoidance and the Maintenance of Anxiety Pathology 182

Risk-Avoidance and Depression 183

Clinical Considerations of Risk-Avoidance and Anxiety 184

Treatment-Seeking, CBT and Risk-Avoidance 184

General Limitations of This Program of Research and Future Directions 187

Concluding Comments 190

REFERENCES 194

APPENDICES 241

Appendix 1: Appendix to Chapter 2 (Study 1) 242

Appendix 2: Appendix to Chapter 3 (Study 2) 246

Appendix 3: Appendix to Chapter 4 (Study 3) 249

Appendix 4: Appendix to Chapter 5 (Study 4) 253

Appendix 5: Appendix to Chapter 6 (Studies 5 & 6) 255

LIST OF TABLES

		Page
2.1	Mean Scores, Standard Deviations, and Bivariate Pearson Correlations between Measures of Social Anxiety, Behavioural Inhibition System and Risk-Avoidance	51
2.2	Main Results of Hypothesised Mediation Model Multiple Regression Analyses in Which Risk-Avoidance Mediates the Relationship Between a Dispositional Vulnerability to Anxiety (BIS) and Social Anxiety (SIAS)	54
3.1	Demographic Information for Anxiety Disorder and Control Groups	68
3.2	Mean Scores, Standard Deviations, and Between-Group Comparisons	71
3.3	Pearson Bivariate Correlation Coefficients of Risk-Taking and Symptom Measures	75
4.1	Demographic Information for Anxiety Disorder and Control Groups	89
4.2	Mean Scores, Standard Deviations, and Between-Group Comparisons (ANCOVA), Adjusting for Age	90
4.3	Symptom Measure Means and Standard Deviations Mean Scores, Standard Deviations, and Pearson Bivariate Correlation Coefficients Between Risk-Taking and Symptom Measures for Anxiety Disorder Group	93
4.4	Results from Hierarchical Linear Regressions for Anxiety Symptom Measures Controlling for Neuroticism and Symptom Measures	95
5.1	Demographic Information for Control Group and Anxiety Disorder Subgroups	112
5.2	Mean Scores and Standard Deviations for Self-report Measures for Control and Anxiety Disorder Subgroups	113
5.3	Mean Scores, Standard Deviations, and Analysis of Variance (ANOVA) Results for Risk-Taking Scores Between the Control and Anxiety Disorder Subgroups	116
5.4	Bivariate Pearson Correlations of Risk-Taking Propensity and Treatment-seeking in Anxiety Disorder Participants Who Have Never Sought Treatment	120
6.1	Demographic Information for Treatment and Control Groups	140
6.2	Mean Scores, Standard Deviations and Within-Group Change (*t* test) Results for Treatment and Control Groups	141

6.3	Distribution and Percentages of Individuals Who are Risk-Averse, Risk-Neutral and Risk-Seeking in Treatment and Control Groups Before and After Internet CBT Treatment	142
6.4	Between-Group Differences at Post-Treatment Adjusting for Pre-Treatment Scores (ANCOVA)	143
6.5	Main Results of Hypothesised Mediation Model Multiple Regression Analyses in Which Change in Risk-Taking Mediates Internet CBT Treatment Outcome (Change in Symptom Severity and Impairment)	148
6.6	Main Results of Alternate Mediation Model Multiple Regression Analyses in Which Change in Symptom Severity and Impairment Mediates Change in Risk-Taking as a Result of Internet CBT Treatment	150
6.7	Pre- and Post-Treatment Mean Scores and Standard Deviations of Primary Measures of Social Phobia (SP) and Panic Disorder with Agoraphobia (PDAg) Patients	162
6.8	Pre- and Post-Treatment Mean Scores, Standard Deviations and Between-Group Comparisons (mixed ANOVA) of Secondary Measures of Social Phobia (SP) and Panic Disorder with Agoraphobia (PDAg) Patients	163
6.9	Pre- and Post-Treatment Mean Scores, Standard Deviations and Within Group Comparisons (Mixed ANOVA) of Risk-Taking Measures for Social Phobia (SP) and Panic Disorder with Agoraphobia (PDAg) Patients	164
6.10	Pearson Bivariate Correlations between Risk-Taking (DOSPERT) and Treatment Outcome Change Scores (Using ITT Analyses)	166

LIST OF FIGURES

		Page
1.1	Representation of Sitkin & Pablo's (1992) model of risk-taking/risky decision-making	6
1.2	Representation of risk propensity in the population	9
1.3	Risk-as-feelings perspective (Lowenstein, Weber, Hsee, & Welch, 2001)	15
1.4	Cognitive processes affecting anxiety (Maner, 2009)	18
1.5	Representation of Maner and Schmidt's (2006) model of the contribution of risk-avoidant decision-making to the maintenance of anxiety pathology	26
2.1	Hypothesised relationship between Behaivoural Inhibition System (BIS) sensitivity, risk-avoidance (RA) and social anxiety (SA) symptoms	44
2.2	The Balloon Analogue Risk Task (BART; Lejuez et al., 2002)	48
2.3	Results of the hypothesised mediation model for the relationship between Behavioural Inhibition System (BIS) sensitivity and social anxiety (SA) as mediated by risk-avoidance (RA)	53
3.1	The Columbia Cart Task (CCT; Figner et al., 2009)	67
3.2	Between-group comparison of mean total cards chosen on the Columbia Card Task (CCT).	72
3.3	Mean number of cards chosen across trials (i.e., mean across four trials collapsed) on the Columbia Card Task (CCT).	72
5.1	Mean total Domain-Specific Risk-Taking (DOSPERT) scale between control, social phobia (SP), obsessive-compulsive disorder (OCD) and generalised anxiety disorder (GAD) subgroups.	115
5.2	Mean self-reported risk-taking score between control, social phobia (SP), obsessive-compulsive disorder (OCD) and generalised anxiety disorder (GAD) subgroups.	117
6.1	Results of the hypothesised mediation model with risk-taking (ΔDOSPERT) as a mediator between the intervention (Internet-based cognitive behavioural therapy, iCBT) and depression (ΔPHQ-9)	147
6.2	Results of the alternate mediation model with depression (ΔPHQ-9) as a mediator between the intervention (Internet-based cognitive behavioural therapy, iCBT) and risk-taking (ΔDOSPERT)	149

“If we didn't live venturously, plucking the wild goat by the beard, and trembling over precipices, we should never be depressed, I've no doubt; but already should be faded, fatalistic and aged”

- Virginia Woolf

CHAPTER 1

INTRODUCTION TO RISK-AVOIDANCE AND ANXIETY PATHOLOGY

LITERATURE REVIEW

	Page
1. INTRODUCTION TO RISK-AVOIDANCE AND ANXIETY PATHOLOGY	1
Introduction to Risk-Avoidance and Anxiety Pathology	2
What is Risk?	4
About Risk-Taking and Risk-Avoidance	4
Models of Emotion and Risk-Taking	10
Somatic Marker Hypothesis	11
Anticipatory Affect	12
Affect-as-Information and the Affect Heuristic	13
Dual-Process Models	14
Risk-as-Feelings	14
Review of Studies of Risk and Anxiety	17
Anxiety and Cognitive Processes	17
Anxiety and Risk Perception	19
The Link Between Dispositional Vulnerabilities to Anxiety and Risk-Taking	21
The Link Between Anxiety and Risk-Taking	24
Risk-Avoidance as a Transdiagnostic Factor	30
Clinical Implications of Risk-Taking and Anxiety Research	31
Risk-Avoidance, Anxiety and Treatment-Seeking	31
Anxiety and Risk-Avoidance as a Treatment Outcome	33
Limitations of Previous Risk-Taking and Anxiety Research	35
Implications for the Program of Research	37

Introduction

From deciding whether to ask someone out on a date, to choosing to wear their seat belt, people encounter a variety of risky decisions every day. This complex ability depends on the capacity to weigh the potential benefits of an outcome against the potential risks – and to learn from the result of these choices. There is mounting evidence to suggest that people with anxiety disorders exhibit a risk-avoidant decision-making bias, the *safety bias*, in which these individuals demonstrate an exaggerated tendency to make choices that minimise the potential for harm (e.g., Lorian & Grisham, 2010, 2011; Lorian, Mahoney, & Grisham, 2011a; Lorian, Titov, & Grisham, 2011b; Maner et al., 2007; Maner & Schmidt, 2006; Miu, Miclea, & Houser, 2008b). While this strategy may be beneficial in some circumstances, the pervasive tendency to avoid perceived risks has been implicated in the development and maintenance of anxiety pathology (Maner & Schmidt, 2006). This thesis intends to extend this literature by examining risk-avoidance in anxiety disorders and the associated theoretical and clinical implications.

It is only within the last 15 – 20 years that researchers have started investigating the role of decision-making and risk-taking in clinical and neurological populations. Most studies to date have focussed on psychiatric disorders characterised by risky behaviour (e.g., substance-abuse, bipolar disorder, psychopathy, schizophrenia, eating disorders, borderline personality disorder; Cavedini et al., 2006b; Chen, Brown, Lo, & Linehan, 2007; Crowley, Raymond, Mikulich-Gilbertson, Thompson, & Lejuez, 2006; Holmes et al., 2009; Hutton et al., 2002; Schmitt, Brinkley, & Newman, 1999). However, the other extreme of this continuum – populations exhibiting marked risk-averse behaviour – has yet to be explored in detail.

There are several converging lines of evidence to suggest that risk-avoidance plays a significant role in the aetiology and maintenance of anxiety disorders (Maner & Schmidt, 2006). First, emotions (including anxiety) are believed to play a fundamental role in the decision-making process (e.g., Baumeister, DeWall, & Zhang, 2009; Bechara, 2004; Loewenstein, Weber, Hsee, & Welch, 2001; Winkielman & Trujillo, 2007). Second, avoidance (e.g., cognitive, experiential, behavioural, etc.; Berman, Wheaton, McGrath, & Abramowitz, 2010; Buller, Maier, Heuser, & Frommberger, 1990; McGuire et al., 2011; Olatunji, Moretz, & Zlomke, 2010; Salkovskis, 1991; Stapinski, Abbott, & Rapee, 2010) has been shown to be an integral component of most forms of clinical anxiety pathology. Third, situational anxiety often results in risk-averse performance on behavioural risk-taking tasks (e.g., Dale, Hemmerich, Ghini, & Schwarze, 2006; Eisenberg, Baron, & Seligman, 1998; Lerner & Keltner, 2001; Maner et al., 2007; Raghunathan & Pham, 1999). Fourth, cognitive biases present in those with pathological anxiety are likely to impact on the various stages of the risky decision-making process (e.g., attentional bias toward threat-relevant stimuli, biased risk appraisals, overestimation of the probability and cost of negative outcomes, intolerance of uncertainty, etc.; for a review, see Mathews, Mackintosh, & Fulcher, 1997; Ouimet, Gawronski, & Dozois, 2009). Finally, dispositional and neurobiological correlates of pathological anxiety (e.g., punishment sensitivity, neuroticism, behavioural inhibition, harm-avoidance, etc.; see Ernst & Paulus, 2005; Kim & Lee, 2011; Knyazev, Slobodskaya, & Wilson, 2002; Paulus, Rogalsky, Simmons, Feinstein, & Stein, 2003; Schonberg, Fox, & Poldrack, 2011; Suhr & Tsanadis, 2007) have also been associated with risk-avoidant behaviour, both on self-report measures and behavioural indices of risk-taking in the real world. The ensuing literature review will attempt to expand on each of the above points in order to provide a background for the research conducted in this thesis.

What is Risk?

Risk has been the subject of a large body of literature across multiple disciplines (e.g., psychology, cognitive science, neuroscience, economics, etc.; for review, see Schonberg et al., 2011). Despite decades of research, however, there appears to be limited agreement on a universal definition. Risk, in the mathematical and economic fields has often been defined in terms of objective and quantifiable variance in outcomes (e.g., risk is a product of probability and perceived benefit [utility], or *expected utility*, EU; Bernoulli, 1738; Edwards, 1954). Conversely, in the clinical literature, the conceptualisation of risk centres on behaviour that has the potential to cause negative outcomes (e.g., harm to oneself or others; Steinberg, 2008). Inherent in the lay-person notion of risk is the "possibility of loss, injury, or other adverse or unwelcome circumstance" (The Oxford English Dictionary, 2010). However, such a conceptualisation neglects the fact that people sometimes choose to engage in risky behaviours because risk also provides an opportunity for reward (Leigh, 1999). As such, *risk* may best be defined as a two dimensional construct involving both gain and loss, that involves "the implementation of options that could lead to negative consequences" (Byrnes, Miller, & Schafer, 1999, p. 367). It is important to note that under such a broad definition, one is able to include a range of everyday 'risky' behaviours (e.g., public-speaking, sharing a drink with a friend, eating a meal without washing your hands) as well as more extreme forms of risk-taking (e.g., gambling, sky-diving, drink driving), thus highlighting the importance and pervasiveness of risk-taking in everyday life.

About Risk-Taking and Risk-Avoidance

In order to understand how anxiety and risk-taking are related, it is important to understand how individuals translate thought into action in order to navigate their environment. One conceptualisation of cognition and behaviour posits that humans rely on four interrelated and complex higher-level executive processes (Blanchette & Richards,

2010): (i) *interpretation*, involves extracting meaning from ambiguous information to form a mental representation; (ii) *judgement*, involves making an estimate of the probability or likelihood of the different outcomes; (iii) *decision-making*, involves selecting and acting upon an option from the available outcomes; and, (iv) *reasoning*, entails using the available information collectively to make inferences about the environment. Research has shown anxiety to impact all of these complex processes, ultimately affecting how individuals perceive and subsequently behave in their environment (for review, see Blanchette & Richards, 2010).

Of particular interest to this literature review is the process of decision-making under *risk* – often referred to interchangeably in the literature as *risk-taking*, *risk-taking behaviour* or *risky decision-making* – during which there is some knowledge or estimation of the probability distribution of the outcomes when deciding what action to take (e.g., a new medical procedure has a 90% success rate with a 10% chance of complications). This can be distinguished from decision-making under *uncertainty* or *ambiguity*, where the probability distribution of the possible outcomes is unknown (e.g., a new never-before-tested medical procedure where chances of success are unknown; see Bechara, 2004). Despite evidence supporting this distinction (e.g., potentially different brain mechanisms; Bach, Seymour, & Dolan, 2009; Huettel, Stowe, Gordon, Warner, & Platt, 2006; Platt & Huettel, 2008), the difference between a risky and an ambiguous situation in the real-world can be difficult to define. For the purpose of this thesis, however, we will focus on risky decision-making, under the premise that individuals are generally averse to ambiguity (Camerer & Weber, 1992; Platt & Huettel, 2008) and attempt to resolve uncertainty by imposing their own perceived probability distributions onto a given situation (i.e., *subjective expected utility theory*, SEU; Savage, 1954).

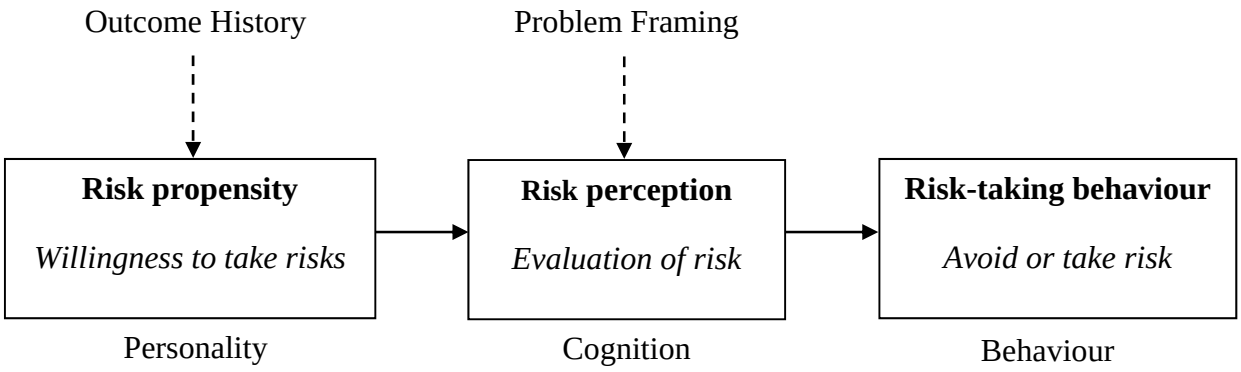

Figure 1.1 Representation of Sitkin & Pablo's (1992) model of risk-taking/risky decision-making.

The components of risk-taking or risky decision-making are perhaps most succinctly described by the framework put forward by Sitkin and Pablo (1992). In their model (see Figure 1.1), Sitkin and Pablo (1992) propose that there are two key inputs to risk-taking behaviour: risk perception (or *risk appraisals)* and risk propensity (or *risk preferences, risk attitudes, risk affinity*). Similar to the concept of judgement described above, *risk perception* refers to an individual's cognitive assessment of how risky a situation is, taking into account the likelihood, utility/cost and uncertainty of both positive and negative consequences. As supported by the literature (e.g., Kühberger, 1998; Slovic, 1987, 2000), Sitkin and Pablo posit that risk perceptions are influenced by situational variables like *problem framing*, or whether the situation is described to the decision-maker as a threat or opportunity. Situations framed positively (emphasising situational threats) encourage risk-avoidant behaviour, while situations that are framed negatively (emphasising salience of opportunities) encourage risk-seeking (i.e., *prospect theory*; Kahneman & Tversky, 1979). *Risk propensity*, on the other hand, refers to an individual's "tendency to take or avoid risks" (Sitkin & Weingart, 1995, p. 1575), conceptualised as a dispositional trait that is persistent but changeable over time. The model proposes that risk propensity is likely to be influenced by *outcome history*, defined as

the outcome of prior risk-related actions (i.e., previous successes result in higher risk propensity). Sitkin and Weingart (1995) offered support for the proposed model, showing that risk perceptions mediate the relationship between risk propensity and risk-taking behaviour. In other words, Sitkin and Pablo's (1992) model offers a straightforward framework for how situational, personality, and cognitive variables interact to affect behaviour.

Whether risk propensity can be generalised across domains has been of considerable interest within the risk literature (Hanoch, Johnson, & Wilke, 2006; Weber, 2010; Weber, Blais, & Betz, 2002; Weller & Tikir, 2011). For example, an experienced investor is likely to take financial risks, but may be risk-avoidant in social situations. As one may expect, risk-taking behaviour is heavily dependent on multiple individual factors (see Vlek & Stallen, 1980), including past experience (e.g., Dale et al., 2006), life history (e.g., Wang, Kruger, & Wilke, 2009), expectations (e.g., Mitte, 2007), self-efficacy (e.g., Kallmen, 2000), locus of control (e.g., Hashimoto & Fukuhara, 2004), personality variables (e.g., Nicholson, Fenton-O'Creevy, Soane, & Willman, 2002), as well as other related psychological constructs (e.g., sensation-seeking, impulsivity and self-control; Freeman & Muraven, 2010; Horvath & Zuckerman, 1993). As such, there exists considerable variability in risk preferences and behaviour, dependent not only on individual and situational factors but also on methodological factors in the measurement of risk (e.g., self-report vs. two-choice scenarios vs. complex behavioural tasks; Dohmen et al., 2011; Mishra & Lalumière, 2011). Nonetheless, evidence suggests that individuals can have both a general risk propensity, related to more stable personality preferences, in addition to domain-specific risk preferences, related to domain or situation-specific factors (Schonberg et al., 2011; Weber, 2010).

One study investigating personality characteristics (as measured by the Neo Personality Inventory – Revised, NEO-PI-R; Costa & McCrae, 1992) and domain-specific risk propensity in a large sample of students and executives, showed that people generally fit

into one of three groups: (i) *risk-seekers*, characterised by high extraversion and openness, as well as low neuroticism, agreeableness and conscientiousness; (ii) *risk-avoiders*, characterised by low extraversion and openness, and high neuroticism, agreeableness and conscientiousness; and (iii), *domain-specific risk-takers* who are situation-sensitive and do not exhibit a strong directional risk propensity (Nicholson, Soane, Fenton-O'Creevy, & Willman, 2005b). Overall, the authors concluded that even domain-specific risk propensity was heavily grounded in personality; however, preferences were more likely to be inconsistent between domains if individuals did not have strong risk-seeking or risk-avoidant tendencies. These issues highlight the complexity of the risk construct and suggest the need for caution in making generalisations and predictions about risk behaviour.

In sum, whether general or domain-specific, risk propensity can be conceptualised as a continuous dispositional variable occurring within the population under a normal distribution (see Figure 1.2; Dohmen et al., 2011; Dohmen et al., 2006). That is, the majority of the population are likely to be *risk neutral*, while only a small percentage of the population engage in either extreme *risk-seeking* (or *risky behaviour*) or extreme *risk-avoidance* (also termed *risk-aversion*, *risk-avoidant behaviour*, and *risk-averse behaviour*).Within the clinical literature, maladaptive risk-seeking behaviour is characterised by exaggerated forms of impulsive and disinhibited behaviour often exhibited in individuals with externalising psychopathology (e.g., substance abuse, self-harm, unsafe sexual behaviour; Leigh, 1999). Risk-avoidant behaviour, on the other hand, is characterised by the general propensity to avoid perceived risky situations as seen in populations with various forms of internalising psychopathology and interpersonal dysfunction (Maner & Schmidt, 2006).

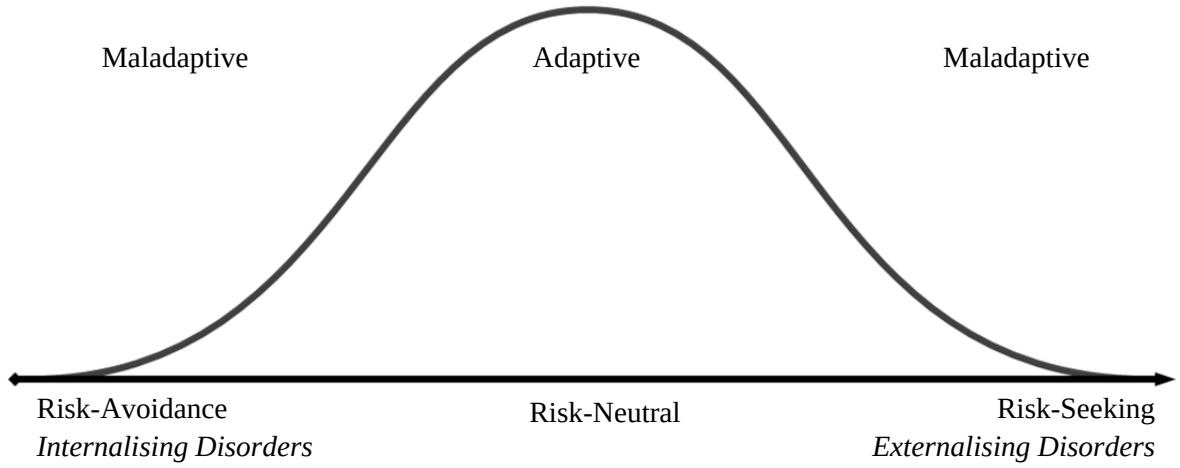

Figure 1.2. Representation of risk propensity in the population.

For the purpose of this thesis, it seems necessary to differentiate risk-avoidance from disorder-specific avoidance; that is, *behavioural*, *experiential* and *cognitive avoidance* implicated in a number of models of pathological anxiety (e.g., Barlow, 2002; Berman et al., 2010; Craske, Sanderson, & Barlow, 1987; Rapee & Heimberg, 1997; Stapinski et al., 2010). In this body of research, risk-avoidance refers to a *global* (or domain non-specific) cognitive decision-making bias that results in avoidance of situations or stimuli that are perceived to be threatening (often across multiple domains; e.g., social, recreational, and financial). On the other hand, behavioural, experiential, and cognitive avoidance involve the avoidance of specific physical, emotive, interoceptive or cognitive stimuli (e.g., avoidance of social situations in SP, 'contaminated' stimuli in OCD, physical exercise in PD, or distressing cognitions in GAD). In this thesis, we argue that pathological anxiety – in particular social phobia (SP), generalised anxiety disorder (GAD), panic disorder with (PDAg) or without (PD) agoraphobia and obsessive-compulsive disorder (OCD), as defined by the current

version of the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; *DSM-IV-TR,* American Psychiatric Association, 2000) – is likely to be associated with a tendency to be risk-averse in domains that are not limited to disorder-specific avoidance. In other words, clinically anxious individuals are expected to exhibit a global risk-avoidant decision-making bias – the *safety bias.*

Models of Emotion and Risk-Taking

The previous section provided a general overview of the construct of risk and decision-making. To further establish the basis of this thesis, the following section will broadly examine literature on the relationship between emotion and risk-taking. *Emotion* refers to the complex psychophysiological experience that occurs in response to a given stimulus, consisting of a strong subjective feeling in combination with a cognitive, behavioural and physical response (Baumeister et al., 2009; Fontaine, Scherer, Roesch, & Ellsworth, 2007). Emotion should be differentiated from *affect,* which refers to more immediate, "automatic, mainly nonconscious responses to stimuli" (Baumeister et al., 2009, p. 13) – equated sometimes with intuition or gut feelings (Gigerenzer, 2007) – and *mood,* which refers to a low intensity, long-lasting affective state that does not necessarily have a particular focus or source (e.g., depressed mood; see Tran, 2007). From an evolutionary perspective, it has been argued that emotions and affect inform individuals about the current state of the environment in which they find themselves and subsequently allows for assessment of their behavioural options in order to take rapid action (DeSteno, Petty, Wegener, & Rucker, 2000).

Traditional economic and mathematical models of risk-taking assumed that individuals make decisions based purely on a single system involving rational and cognitive evaluations about the consequences of possible choices (i.e., probability and utility) – free of the influence of emotion (see Busemeyer, Hastie, & Medin, 1995). While these models and

similar adapted models were able to explain a range of risky decision-making phenomena (see Loewenstein, Rick, & Cohen, 2008; Machina, 2006; Starmer, 2000), deviations from predicted choice patterns were accounted for in terms of cognitive biases, heuristics and errors (Kahneman & Tversky, 1982; Simon, 1957; Tversky & Kahneman, 1974). Although some of these models did incorporate emotions (e.g., Arkes, Herren, & Isen, 1988; Loomes & Sugden, 1982, 1986; Mellers, Schwartz, & Ritov, 1999; Mellers, Schwartz, Ho, & Ritov, 1997), they were seen as epiphenomena or incidental to cognitive evaluations of risk, and subsequently were not believed to affect risk behaviour. More recently, however, emotions and the individual differences related to emotion have been implicated in a number of theoretical decision-making models (e.g., Bechara & Damasio, 2005; Damasio, Everitt, & Bishop, 1996; Loewenstein et al., 2001; Slovic, Finucane, Peters, & MacGregor, 2007). While an in depth exploration of the vast risk literature goes beyond the scope of this thesis, a review of the prominent models of risk and emotion is necessary in order to establish a background for this thesis.

Somatic Marker Hypothesis

One of the first and most influential theories of how emotions affect decision-making was proposed by Damasio's (1994; 1996) *somatic marker hypothesis* (SMH). The SMH posits that emotions mediate the interaction between the environment and the human decision process by the emotional 'tagging' of previously encountered stimuli or situations using physiological signals (e.g., heart rate, skin conductance, etc.), known as *somatic markers*. The formation and representation of somatic markers in the brain is proposed to occur in the ventromedial prefrontal cortex (VMPFC) and limbic structures (i.e., amygdala, insula, orbitofrontal cortex, and anterior cingulate cortex), such that when a similar situation is encountered, interoceptive somatic signals formed previously will bias selection of outcomes (i.e., encourage acceptance of favourable outcomes and rejection of disadvantageous

outcomes). It is believed that the influence of somatic markers may occur through conscious, overt or unconscious, covert processes (for more detail, see Reimann & Bechara, 2010).

Much of the support for the SMH has been derived from studies showing that healthy individuals generate greater anticipatory skin conductance responses (SCRs) – an index of somatic marker signals – prior to selecting disadvantageous outcomes on a well-known decision-making task (*Iowa Gambling Task*, IGT; Bechara, Damasio, Damasio, & Anderson, 1994; see below for description), even before conscious awareness of the disadvantageous probability contingencies (e.g., Bechara et al., 1994; Bechara, Damasio, Damasio, & Lee, 1999; Bechara, Tranel, Damasio, & Damasio, 1996). In contrast, patients with damage to the VMPFC demonstrate impaired decision-making performance and an absence of SCRs prior to selecting disadvantageous outcomes. Despite strong evidence in support of the SMH, this hypothesis has been called into question more recently, with opponents querying the role and validity of the physiological components (i.e., somatic markers) of the model (for review of criticisms, see Dunn, Dalgleish, & Lawrence, 2006; Reimann & Bechara, 2010).

Anticipatory Affect

Similar to the SMH, the effect of emotions on the decision-making process has also been conceptualised by the neurally-based *anticipatory affect* approach (Kuhnen & Knutson, 2005). Anticipatory affect refers to immediate emotional states (e.g., anxiety, dread, fear, etc.) that are experienced in anticipation of risks and uncertainties (Knutson & Greer, 2008), and it is these states that are believed to guide choice behaviour (i.e., negative arousal is associated with risk-avoidance and positive arousal is associated with risk-seeking). Support for this view (and indirect support for the SMH) has been gathered by brain-imaging data showing that neural changes are associated with affective experience seconds prior to making a choice (see Knutson & Greer, 2008). Despite being conceptually similar to the SMH, the anticipatory affect approach does not propose a mediating role of the peripheral nervous

system (i.e., through somatic markers), and unlike other approaches, the anticipatory affect approach differentiates between positive and negative emotions.

Affect-as-Information and the Affect Heuristic

Several related theoretical explanations have been put forward to account for the adaptive function of emotions in risk-taking. In particular, affect is believed to function as a source of information, a "spotlight," a motivator and as common currency during the decision-making process (Peters & Slovic, 2000; Peters, Västfjäll, Gärling, & Slovic, 2006a). One of the earliest approaches proposed by Zajonc (1980), argued that automatic affective reactions occur preceding cognitive reactions and subsequently guide future judgement and information processing. Following a similar argument, the *affect-as-information* approach – originally proposed to account for preferences in social psychology – posits that positive and negative feelings associated with objects (e.g., like vs. dislike) will directly affect judgements of similar objects in the future; in decision situations, this 'like' or 'dislike' is believed to bias choice outcomes (Clore, 1992; for review of supporting studies, see Clore, Gasper, & Garvin, 2001; Clore, Schwarz, & Conway, 1994; Schwarz & Clore, 1983). In support of this, Gasper and Clore (2000) found that judgements of risk were influenced only when individuals were made to pay attention to their emotional state. In a similar vein, the *affect heuristic* proposes that individuals use an overall affective impression (i.e., representations of events and objects that are tagged with a general feeling of "goodness" or "badness") to guide decision-making behaviour. For example, a person is likely to label a situation as 'risky' (e.g., giving a presentation to colleagues) if a similar experience has been 'tagged' in their memory with negative affect (e.g., past presentation went poorly). Slovic et al. (2007; 2005) argue that use of such a cognitive short-cut is more efficient than the cognitive assessment of pros and cons, especially in complex decision situations when cognitive resources are limited.

Dual-Process Models

While traditional conceptualisations of decision-making have assumed a single cognitive-based system, models incorporating the influence of emotion have moved toward a dual-process paradigm, popular also in other areas of psychology (e.g., cognition, memory, reasoning, etc.; see Chaiken & Trope, 1999; Epstein, 1994; Sloman, 1996). In particular, dual-process models of risk posit that there are two qualitatively distinct pathways with which risks are evaluated: the *affect-based* system, which is driven by more automatic, intuitive and experiential information, and the *cognition-based* system, driven by more controlled, deliberative and numerical/logical considerations, as in traditional models of decision-making (e.g., Kahneman, 2003; Kahneman & Frederick, 2002; Mukherjee, 2010; Slovic et al., 2005; van Gelder, de Vries, & van der Pligt, 2009). For example, one model differentiates between the ways in which risks are perceived (cognition-based, 'cold') and the way in which risks are acted upon (affect-based, 'hot') as 'risk-as-analysis' and 'risk-as-feelings', respectively (Slovic, Finucane, Peters, & MacGregor, 2004). While there are several dual-process theories of risk (e.g., Bracha & Brown, 2008; Mukherjee, 2010; Peters & Slovic, 2000; Reyna, 2004), all models share conceptual overlap in the idea that there are two parallel interactive modes that respond to different parts of a situation (e.g., the cognitive mode is sensitive to outcomes and probabilities, whereas the affect-based mode is not; Slovic et al., 2004). Despite the popularity of these models in accounting for risky decision-making phenomena, only one study to date has tested and confirmed the plausibility of a dual-process conceptualisation of risk (van Gelder et al., 2009).

Risk-as-Feelings

The above dual-process approach is compatible with Loewenstein et al.'s (2001) *risk-as-feelings* hypothesis, which proposes that decision-making depends directly on the emotion experienced at the time of the decision (see Figure 1.3). The model posits that any given risky

situation involves a cognitive assessment of potential outcomes, but also produces a reciprocal emotional reaction (e.g., worry, anxiety, dread, fear). Multiple factors (e.g., background mood, feeling states, anticipated outcomes, immediacy of risk, etc.) are likely to exert opposing effects on cognitive and affective risk assessments, thereby producing potentially conflicting responses to the same risk. Similar to dual-process theories of risk-taking, Loewenstein et al. (2001) argue that emotional reactions will generally exert a stronger influence on the behavioural response (even if the response may not make sense). For example, a person with a specific phobia may know rationally that the phobic stimulus will not cause harm but will nonetheless engage in avoidant behaviour.

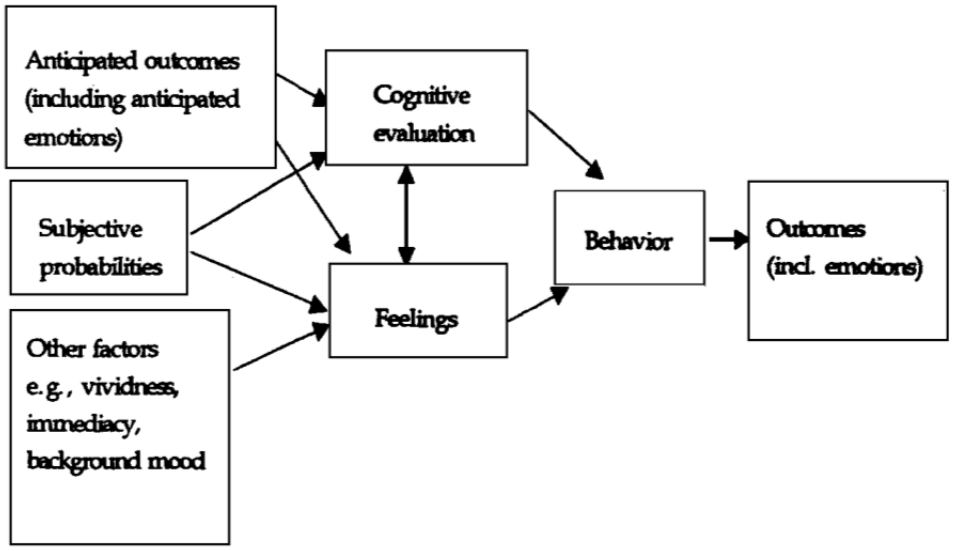

Figure 1.3. Risk-as-feelings perspective (Lowenstein, Weber, Hsee, & Welch, 2001)

Although no studies have formally tested this approach, Loewenstein et al. (2001) provide convincing evidence for each component of the risk-as-feelings model and show how it readily accounts for a range of behaviours during which there is a discrepancy between cognitive evaluations and feelings. While the concept shares similarities with the SMH, the risk-as-feelings hypothesis offers a purely psychological (rather than neurobiological)

framework of risky decision-making. Furthermore, unlike the SMH, the risk-as-feelings hypothesis highlights the potentially disruptive role of emotions and does not assume that emotional responses will ultimately result in better decision-making (Reimann & Bechara, 2010). In contrast to other similar approaches that tend to assume that emotion serves as an informational input into the decision process, the risk-as-feelings model advocates a stronger role for emotions, such that emotions generate a behavioural response that often deviates from what is viewed as the best response (Loewenstein et al., 2008; Loewenstein et al., 2001).

It is of note that the majority of models incorporating emotion (with the exception of the risk-as-feelings hypothesis) actually refer to the influence of affective and emotional states as situational factors on the decision-making process, rather than the influence of ongoing background mood. Given the strong association between affective reactions, emotional states and background mood, however, it is likely that factors affecting mood (e.g., pathological anxiety) also influence decision-making behaviour. Indeed, there is evidence to suggest that situational affect (e.g., state anxiety) mediates the influence of dispositional mood (e.g., trait anxiety) on cognitive processes like decision-making. However, some studies have also shown dispositional mood to affect cognition even after controlling for situational affect, suggesting that the effect of background mood on risk-taking may also be independent of state affect (Miu et al., 2008b). Nevertheless, despite subtle differences in the conceptualisation of how emotion relates to decision-making and risk-taking behaviour, together these models imply that emotions can have a strong impact on behaviour. Therefore, consistent with the reviewed models, it is likely that clinical levels of anxiety will influence decision-making and risk-taking behaviour.

Review of Studies of Risk and Anxiety

So far, this chapter has reviewed literature on the construct of risk, decision-making and the influence of emotion on the decision-making process. The remainder of this literature review will examine research that provides indirect and direct support for the hypothesised relationship between risk-avoidance and clinical anxiety. Specifically, we will first review research on anxiety and cognitive processes, including risk perception, followed by an examination of research investigating the relationship between correlates of pathological anxiety and risk-taking. Finally, we will conclude with a review of research directly examining the link between anxiety and risky decision-making.

Anxiety and Cognitive Processes

Anxiety, which can be experienced at a state or trait level, refers to a naturally occurring response resulting in the presence of negative affect, distress, vigilance to perceived threat, worry, and physiological hyper-arousal (Barlow, 2002). *Pathological anxiety* (or *clinical anxiety*) occurs when the anxiety experienced results in maladaptive cognitions or behaviour, is excessive, uncontrollable and causes psychological distress and/or significant impairment of daily functioning (e.g., work, social, etc.) For the purpose of this thesis, pathological anxiety will refer to individuals who experience clinical or subclinical amounts of one or more anxiety disorder diagnosis (according to the current DSM-IV-TR; American Psychiatric Association, 2000).

According to many cognitive frameworks of anxiety, a risk-related appraisal process is believed to play a fundamental role in precipitating and perpetuating anxiety disorders (Brosch, Pourtois, & Sander, 2010; Maner & Schmidt, 2006; McNally, 2001; Stapinski et al., 2010). As proposed by Maner (2009), anxiety involves a complex interaction of cognitive processes – including threat appraisals, attention to threat, pessimistic risk perceptions and judgements, and risk-avoidant decision-making – that have evolved to detect, assess and

respond promptly to signs of possible threat (see Figure 1.4). Threat-related cognition and anxiety are therefore proposed to function in a self-perpetuating cycle, where cognitive processes can be both the cause and consequence of anxiety (Maner, 2009). For example, attending to threatening information can induce anxiety, which can in turn increase attention to threat. As with other cognitive processes related to anxiety, a risk-avoidant decision-making bias may be seen as a remnant of a once adaptive process that assisted in self-protection through the implementation of risk-averse behaviour.

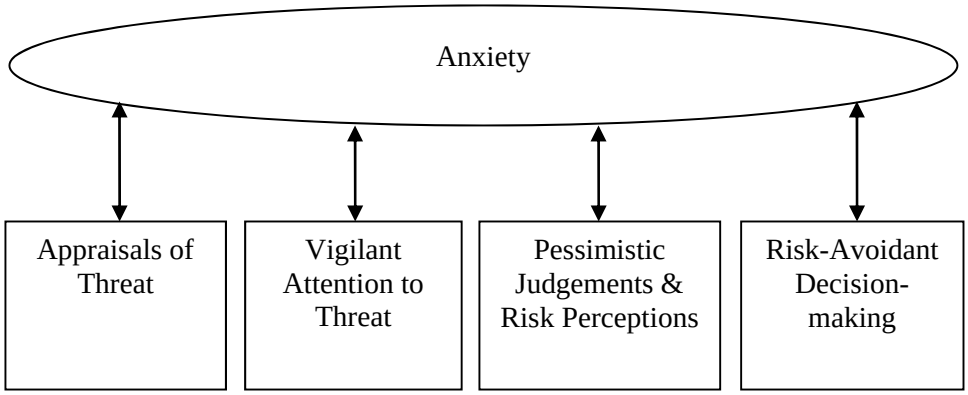

Figure 1.4. Cognitive processes affecting anxiety (Maner, 2009).

In line with this, a significant amount of research has shown that individuals with anxiety disorders are significantly more likely than non-clinical controls to remember threatening stimuli (e.g., Mathews, Mogg, May, & Eysenck, 1989), interpret ambiguous stimuli as threatening (e.g., Butler & Mathews, 1983, 1987), attend to threatening stimuli (e.g., Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007; MacLeod, Mathews, & Tata, 1986), interpret situations as more risky and costly for themselves (e.g., Muris & van der Heiden, 2006), and overestimate the probability and cost of future negative events (e.g., Constans, 2001). While these processes have often been studied separately, recent models have proposed that pathological anxiety is both caused and

maintained by threat-related biases at each level of the judgement and decision-making process (see Blanchette & Richards, 2010; Ouimet et al., 2009).

Anxiety and Risk Perception

While all cognitive processes are likely to impact the decision-making process, risk perceptions are of particular relevance to this thesis as they may be seen to directly influence risk-taking behaviour (Weber & Milliman, 1997) and have been implicated in a number of models of pathological anxiety (Beck, Emery, & Greenberg, 1985; Lazarus & Folkman, 1984; see McGinn, 2010; McNally, 2001; Stapinski et al., 2010). As outlined previously, judgement or risk perception refers to the cognitive evaluation of the probability of risk in a given situation, and is typically assessed in research by asking participants to rate the likelihood of positive or negative events in conjunction with the subjective utility/cost (Mishra & Lalumière, 2011). While the body of literature examining anxiety and risk-taking appears to be small, a considerable amount of literature has investigated the relationship between anxiety and risk perceptions.

Past research has found that individuals exhibiting high trait-anxiety have an attentional bias towards threat, which is subsequently believed to negatively bias risk perception (Broadbent & Broadbent, 1988; Gasper & Clore, 1998; MacLeod et al., 1986; Mathews et al., 1997; Matthews, Panganiban, & Hudlicka, 2011; Mogg, Mathews, & Eysenck, 1992). Results from multiple studies show that experimentally induced negative emotional states result in increased risk estimates for situation-specific outcomes (e.g., Johnson & Tversky, 1983; Lerner & Keltner, 2000; Wright & Bower, 1992). Research has also found that both high-trait anxiety and clinically anxious individuals overestimate the probability and the cost of negative outcomes (e.g., Constans, 2001; DeSteno et al., 2000; Eisenberg et al., 1998; Mathews et al., 1997), even after controlling for depression (e.g., Maner & Schmidt, 2006; Mitte, 2007; Stöber, 1997).

Butler and Mathews (1983), for example, found anxious and depressed patients were more likely to rate the probabilities and costs of negative outcomes as greater than non-clinical controls. Anxious patients, however, showed greater risk perceptions for themselves relative to other people, while risk perceptions did not differ for themselves or others in depressed patients. Other studies using clinical populations have showed, for instance, that individuals with SP have a tendency to overestimate the probability and intensity of distress in social situations (e.g., Gilboa-Schechtman, Franklin, & Foa, 2000; Nelson, Lickel, Sy, Dixon, & Deacon, 2010; Taylor & Wald, 2003; Wilson & Rapee, 2005), whereas people with GAD overestimate distress globally across situations (e.g., Constans, 2001). In line with this, it has been argued that state anxiety influences situation-specific risk appraisals, while trait anxiety is associated with global and self-relevant negative risk appraisals (Butler & Mathews, 1987; Eisenberg et al., 1998; Stöber, 1997). However, results have been somewhat inconsistent about the effect of anxiety on perceptions of positive outcomes. While some studies have found that anxiety does not reduce the perception of probability for positive outcomes (Butler & Mathews, 1987), others have shown anxiety to affect perceptions of probability and utility in both positive and negative outcomes (albeit in opposing directions) (e.g., Stöber, 1997).

As seen above, research has generally established strong evidence for a relationship between anxiety and biased risk perceptions; however, while risk perception is known to influence risk-taking behaviour, it is less clear which comes first: anxiety or risk perception? Using structural equation modelling to test the two alternative hypotheses (affect precedes risk perception vs. risk perception precedes affect), Rundmo (2002) showed that the overall affective impression of the situation predicted risk perception. Likewise, Peters et al. (2006a) found that worry about medical errors (rather than risk perceptions) better predicted risk-avoidant and precautionary actions, suggesting that risk appraisals may only partially mediate

the relationship between anxiety and risk-taking behaviour. Therefore, in line with models of emotion and decision-making, anxiety may influence risk perceptions, but may also exert an influence on risk-taking behaviour beyond the cognitive appraisal of risk.

The Link between Dispositional Vulnerabilities to Anxiety and Risk-Taking

The previous section briefly addressed research on anxiety and risk perception; while this literature provides some support for the relationship between risk-avoidance and anxiety, perceiving a situation to be risky is not the same as avoiding that risk. With this in mind, the remainder of this literature review will focus on research investigating the indirect and direct relationships between anxiety and decision-making.

Some research has provided indirect evidence of a link between risk-avoidance and anxiety by investigating how dispositional vulnerabilities to anxiety (e.g., neuroticism, punishment sensitivity, harm avoidance, etc.) are also associated with measures of risk-avoidance (e.g., Carver & White, 1994; Suhr & Tsanadis, 2007). A number of studies, for example, have shown that punishment sensitivity (or *behavioural inhibition sensitivity*; BIS; see Chapter 2 for more detail) is highly associated with risk-avoidance (e.g., Franken & Muris, 2005; Sakagami, Pan, & Uttl, 2006; van Honk, Hermans, Putman, Montagne, & Schutter, 2002). On a modified version of the *Iowa Gambling Task* (IGT; Bechara et al., 1994), Peters and Slovic (2000) found that students who reported high punishment sensitivity were more likely to employ a risk-avoidant strategy. Likewise, punishment sensitivity was found to be inversely associated with bet size (indicative of risk-aversion) on a cognitive affective slot machine task (Demaree, DeDonno, Burns, & Erik Everhart, 2008).These findings have been corroborated by a number of studies (e.g., Goudriaan, Oosterlaan, de Beurs, & van den Brink, 2005; Goudriaan, Oosterlaan, de Beurs, & Van Den Brink, 2006; Kim & Lee, 2011; Lauriola, Russo, Lucidi, Violani, & Levin, 2005; Suhr & Tsanadis, 2007); however, results have not always been consistent, suggesting more research is needed (see

Brunborg, Johnsen, Mentzoni, Molde, & Pallesen, 2011; Brunborg et al., 2010). Given that BIS is believed to be the neural substrate for anxiety (Gray & McNaughton, 2000) and that most anxious individuals would score highly on measures of BIS (Brenner, Beauchaine, & Sylvers, 2005), it is probable that anxious individuals will also demonstrate risk-avoidant behaviour.

A limited body of research exploring other dispositional correlates of risk-taking also offers support for the presence of a risk-avoidant bias in anxiety. For example, one study found that shyness in females, which is highly associated with social anxiety (van Ameringen, Mancini, & Oakman, 1998), is related to more conservative strategies on the IGT (Addison & Schmidt, 1999). Another study found extraversion to be positively correlated with decision-making on the IGT, showing that individuals low on extraversion (or high on introversion) – another factor highly related to clinical anxiety – were more likely to avoid making risky choices on the task (Peters & Slovic, 2000). High measures of neuroticism and conscientiousness have also been associated with a risk-avoidant bias on the IGT; however, as neuroticism is implicated in many forms of psychopathology, these findings may not be unique to people with anxiety disorders (O'Carroll & Papps, 2003). Other anxiety-related factors associated with anticipation of negative consequences, such as reduced control, locus of control or a perceived lack of control, have also been tied to risk-avoidant decision-making (e.g., Moye, Karel, Gurrera, & Azar, 2006) and risk-avoidant behaviour (e.g., Brehmer, 1992; Chorpita & Barlow, 1998; Freeman & Muraven, 2010; Horswill & McKenna, 1999; Strickland, Lewicki, & Katz, 1966). Taken together, these studies offer additional support for the hypothesised association between pathological anxiety and risk-avoidant decision-making and behaviour.

Further support for the association between risk-avoidance and anxiety can also be found in studies examining neurobiological correlates of risk-taking. Research suggests there

is significant overlap of brain structures implicated in both risk-avoidance and general clinical anxiety. Risk-aversion (Mohr, Biele, & Heekeren, 2010b; Polezzi, Sartori, Rumiati, Vidotto, & Daum, 2010; Roy et al., 2011; Schonberg et al., 2011; Xue et al., 2009), pathological anxiety (Martin, Ressler, Binder, & Nemeroff, 2010; Wu et al., 1991) and factors predisposing individuals to anxiety disorders (e.g., trait anxiety and behavioural inhibition; Kim & Whalen, 2009; Shackman, McMenamin, Maxwell, Greischar, & Davidson, 2009) are all believed to be associated with abnormal functioning of the frontolimbic circuit of the brain (including the prefrontal cortex, insula and amygdala, etc.; see also Li, Chao, & Lee, 2009) and abnormal neurotransmitter levels in these structures (Ramsøy & Skov, 2010). For example, Liberzon et al. (2003) found that patients with posttraumatic stress disorder (PTSD) exhibit impaired activity of the medial prefrontal cortex and anterior cingular cortex, suggesting difficulties in feedback processing during decision-making, subsequently resulting in risk-avoidant choices. In line with this, more recent neuropsychopharmacological research has shown that manipulations in serotonin levels (as implicated in anxiety disorders; e.g., Lucki, 1996) affect decision-making, proposing that the negative risk-related cognitive biases associated with anxiety are directly influenced by reduced serotonergic activity (for review, see Rogers, 2011).

Conceptually, risk-avoidance shares similarities with other psychological constructs (e.g., harm-avoidance, behavioural inhibition). Indirect support for the presence of a risk-avoidant bias in anxiety disorders may come from examining the relationship between these correlates of risk-avoidance and anxiety. For example, closely associated with self-report and behavioural measures of risk-avoidance, *harm-avoidance* has been defined as the “tendency to respond intensely to signals of aversive stimuli, thereby learning to inhibit behavior to avoid punishment, novelty, and frustrative non-reward” (Cloninger, 1987, p. 575). Increased harm-avoidance has been found across anxiety disorders, including SP (e.g., Faytout et al.,

2007), PD (e.g., Starcevic, Uhlenhuth, Fallon, & Pathak, 1996; Wiborg, Falkum, Dahl, & Gullberg, 2005), GAD (e.g., Akiskal, 1998; Starcevic et al., 1996), and OCD (e.g., Ettelt et al., 2008; Pfohl, Black, Noyes, Kelley, & Blum, 1990; Richter, Summerfeldt, Joffe, & Swinson, 1996).

Similarly, within the developmental literature, the construct of behavioural inhibition (BI; Kagan, Reznick, & Snidman, 1987; conceptually differentiated from the construct of BIS, described above) has been described as "the consistent tendency to show marked behavioral restraint or fearfulness with unfamiliar people, situations, or events" (Hirshfeld-Becker et al., 2008, p. 358). BI in infancy and children has been shown to be a robust predictor of anxiety pathology (for review, see Hirshfeld-Becker et al., 2008) and other risk-avoidant tendencies in adulthood (e.g., greater thrill-avoidance, have smaller social networks, less likely to assume leadership roles or take on ambitious projects, etc.). Given the considerable conceptual overlap between such constructs and risk-avoidant behaviour, this literature offers additional support for the predicted association between risk-aversion and anxiety disorders.

The Link between Anxiety and Risk-Taking

The previous section discussed how anxiety is likely to be related to a risk-avoidant bias by exploring the relationship between anxiety correlates and risk-taking. The following section will review the literature that has directly examined pathological anxiety and risk-taking or risky decision-making. To date, only a handful of studies have directly examined the relationship between risk-avoidance and anxiety (e.g., Eisenberg et al., 1998; Hockey, Maule, Clough, & Bdzola, 2000; Maner et al., 2007; Maner & Schmidt, 2006; Matthews et al., 2011; Mitte, 2007; Righi, Mecacci, & Viggiano, 2009). In particular, risk-avoidance – as measured by self-report, forced-choice hypothetical decision scenarios, and/or behavioural decision-making tasks – has been found to be associated with situational anxiety (as induced

under experimental conditions; e.g., Preston, Buchanan, Stansfield, & Bechara, 2007), trait anxiety (as measured by self-report individual difference measures; e.g., Eisenberg et al., 1998; Maner & Schmidt, 2006), and symptoms of pathological anxiety in analogue samples (e.g., Maner et al., 2007b). Surprisingly few studies, however, have investigated risk-avoidance in clinically anxious samples (e.g., Kashdan, Collins, & Elhai, 2006; Lorian & Grisham, 2010; Maner et al., 2007).

Maner and Schmidt (2006) were one of the first to propose that a global risk-avoidant bias may be implicated in the development and maintenance of general pathological anxiety. In their first study, Maner and Schmidt investigated the relationship between trait anxiety, negative risk appraisals and risk-averse decision-making (as measured by the *Risk Taking Behaviors Scale*, RTBS; Weber et al., 2002). Overall, perceptions of the severity of negative outcomes (and not the perceived likelihood) were found to mediate the relationship between anxiety and risk-avoidant choices. The authors subsequently concluded that people who engage in avoidant behaviour may do so because of the anticipated intensity of distress and not because they felt distress was more probable. Furthermore, the study employed analyses to control for depression, showing that depression did not play a role in the relationship between anxiety and risk-aversion (as proposed elsewhere; Chapman et al., 2007; Smoski et al., 2008) and in fact suggests that anxiety may be the mediating factor in risk-avoidance observed in depressed populations.

Based on their findings, Maner and Schmidt (2006) proposed a model that provides preliminary evidence for a risk-aversive decision-making bias that may be responsible for the maintenance of anxiety pathology, such that: (a) biased appraisals of the severity of risk cause anxiety; (b) anxiety perpetuates the development of negative risk appraisals; (c) anxiety and negative risk appraisals serve as inputs into the decision-making process; (d) risk-avoidant choices perpetuate risk-avoidant behaviour that maintain biased risk appraisals (see

Figure 1.5). However, the authors emphasised that more research was necessary to confirm these initial findings.

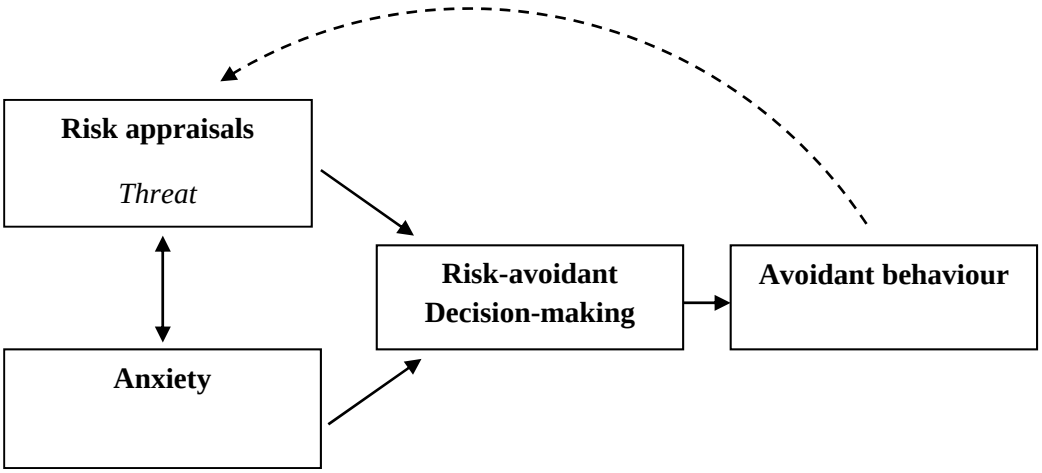

Figure 1.5. Representation of Maner and Schmidt's (2006) model of the contribution of risk-avoidant decision-making to the maintenance of anxiety pathology.

Maner et al. (2007) extended this line of research by investigating the relationship between social anxiety (Study 1), trait anxiety, worry (Study 2) and risk-avoidance in undergraduate students. Global decision-making orientation was measured using a behavioural measure of risk-taking – the *Balloon Analogue Risk Task* (BART; Lejuez et al., 2002). In brief, the BART requires participants to accumulate points toward rewards of increasing value ($5, $10, $25, and $50 rewards) by blowing up 15 balloons on a computer screen. The explosion threshold for each balloon varies, and if exploded, all points are lost. Overall, the authors found a small yet significant association between risk-avoidance and the hypothesised anxiety variables. A further study (Study 3) indicated that a treatment-seeking population of anxiety disordered individuals were substantially more risk-avoidant on a 14-item version of the RTBS when compared to non-clinical controls and individuals with mood

disorders and learning disabilities. Despite the absence of a behavioural measure of risk-taking in Study 3, these studies offer preliminary evidence that individuals with anxiety disorders may exhibit a prominent bias towards making risk-avoidant choices.

With the exception of Maner et al.'s (2007b) study described above, surprisingly few studies have examined risk-avoidance in clinically anxious samples. One study argued that individuals with OCD have a tendency to be cautious and risk-averse across a wide-range of activities (Steketee & Frost, 1994). Because available measures of risk-taking appeared more sensitive to activities reflecting risk-seeking and impulsivity, Steketee and Frost (1994) developed a self-report measure of everyday risk-taking (*Everyday Risk Inventory*, ERI). The ERI focuses on avoidance of ordinary activities that one is likely to encounter in day-to-day life. Consistent with other research showing reduced risk-taking in individuals with subclinical OCD symptoms (Frost, Steketee, Cohn, & Griess, 1994), results of their study supported the hypothesis that individuals with a clinical diagnosis of OCD were more risk-avoidant than non-clinical controls; however, the authors noted that further research was needed to determine whether risk-avoidance was unique to OCD.

A later study by Cicolini and Rees (2003) found that individuals with OCD were more risk-averse than non-clinical controls, even after removing OCD-specific items from the analysis and using a version of the ERI adapted for an Australian population. Furthermore, a study comparing personality traits between OCD and other clinical disorders found individuals with OCD to report significantly lower scores on a risk-related personality variable (i.e., the actions factor of the Openness subscale of the *Revised NEO Personality* I*nventory*, NEO-PI-R Form S; Costa & McCrae, 1992; Rees, Anderson, & Egan, 2006). These results suggest that certain personality traits (e.g., risk-avoidance) may be unique to OCD; however, these results warrant replication using larger samples and multiple measures of risk-avoidance. Furthermore, other studies have reported no significant differences

between OCD, or other anxiety disorders, and non-clinical controls on the actions factor of the NEO-PI-R (e.g., Bienvenu et al., 2001; Bienvenu et al., 2004).

While a number of the studies examining risk-avoidance and anxiety have utilised self-report measures, some of the support for the safety bias has been derived from studies using behavioural risk-taking tasks, or tasks that simulate risky decisions. As mentioned previously, one particularly popular decision-making task – the *Iowa Gambling Task* (IGT; Bechara, Damasio, Damasio, & Anderson, 1994) – represents real-life decision-making and risk-taking by asking participants to choose between an immediate reward and a long-term negative outcome. Participants must select a card from one of four decks for a total of 100 trials with the goal of winning as much money as possible. Two of the decks are considered advantageous/safe (net win +$250) while two decks are considered disadvantageous/risky (net loss -$250). As participants are not aware which are the advantageous or disadvantageous decks, they must formulate a strategy over the course of the trials to achieve the optimal long-term outcome. One would expect normal participants to show a learning curve over the trials that indicates greater selection of the advantageous decks by the completion of the task (Dunn et al., 2006).

One recent study by Mueller et al. (2010) demonstrated that GAD analogues employed a risk-averse strategy on the IGT and learned how to avoid potential future losses (vs. high short-term loss) faster than non-clinical controls. These results suggest that individuals with GAD are risk-averse because of enhanced sensitivity to unpredictable future loss rather than sensitivity to large loss in the near future. Furthermore, Kirsch and Windmann (2009) showed that in an adult sample of individuals with anxiety disorders, better performance on the IGT was associated with measures of worry, anxiety sensitivity, as well as intolerance of uncertainty. In another study, children with anxiety, depression and attention-deficit/ hyperactivity disorder (ADHD) learned a risk-averse strategy faster on the

IGT than children with ADHD but not anxiety and depression (Garon, Moore, & Waschbusch, 2006). Other studies examining anxiety and decision-making have also shown support for a risk-averse strategy (Preston et al., 2007).

However, studies of anxiety and IGT performance have not always been consistent; some studies have found impaired performance (i.e., increased risk-taking as determined by greater selection from disadvantageous decks) in anxious individuals (Miu, Heilman, & Houser, 2008a). Interestingly, Nielen et al. (2002) demonstrated that while people with OCD do not differ from healthy controls on decision-making on the IGT, their performance is related to symptom severity and anxiety symptomatology. In other words, moderate anxiety was associated with risk-avoidant behaviour, while more severe anxiety resulted in impaired, or risky, performance on the task. As discussed previously in the SMH, this result suggests that high levels of anxiety may disrupt the formation of somatic markers or may result in inadequate inhibition of processes in the prefrontal cortex, resulting in risky choices (Arnsten & Li, 2005; Nielen, Veltman, Jong, Mulder, & Den Boer, 2002). The authors also suggest that severe OCD symptomatology may result in risky decision-making because such subjects often have an inability to cope with negative emotions – this ability is associated with the capacity to postpone immediate reward (Mischel, Shoda, & Rodriguez, 1989). In this way, one could predict that the severity of an individual's anxiety pathology may play a role in the ability to make complex decisions.

While there is growing support for the relationship between anxiety and risk-avoidant decision-making and behaviour, some research has shown that this may not always be the case. For example, in one study, dispositionally anxious individuals (determined by those high in punishment or BIS sensitivity) took more risks than non-anxious individuals in a forced-choice risk-taking task in order to avoid potentially losses (but not to achieve gains), suggesting anxious individuals may engage in risky behaviour in order to avoid perceived

negative outcomes (Lauriola & Levin, 2001; see also Lauriola et al., 2005). In line with this, clinical anxiety is often associated with forms of disinhibited and risk-seeking behaviour, particularly in the health and recreational domains (e.g., alcohol and substance abuse, self-harm, etc.; see Kashdan et al., 2006; Kashdan & McKnight, 2010; Kashdan, McKnight, Richey, & Hofmann, 2009). However, such risky behaviour has been proposed to serve an emotion regulatory function by helping regulate negative affect associated with anxiety and therefore may be functionally distinct from risk-avoidant behaviour (Woodman, Huggins, Le Scanff, & Cazenave, 2009).

Risk-Avoidance as a Transdiagnostic Factor

As we have seen, the existing body of literature offers preliminary evidence for the presence of a risk-avoidant bias in pathological anxiety. Given the paucity of research on risk-avoidance and clinical anxiety, however, it is unclear whether the safety bias is present across all anxiety disorders. The high degree of comorbidity and theoretical similarities between anxiety disorders has prompted investigation into cognitive and behavioural mechanisms, or *transdiagnostic factors*, that are shared across the disorders (e.g., Harvey, 2004; Mansell, Harvey, Watkins, & Shafran, 2008). Maner and Schmidt (2006) proposed the possibility that a risk-avoidant bias is implicated in the development and maintenance of pathological anxiety, implying that risk-avoidance may be a possible transdiagnostic factor that contributes to anxiety comorbidity. This idea is supported by the literature reviewed in this Chapter, demonstrating that many of the cognitive processes contributing to risky decision-making (e.g., biased risk appraisals) as well as risk-avoidant decision-making and behaviour, is present across different anxiety disorders and dispositional vulnerabilities. To date, however, no studies have systematically investigated the contribution of risk-avoidance to clinical anxiety symptoms across disorders suggesting the need for research. For this reason, this thesis will look at risk-avoidance and anxiety across a number of anxiety disorders.

Clinical Implications of Risk-Taking and Anxiety Research

The previous section reviewed empirical research supporting the theoretical implications of the relationship between risk-avoidance and anxiety. However, if a risk-avoidant bias is involved in the aetiology and maintenance of pathological anxiety, then there is reason to believe that risk-avoidance may also have important clinical implications. As such, the following section will review research investigating the clinical implications of risk and anxiety, particularly with regard to treatment-seeking and treatment outcome.

Risk-Avoidance, Anxiety and Treatment-Seeking

A significant amount of clinical research has focussed on improving current treatment protocols; however, much of the targeted population is not accessing treatment. For example, despite the proven efficacy of evidence-based treatments for anxiety, less than half report seeking any treatment and those who do, often do so after long delays (Andrews, Issakidis, Sanderson, Corry, & Lapsley, 2004; Wang et al., 2007b). Interest in reducing the burden of anxiety disorders has prompted research into a wide range of variables that may affect mental health service utilisation and contribute to delays in help-seeking behaviour (e.g., treatment barriers, predictors of service utilisation, etc.). One recent study by Marques and colleagues (2010), for example, investigated barriers to treatment and treatment utilisation in an online sample of 175 individuals with OCD. As expected, participants indicated low rates of treatment utilisation (with many seeking non-evidence based methods) and the majority reported a number of barriers to seeking treatment (e.g., stigma, shame, treatment perceptions, and logistical and financial constraints). Another large-scale Internet-based survey of socially anxious individuals in the community reported that 92% of respondents met criteria for SP, but only one third of participants reported having sought psychotherapeutic intervention (Erwin, Turk, Heimberg, Fresco, & Hantula, 2004).

Furthermore, individuals who had never sought treatment reported greater symptom severity than those who had.

The majority of studies investigating treatment barriers in anxious populations, however, have focussed on variables that increase the likelihood of seeking treatment – *approach* factors – as opposed to those that decrease the likelihood of seeking treatment – *avoidance* factors (Kushner & Sher, 1989, 1991; Vogel & Wester, 2003). It is possible that the level of risk-avoidance experienced by someone with an anxiety disorder is associated with willingness to seek treatment. To our knowledge, only a small number of studies have explicitly investigated avoidance associated with treatment-seeking (e.g., Deane & Chamberlain, 1994; Kushner & Sher, 1989, 1991) and even fewer have examined the relationship between risk attitudes, decision-making and treatment-seeking (e.g., Lorian & Grisham, 2011). Vogel and colleagues (2006) put forward a four-step model of information-processing that denotes the components involved in the decision to seek professional help: (i) encoding and interpretation; (ii) generating options; (iii) decision-making; and, (iv) evaluation. Of particular interest to this thesis is the third step – decision-making – which involves evaluation of the potential costs (or risks) and benefits. As outlined by Vogel et al. (2006), this step of decision-making is likely to be influenced by several factors including anxiety, fear of negative evaluation (stigma), feelings of self-efficacy, and prior experience. As discussed previously, such factors have also been implicated in risk-avoidant choices. Even amongst individuals who are not particularly risk-averse, the perceived costs of seeking help have been found to outweigh the potential benefits (Vogel & Wester, 2003), so that seeking professional help is often seen as worse or the same as not seeking help at all (Ten Have et al., 2010) or viewed as a last resort (Hinson & Swanson, 1993). These results imply that certain cognitive factors – like the safety bias – may be implicated in the decision to seek help and certainly warrants further investigation (see Chapter 5).

Anxiety and Risk-Avoidance as a Treatment Outcome

The safety bias may also have important implications once anxious individuals make the decision to seek help. Despite the proven efficacy of cognitive-behavioural therapy (CBT) for anxiety disorders, there still remains a large proportion of individuals who do not get better, suggesting there is room for improvement (for meta-analysis, see Hofmann & Smits, 2008). CBT protocols generally involve implementation of strategies designed to target maladaptive cognitions and behaviours that maintain anxiety (e.g., cognitive challenging, graded-exposure, etc.; Andrews, 2003). If risk-avoidance contributes to the maintenance of pathological anxiety as proposed, then it may be beneficial to investigate whether risk-avoidance can be targeted in treatment. Few studies have examined whether risk propensity or decision-making changes following treatment (Aklin, Tull, Kahler, & Lejuez, 2009; Anderson, Joyce, Carter, McIntosh, & Bulik, 2002; West, Fretz, & Macdonald, 1970), particularly in clinically anxious populations. One of the first studies to examine risk propensity as a treatment outcome investigated modification in risk-taking behaviour on a game of chance in boys aged five to 13 years as a result of an intervention for behavioural problems (West et al., 1970). Results demonstrated a significant shift toward optimal, or moderate, risk-taking behaviour of those in the treatment group relative to the control group (i.e., boys that were risk-averse prior to treatment showed increased risk-taking and vice versa). A more recent study by Aklin and colleagues (2009) found risk-taking on the BART (Lejuez et al., 2002) to decrease significantly as a result of a 30-day residential course of treatment for substance abuse. Although far more research is needed, these studies offer preliminary evidence that risk propensity and decision-making tendencies can change because of treatment.

Despite a lack of studies, there are several reasons to believe that CBT treatment of anxiety will be associated with reduced risk-aversion in domains that are not limited to

specific anxiety pathology: i) risk-aversion is positively associated with symptom severity, suggesting that as symptoms reduce, so too should risk-avoidance (Lorian & Grisham, 2010; Maner et al., 2007; Maner & Schmidt, 2006; Mitte, 2007; Miu et al., 2008b). (ii) CBT for anxiety disorders (which involves challenging cognitive biases through cognitive restructuring techniques and through exposure to specific feared situations) has been shown to affect transdiagnostic constructs that are also related to risk-aversion (e.g., self-efficacy; Carey, 2010; Clark & Beck, 2010; Kallmen, 2000; Polman, Bouman, van Hout, de Jong, & den Boer, 2010; Warmerdam, van Straten, Jongsma, Twisk, & Cuijpers, 2010); (iii) CBT is also likely to target beliefs and biases that are related to risk-appraisal (e.g., overestimation of probability and cost of negative events); (iv) CBT has been shown to alter personality factors that are highly associated with risk-aversion (e.g., harm avoidance; Abrams et al., 2004; Faytout et al., 2007; Paulus et al., 2003; Quilty, Godfrey, Kennedy, & Bagby, 2010); (iv) emotion regulation and attention training strategies, which are considered to be integral to CBT (e.g., cognitive reappraisal; Clark & Beck, 2010), have been shown to reduce risk-perceptions and risk-avoidant behaviour (Gasper & Clore, 1998; Heilman, Crisan, Houser, Miclea, & Miu, 2010); and finally, (iv) CBT is believed to normalise neurophysiology in brain structures that are common to both clinical anxiety and risk-taking (e.g., Etkin, Pittenger, Polan, & Kandel, 2005; Porto et al., 2009).

Indeed, neuropsychopharmacological studies have shown treatment of anxious patients with anxiolytic medication to improve normal functioning of the frontolimbic circuit. In line with this, studies of risk-taking have shown that administration of anxiolytic medication (e.g., benzodiazepines; Lane, Cherek, & Nouvion, 2008; Lane, Tcheremissine, Lieving, Nouvion, & Cherek, 2005), direct stimulation or inhibition of the above mentioned brain structures, as well as manipulation of serotonin levels (through pharmacological or dietary means) can alter risky decision-making. Likewise, CBT treatment for anxiety is

believed to normalise functioning of the frontolimbic structures (Etkin et al., 2005; Porto et al., 2009). Together, this research suggests that treatment of anxiety may be associated with changes in risk-taking through neurophysiological changes to common frontolimbic structures.

While, to our knowledge, there is no direct evidence for the effect of CBT on risk-avoidance, there is evidence for significant overlap of the neural substrates of emotion regulation and decision-making, suggesting that improving emotion regulation (considered to be an integral component CBT that assists neurophysiological change; Clark & Beck, 2010) can alter risk-taking propensity. In one study, Heilman et al. (2010) demonstrated that engaging in cognitive reappraisal of fear-related material significantly reduced risk-avoidant behaviour on the BART. Similarly, an earlier study showed that the effect of anxiety on risk perceptions could be reduced by asking participants not to pay attention to their feelings (Gasper & Clore, 2000). Therefore, in addition to reducing anxiety symptoms, it is possible that CBT results in reduced risk-avoidance. It is of note, however, that the mechanisms underlying this change are unknown. It may be that reduction in anxiety symptoms precedes reduced risk-avoidance or vice versa; alternatively, a common mechanism may precede improvement in risk-avoidance and anxiety. Subsequent research is needed to investigate risk-avoidance as a treatment outcome and the possible mechanisms of this change (see Chapter 6).

Limitations of Previous Risk-Taking and Anxiety Research

In reviewing the literature on anxiety and risk-taking, perhaps the biggest limitation is the lack of integration and systematic research exploring the theoretical and clinical aspects of this area. As an emerging topic of research, the body of literature investigating the association between risk-avoidance and pathological anxiety is relatively small and appears to be limited by sample and methodological issues. Of this literature, the majority of studies

have utilised a cross-sectional design to examine the relationship between indices of state or trait anxiety and measures of self-reported risk propensity or behavioural risky decision-making in undergraduate samples. Very few studies, however, have investigated the relationship between measures of clinical anxiety symptomatology and risk-taking, limiting the generalisability of the current literature to pathological anxiety.

Although some studies have investigated risk-taking in clinical samples, these have been limited by the use of self-report, forced-choice decision scenarios, or behavioural measures that are not particularly sensitive to risk-avoidant behaviour (e.g., IGT; see Chapter 2). Indeed, no studies to date have investigated risk-taking in a clinically anxious population using the BART or an analogous objective measure of risk-taking, and therefore the effect of severe anxiety symptomatology on behavioural indicators of risk-avoidance is unknown. The existing body of literature is also limited by the depth with which risk-avoidance has been investigated. For instance, whether the safety bias is consistent across behavioural domains (i.e., social, recreational, and financial) and across the anxiety disorders (i.e., as a transdiagnostic factor) has not been examined. Furthermore, the lack of experimental and longitudinal designs has precluded studies from making any causal inferences about the relationship between dispositional or pathological anxiety and risk-avoidance or the implication of risk-avoidance in the aetiology or maintenance of anxiety pathology.

In addition to the above, current studies have not yet examined the potential clinical implications of risk-avoidance. That is, are measures of domain-specific or global risk-avoidance associated with willingness to seek treatment or can risk-avoidance be reduced by CBT? These questions are not only of relevance to the treatment of anxiety disorders, but potentially for other clinical populations that demonstrate risk-avoidant or risk-prone biases. Therefore, it is unknown whether the hypothesised relationship between risk-avoidance and anxiety can be replicated in clinical populations using objective measures of risk-avoidance,

whether there are differences in risk-taking across domains and diagnoses, and whether there are clinical implications of risk-avoidance in these populations.

Implications for the Program of Research

The literature presented in this review offers strong support for the hypothesis that risk-avoidance plays a fundamental role in the development and maintenance of anxiety pathology. Further, an understanding of risk-avoidance among individuals with anxiety disorders holds significant theoretical and clinical utility. This thesis represents a theoretically driven program of research that aims to investigate the association between risk-avoidance and pathological anxiety in several clinically anxious populations using multiple validated indices of risk-taking. Additionally, this thesis aims to contribute to the existing literature by exploring the clinical implications of risk-avoidance for treatment-seeking and as a CBT treatment outcome variable.

As discussed in this Chapter, it has been proposed that a risk-avoidant bias is implicated in the aetiology of pathological anxiety. Prior research has established a non-directional link between risk-avoidance and anxiety and one study has shown that trait anxiety predicts variance in risk-avoidance (Maner & Schmidt, 2006). However, no studies have examined the association between a biological predisposition to anxiety, risk-avoidance, and anxiety symptomatology. Accordingly, Chapter 2 of this thesis describes a replication and extension of Maner et al.'s (2007) second study that additionally includes a measure of dispositional vulnerability to anxiety (behavioural inhibition sensitivity, BIS). This study (Study 1) sought to investigate whether risk-avoidance is associated with social anxiety symptomatology in a non-clinical population, and to determine whether the relationship between an established dispositional vulnerability to anxiety and SP symptoms is mediated by a risk-avoidant bias.

In addition, although preliminary studies (using self-report and behavioural measures of decision-making in various non-clinical and clinical samples) have established associations between risk-avoidance and anxiety, studies using clinical populations and valid indices of risk-taking are needed to confirm this hypothesis. Thus, Chapter 3 describes an online study (Study 2) that examines risk-avoidance in a clinically anxious sample using multiple indices of self-report and behavioural risk-taking. In addition to employing the use of a clinical sample and an additional self-report measure that is sensitive to risk-avoidance (the ERI), this study utilised a novel behavioural risk-taking task, the *Columbia Card Task* (CCT; Figner, Mackinlay, Wilkening, & Weber, 2009) to overcome the limitations of other behavioural risk-taking measures (e.g., the BART and the IGT).

While it has been proposed that risk-avoidance is implicated in the development and maintenance of anxiety disorders (see Maner & Schmidt, 2006), little has been done to systematically investigate the contribution of this bias to anxiety disorder symptomatology. Given the considerable overlap between risk-aversion and vulnerability factors to anxiety (e.g., neuroticism; Paulus et al., 2003), risk-avoidance may contribute uniquely to the presence of anxiety symptomatology as a transdiagnostic factor. With this in mind, Chapter 4 presents a study (Study 3) examining risk-avoidance in a clinically anxious treatment-seeking sample. In particular, the aim of this study was to replicate work by Maner et al. (2007) by examining differences in risk-taking between clinically anxious patients and non-clinical control participants. The second aim of this study was to extend this line of research by examining the relationship between risk-avoidance and symptoms of anxiety disorders, specifically SP, GAD, and PDAg.

As noted in this Chapter, much of the work done in this field has focussed on obtaining a theoretical understanding of the relationship between risk-avoidance and anxiety. However, these studies have not explored the potential clinical implications of such a bias,

such as the influence of risk-avoidance on treatment-seeking or treatment outcome. Subsequently, Chapter 5 presents a study (Study 4) with the aim of replicating the findings in Study 2 and 3 as well as investigating how risk-avoidance is related to treatment utilisation in an online sample of individuals meeting diagnostic criteria for SP, OCD, or GAD.

Finally, Chapter 6 presents two studies that investigate the treatment outcome implications of risk-avoidance. Study 5 aimed to investigate changes in risk-avoidance (particularly, social and recreational) over the course of an six-lesson Internet-delivered cognitive-behavioural therapy (iCBT) treatment for GAD. Finally, the aim of Study 6 was to examine changes in risk-avoidance over the course of a clinic-based group CBT (CBGT) program for SP and PD.

This initial chapter has presented some of the critical theoretical and empirical evidence that supports the presence of a pervasive risk-avoidant bias, the safety bias, in pathological anxiety. This program of research aims to contribute to the expanding literature on decision-making and anxiety by systematically investigating the theoretical and clinical implications of the safety bias in clinically anxious samples. It is hoped that this research will contribute to a more empirically supported understanding of the cognitive and decision-making mechanisms that contribute to the development and maintenance of anxiety pathology.

CHAPTER 2

RISK-AVOIDANCE AND SOCIAL ANXIETY PATHOLOGY

STUDY 1*

Page

STUDY 1: Risk-Avoidance and Social Anxiety Pathology

Introduction 41

Behavioural Inhibition System and Anxiety Pathology 41

BIS, Risk-Avoidance and Anxiety Pathology 43

Measures of Risk-Taking 44

Method 46

Participants 46

Measures 46

Procedure 49

Results 49

Participant Characteristics 49

Correlation Analyses 49

Mediation Analysis 52

Discussion 54

Implications for the Program of Research 59

*Study published: Lorian, C. N., & Grisham, J. R. (2010). The safety bias: risk-avoidance and social anxiety pathology. *Behaviour Change*, *27*(1), 1-13.

STUDY 1

Risk-Avoidance and Social Anxiety Pathology

Introduction

As seen in Chapter 1, a small albeit expanding body of research has established a link between risk-avoidant decision-making and state (e.g., Preston et al., 2007), trait (e.g., Eisenberg et al., 1998) and clinical anxiety (e.g., Maner et al., 2007b). Furthermore, it has been proposed that risk-avoidance may be implicated in the development and maintenance of anxiety disorders (Maner & Schmidt, 2006). Given that few studies have examined the relationship between risk-avoidance and anxiety, the purpose of the current study was to replicate and extend Maner et al.'s (2007b) study examining the association between risk-avoidance and social anxiety symptoms in an undergraduate population. Specifically, Study 1 investigated (i) whether there is a relationship between social anxiety symptom severity and self-report and behavioural measures of risk-avoidance, and (ii) whether risk-avoidance mediates the relationship between a dispositional vulnerability to anxiety (behavioural inhibition system sensitivity; BIS; Gray, 1970) and social anxiety symptoms.

Behavioural Inhibition System and Anxiety Pathology

As reviewed in Chapter 1, prior research has established a non-directional link between risk-avoidance and anxiety and one study has shown that trait anxiety predicts variance in risk-avoidance (Maner & Schmidt, 2006). However, no studies have examined the role of risk-avoidance in the development of anxiety symptomatology. Although many temperamental and personality variables have been linked to the development of anxiety pathology, the current study examined BIS sensitivity (also known as *punishment sensitivity*), a component of *Reinforcement Sensitivity Theory* (RST; see Gray, 1970). The BIS brain subsystem – which includes the amygdala, prefrontal dorsal stream and septo-hippocampal system – is believed to be the neural substrate for anxiety (Gray & McNaughton, 2000). The fundamental function of

the BIS subsystem in all individuals is to resolve rival goal conflicts through increased emotional arousal, increased attention, risk assessment behaviour (e.g., cognitive scanning of threat-relevant information) and the inhibition of prepotent response behaviour (Kimbrel, 2008; McNaughton & Corr, 2004). Activation of the BIS structures in the brain is believed to result in an attentional bias for potentially threatening information, leading to risk-avoidant behaviour.

Physiological hyperarousal of the BIS system (e.g., through decreased serotonin levels as determined by genetics) manifests itself as particular stable dispositional qualities and emotional consequences, including sensitivity to aversive/threatening stimuli and negative outcomes, nervousness, anxiety, and avoidant behaviour in novel situations. As such, BIS sensitivity is best conceptualised as a general dispositional tendency to (be sensitive to and) avoid punishment or novelty and is usually measured using self-report indices assessing engagement in such tendencies (e.g., Carver & White, 1994; Heubeck, Wilkinson, & Cologon, 1998). Measures of BIS sensitivity have been linked closely to other anxiety-related dispositional correlates such as neuroticism and trait anxiety (e.g., Knyazev et al., 2002). Not surprisingly, hyperactivation of the BIS has been implicated in (and predictive of) several anxiety disorders, including SP (Coplan, Wilson, Frohlick, & Zelenski, 2006; Gray & McNaughton, 2000; Kashdan & Roberts, 2006; Stemberger, Turner, Beidel, & Calhoun, 1995; van Ameringen et al., 1998). In line with this, Kimbrel (2008) proposed a model of generalised SP suggesting that genetic influences on the BIS brain structures result in an individual's initial vulnerability to developing anxiety pathology; depending on multiple situational and environmental factors, a vulnerable person may or may not go on to develop SP.

In the current study, we focussed on social anxiety in order to replicate and extend previous findings in a similar population (e.g., Maner et al., 2007). While all anxiety disorders are linked to avoidance behaviour, risk-aversion may be viewed as a central tenet of cognitive-behavioural models of social phobia (SP; Clark & Wells, 1995; Rapee & Heimberg, 1997). Thus,

the current study sought to investigate whether risk-avoidance is associated with social anxiety symptomatology in a non-clinical population, and to determine whether the relationship between BIS and SP symptoms is mediated by a risk-avoidant bias.

BIS, Risk-Avoidance and Anxiety Pathology

As we have seen, some research has indirectly shown that risk-avoidance may play a role in anxiety by investigating the relationship between measures of BIS sensitivity and decision-making (e.g., Suhr & Tsanadis, 2007). Given that a major component of risky decision-making involves a cognitive evaluation of the rewards and consequences, it is not surprising that a dispositional sensitivity to punishment (i.e., BIS sensitivity) would be related to risk-avoidant choices. Indeed, this association has been found consistently across a number of studies in the risk literature (e.g., Franken & Muris, 2005; Sakagami et al., 2006; van Honk et al., 2002). Furthermore, if BIS sensitivity has been implicated in the development of social anxiety, and both BIS and social anxiety are related to risk-avoidant behaviour, one might hypothesise that risk-avoidance is in part involved in this developmental trajectory. That is, the link between an initial dispositional vulnerability to developing anxiety (i.e., BIS sensitivity) and social anxiety symptoms may be mediated by risk-avoidance (Figure 2.1). If risk-avoidance does, in fact, mediate the relationship between BIS sensitivity and social anxiety, this would lend support to the proposition that risk-avoidance is implicated in the aetiology of pathological anxiety.

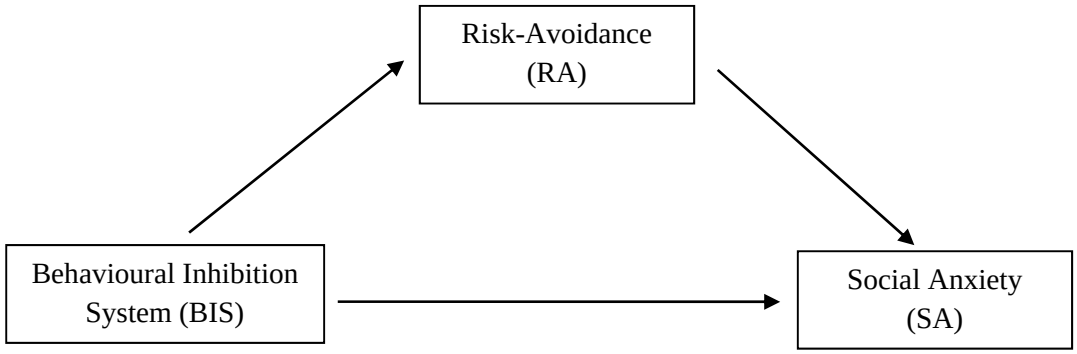

Figure 2.1. Hypothesised relationship between Behavioural Inhibition System (BIS) sensitivity, risk-avoidance (RA) and social anxiety (SA) symptoms.

Measures of Risk-Taking

As noted in Chapter 1, risk-taking can be measured using both self-report and behavioural indices. Self-report measures of risk propensity directly ask respondents about their willingness to engage in certain 'risky' behaviours and are believed to assess more stable and personality-based (or trait-dependent) attitudes towards risk-taking. On the other hand, behavioural measures involve laboratory tasks assessing implicit risk-taking behaviour during which individuals are asked to make choices and directly experience the outcomes in real-time; these measures are believed to assess the process of making decisions and tap into the more dynamic (or state-dependent) aspects of individual risk-taking (Mishra & Lalumière, 2011; Schonberg et al., 2011; Weber, 2010). Since self-report and behavioural indices of risk-taking likely measure different aspects of the risk-taking construct, it is important to include both types of measures. In particular, while self-report measures may indicate that anxious individuals prefer not to take risks, behavioural measures show that a preference to avoid risks translates into risk-avoidant behaviour (Schonberg et al., 2011; Weber & Johnson, 2009).

Previous research examining risk-taking and anxiety, however, has relied heavily on the use of self-report measures and forced-choice decision scenarios. As outlined by Lejuez et al.

(2002), the limitations associated with using self-report measures in the assessment of risk (e.g., need for insight, poor predictability of future behaviours, etc.) has prompted the development and increasing use of objective behavioural measures. In contrast to self-report measures, behavioural measures of risk-taking tasks are designed to mimic real-world decision-making by asking individuals to choose between risky and safe options across multiple trials (see Mishra & Lalumière, 2011). As described previously, for example, the Balloon Analogue Risk Task (BART; Lejuez et al., 2002), requires participants to accumulate points (later converted to real money) by blowing up 15 consecutively presented balloons on a computer screen. The explosion threshold for each balloon varies, and if exploded, all points are lost, requiring participants to decide at what point to 'bank' their money. Unlike other behavioural measures of risk-taking (e.g., Iowa Gambling Task, IGT; Bechara et al., 1994), the BART demonstrates good convergent validity with measures of risk-related constructs (e.g., sensation seeking, r = .35, and trait impulsivity, r = .28; Lejuez et al., 2002) and has been shown to have predictive validity for real-world risk-taking behaviour, including drug/cigarette use, alcohol use, gambling, unsafe sexual behaviour and stealing (Lejuez et al., 2003a; Lejuez, Aklin, Zvolensky, & Pedulla, 2003b; Lejuez et al., 2002).

With this in mind, Study 1 sought to replicate and extend previous findings in an undergraduate sample using both a self-report and a behavioural measure of risk-avoidance in addition to investigating the relationship to BIS sensitivity. First, we examined the relationship between social anxiety symptom severity, risk-avoidance, and BIS sensitivity. In line with previous research, we predicted that social anxiety symptom severity would be positively correlated with both BIS sensitivity and risk-avoidance. Second, we hypothesised that risk-avoidance would mediate the relationship between BIS sensitivity and social anxiety symptom severity, offering support to the possibility that risk-avoidance is implicated in the development of pathological anxiety.

Method

Participants

Fifty-five undergraduate students (40 female) with a mean age of 20.24 years (*SD* = 4.17) were recruited from the University of New South Wales Psychology undergraduate participant pool. Ethnic composition of this sample was 42% Caucasian, 35% Asian, and 24% other. Participants were required to have adequate proficiency in English to complete the study measures and were screened for substance abuse/ dependence, suicidal/psychotic ideation, brain-injury or any organic mental disorder.

Measures

Demographic Questionnaire. Participants were asked to provide their gender, age and ethnicity.

Social Interaction Anxiety Scale (SIAS). Social anxiety symptom severity was measured by the SIAS (Mattick & Clarke, 1998). The SIAS measures the level of anxiety experienced in one-on-one and group social contexts, asking individuals to rate 20 items on a 5-point Likert scale (0 – *Not at all characteristic*, to 4 – *Extremely characteristic*) (e.g., *"I get nervous if I have to speak with someone in authority," "When mixing in a group I find myself worrying I will be ignored."*) The possible range of scores is 0 to 80. The SIAS has been shown to have high internal consistency (α = .94), test-retest reliability (*r* = .92) (Mattick & Clarke, 1998), as well as high discriminant and construct validity for the assessment of social anxiety (see Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992; Mattick & Clarke, 1998). Internal consistency for the current sample was high (α = .97).

Behavioral Inhibition Scale (BIS). Information about participants' BIS sensitivity was assessed using the BIS subscale of the popular *Behavioral Inhibition Scale/ Behavioral Activation Scale* (BIS/BAS; Carver & White, 1994). This is a widely used 20-item self-report instrument assessing anxiety in situations involving potential punishment (BIS scale – 7-items;

e.g., *"Criticism or scolding hurts me quite a bit"*) and peoples' responses to rewarding situations (BAS scale – 13-items; e.g., *"When I get something I want, I feel excited."*) Construct validity for the BIS scale has been demonstrated, particularly with measures of neuroticism (r = .56-.62) and negative affect (r = .47-.59; Jorm et al., 1999). Internal consistency has also been shown to be adequate (α = .66-.76; Carver & White, 1994; α = .81, this study), as has test-retest reliability (r = .59-.69; Carver & White, 1994).

Indices of Risk-Avoidance.

Domain-Specific Risk-Taking Scale (DOSPERT). Participants' risk-avoidance in various settings was assessed using the 30-item version of the DOSPERT (Blais & Weber, 2006; see Appendix 1), which was developed from the 40-item Risk-Taking Behaviors Scale (RTBS; Weber et al., 2002). Individuals are asked to rate the likelihood (1 – *Extremely Unlikely*, 7 – *Extremely Likely*) of personally engaging in certain 'risky' activities across five overlapping domains, with six questions in each domain (Social, e.g., *"Disagreeing with an authority figure on a major issue"*; Recreational, e.g., *"Going camping in the wilderness"*; Financial, e.g., *"Betting a day's income at the horse races"*; Health and Safety, e.g., *"Engaging in unprotected sex"*; Ethical, e.g., *"Buying an illegal drug for your own use"*). The overall score is calculated by summing all item responses with lower scores indicating more pronounced risk-avoidance. The DOSPERT has been shown to have high internal consistency (α = .71 - .86; Blais & Weber, 2006). Furthermore, Weber, Blais and Betz (2002) reported adequate test-retest reliability (r = .44 - .80) as well as adequate external validity when compared to various risk-related constructs (e.g., sensation seeking, dispositional risk-taking, intolerance for ambiguity, and social desirability). In the current sample, the total score (α = .84) and all five subscales were examined, Social (α = .70), Recreational (α = .87), Financial (α = .75), Health and Safety (α = .65) and Ethical (α = .72).

Balloon Analogue Risk Task (BART). Risk-avoidance was further assessed using the BART (Lejuez et al., 2002). As outlined previously, the BART consists of 15 trials during which participants are presented with an on-screen "balloon" and balloon pump (see Figure 2.2). In this study, each pump of the balloon earned the participant three cents. All money earned accumulates in a "temporary bank" until one of two results occur: a) the explosion threshold has been reached (i.e., the balloon bursts, accompanied by a 'popping' sound) and the participant loses all money earned on that trial; or, b) the participant chooses to collect winnings, transferring the money earned on that trial into a "permanent bank" that remains unaffected by subsequent trials. Participants are awarded with the exact amount of real money that is accumulated in the "permanent bank". The explosion threshold for each balloon trial is variable and unknown to participants (fixed odds ratios of 1/128, 1/32 and 1/8). The dependent variable of the task is taken to be the average number of pumps (adjusted average pumps) on all unexploded balloon trials (Lejuez et al., 2002), with a smaller number of pumps reflecting a more risk-avoidant performance. As described previously, excellent psychometric properties have been established and adequate test-retest stability has been demonstrated (e.g., r = .77; White, Lejuez, & de Wit, 2008).

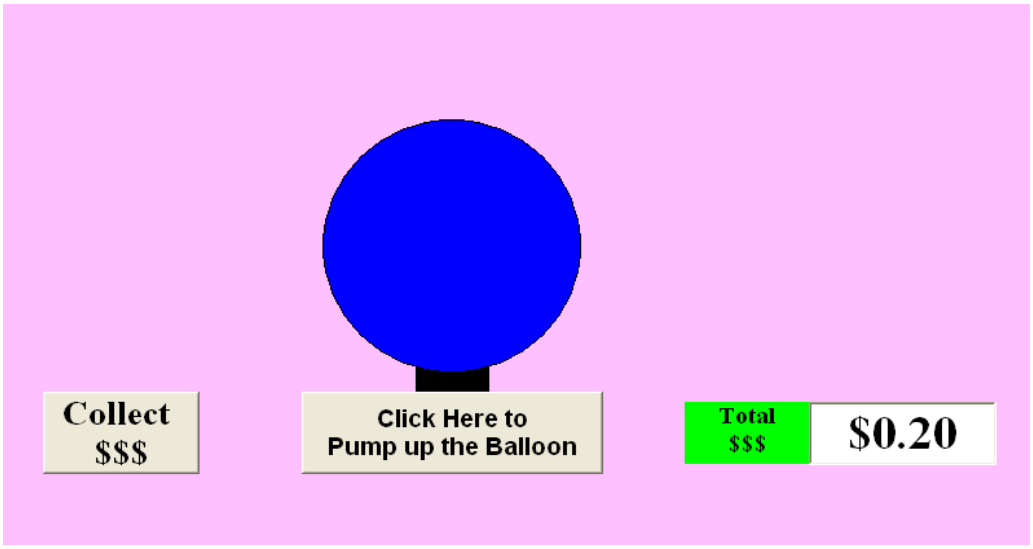

Figure 2.2. The Balloon Analogue Risk Task (BART; Lejuez et al., 2002)

Procedure

Participants were tested at individual computer workstations equipped with headphones. Following the provision of informed consent (see Appendix 1), participants were required to complete a booklet of measures (with the order of questionnaires balanced) followed by a single computer task (i.e., the BART). Compensation for participation was in the form of course credit and a small sum of money ($5-10, amount contingent on task performance). The experimental procedures complied with ethical guidelines as approved by the University of New South Wales.

Results

Participant Characteristics

The sample had a mean SIAS score of 27.53 (*SD* = 19.93), slightly higher than the figures reported by Purdon et al. (2001) for a sample of undergraduate students (*M* = 22.38, *SD* = 15.40). BIS (e.g., Muris, Rassin, Franken, & Leemreis, 2007), DOSPERT (e.g., Blais & Weber, 2006) and BART (e.g., Maner et al., 2007) scores were also comparable to other studies utilising undergraduate samples (see Table 2.1 for *M*s and *SD*s).

Correlation Analyses

Bivariate Pearson correlation analyses were conducted to examine the relationship between social anxiety and risk-taking as measured by the DOSPERT and the BART (see Table 2.1 for correlation coefficients, *M*s, and *SD*s). Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. Social anxiety (as measured by the SIAS) was found to be significantly negatively correlated with the DOSPERT total score ($p < .01$). At the subscale level, social anxiety was significantly negatively correlated with the Social and the Recreational subscales but not the Financial, Ethical, and Health and Safety subscales (*p*s > .05). Consistent with hypotheses, social anxiety was significantly negatively associated with behavioural risk-taking as measured by

the BART ($p < .001$). These results suggest that there exists a relationship between social anxiety and risk-avoidance within some, but not all, domains (i.e., social and recreational) and with behavioural risk-taking.

Correlations between BIS (as measured by the BIS subscale of the BIS/BAS), social anxiety and measures of risk-avoidance were also performed (see Table 2.1 for correlation coefficients). We predicted that BIS would be positively correlated with social anxiety, and negatively correlated with both measures of risk-taking. Results showed that BIS was strongly positively associated with social anxiety ($p < .001$). BIS was also found to be significantly negatively correlated with the total score of the DOSPERT, as well as the Social and Recreational subscales (ps <.01). The Financial and Health and Safety subscales were also correlated with BIS, but to a lesser degree (ps < .05). Only the relationship between BIS and the Ethical subscale was found to be nonsignificant ($p > .05$). As predicted, a statistically significant relationship between BIS and behavioural risk-taking (i.e., the BART) was also present. As seen with social anxiety, there was also a significant relationship between BIS and risk-avoidance (as determined by both the DOSPERT and the BART). In sum, consistent with our hypotheses, there were significant associations between the three key variables of interest (social anxiety, BIS, and risk-avoidance).

Table 2.1

Mean Scores, Standard Deviations, and Bivariate Pearson Correlations between Measures of Social Anxiety, Behavioural Inhibition System and Risk-Avoidance

Measure	Mean	SD	1	2	3	4	5	6	7	8	9
1. SIAS	27.53	19.93	--								
2. BIS	21.44	3.99	.58***	--							
3. DOSPERT – Total	96.97	20.79	-.35**	-.50***	--						
4. DOSPERT – Social	29.35	6.18	-.44***	-.42***	.64***	--					
5. DOSPERT – Recreational	19.60	8.36	-.39**	-.44**	.74***	.59***	--				
6. DOSPERT – Financial	16.11	6.12	-.08	-.32*	.47***	-.06	.31*	--			
7. DOSPERT – Ethical	14.93	5.96	.03	-.05	.48***	.03	-.04	.07	--		
8. DOSPERT – Health & Safety	16.99	6.63	-.15	-.28*	.74***	.37**	.26	.16	.58***	--	
9. BART	37.23	11.14	-.43***	-.33*	.43***	.41**	.36**	.10	.14	.30*	--

Note. SIAS = Social Interaction Anxiety Scale; BIS = Behavioral Inhibition scale/Behavioral Activation scale, Behavioral Inhibition subscale; DOSPERT = Domain-Specific Risk-Taking scale; BART = Balloon Analogue Risk Task, adjusted average pumps.

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

Mediation Analysis

To test the hypothesis that risk-avoidance mediates the relationship between BIS and social anxiety, hierarchical regression analyses were carried out in line with Baron and Kenny (1986), such that: (1) the independent variable (BIS sensitivity, BIS subscale) must be significantly associated with the dependent variable (social anxiety, SIAS; path c); (2) the independent variable must be significantly associated with the mediator (risk-avoidance: BART; path a); (3) the mediator must be significantly associated with the dependent variable(s), corrected for the criterion (path b); and (4) when the criterion is regressed on both the dependent and mediator variables, the mediator is a unique predictor of the dependent variable, and the effects of the independent variable become nonsignificant (path c'). If all pathways are significant then criteria for partial mediation is met; however, if all pathways are significant except path c, then criteria for full mediation is met. As such, we predicted that BIS would significantly predict both BART and SIAS scores, and that the relationship between BIS and SIAS would significantly reduce when SIAS is regressed on BIS and BART scores.

Regression analyses revealed that risk-avoidance approached significance as a partial mediator of the relationship between BIS and SIAS (see Figure 2.3); that is, the preconditions (pathways a, b, c, c' had *p*s < .05) for BART as a partial mediator were fulfilled (see Table 2.2 for complete statistics for mediation analyses), such that: (1) there was a significant effect of BIS on SIAS; (2) there was a significant effect of BIS on BART scores; (3) there was a significant effect of BART scores on SIAS, controlling for BIS; and (4), while controlling for BART scores, the effect of BIS on SIAS was less significant than pathway *c*.

The strength of mediation was measured using the Sobel-test procedure (Sobel, 1982). As recommended for small samples, a nonparametric bootstrapping analysis was also conducted to confirm significance of the mediation relationship, significant if the 95%

confidence intervals do not include 0 (Preacher & Hayes, 2004; Preacher, Rucker, & Hayes, 2007). A macroextension for SPSS developed by Preacher and Hayes (2004) was used to assist with the above steps for mediation. As such, analyses revealed a marginally significant mediation effect, $z = 1.78$, $p < .10$, indicating that the change in the beta coefficient between BIS and SIAS from $\beta = 2.75$ to $\beta = 2.28$, when controlling for risk-avoidance, approached significance. Results of bootstrapping analyses (10,000 samples) of the indirect effect confirmed this result (lower 95% CI = .08, upper 95% CI = 1.00). Overall, results suggest that risk-avoidance may partially mediate the association between BIS and social anxiety.

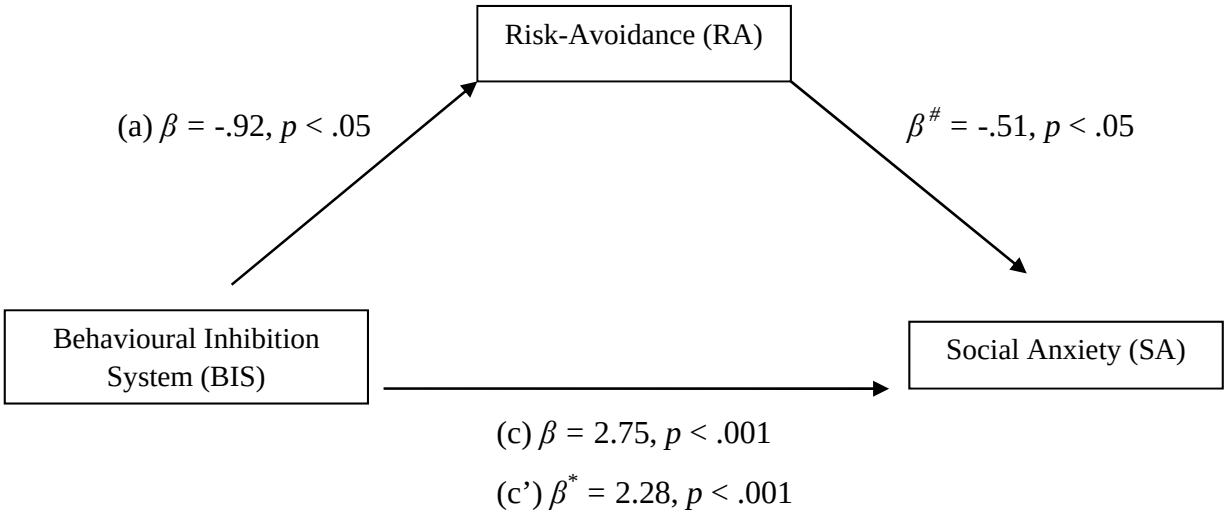

Figure 2.3. Results of the hypothesised mediation model for the relationship between Behavioural Inhibition System (BIS) sensitivity and Social Anxiety (SA) as mediated by Risk-Avoidance (RA). ($N = 55$; * influence of risk-avoidance controlled for, # influence of BIS controlled for).

Table 2.2

Main Results of Hypothesised Mediation Model Multiple Regression Analyses in Which Risk-Avoidance Mediates the Relationship Between a Dispositional Vulnerability to Anxiety (BIS) and Social Anxiety (SIAS)

Step	Path	Independent Variable	Dependent Variable	β	*SE* β	*t*(54)	Part *r*
1	c	BIS	SIAS	2.75	.54	5.13***	.58***
2	a	BIS	BART	-.92	.36	-2.54*	-.33*
3	b	BART	SIAS	-.51	.19	-2.64*	-.28*
	c’	BIS	SIAS	2.28	.54	4.23***	

Note. SIAS = Social Interaction Anxiety Scale; BIS = Behavioral Inhibition scale/Behavioral Activation scale, Behavioral Inhibition subscale; BART = Balloon Analogue Risk Task, adjusted average pumps.

[a] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Discussion

In the current study we examined the relationship between social anxiety, risk-avoidance and dispositional BIS sensitivity. Consistent with previous studies (e.g., Maner et al., 2007), we found that higher levels of social anxiety were associated with less (self-reported) risky behaviour in the real-world and a more risk-avoidant strategy on a behavioural decision-making task. Furthermore, consistent with previous research, BIS sensitivity was significantly positively correlated with both social anxiety and self-reported and behavioural risk-avoidance. Hierarchical regression analyses suggested that risk-avoidance may be a partial mediator of this relationship. These findings thereby provide initial evidence for the proposed model of risk-avoidance as a pathway for the development of pathological social anxiety.

We investigated the relationship between social anxiety and self-reported risk-avoidance further by examining correlations between social anxiety and specific risk domains. Not surprisingly, social anxiety was strongly correlated with risk-avoidance in the social and recreational domains; however, no significant associations were observed between social anxiety and the financial, ethical and health and safety domains. Such domain-specific differences suggest that the relationship between risk-avoidance and anxiety, in this case social anxiety, may be more complex than initially proposed by Maner and Schmidt (2006).

The finding that social anxiety was associated with risk-avoidance in the social and recreational domains is unsurprising. In line with the clinical literature, avoidance of social situations – which may be conceptualised as reduced risk-taking in social contexts – has been strongly implicated in the maintenance of social phobia, and reducing such avoidance is the hallmark of current CBT treatments (e.g., Rapee & Heimberg, 1997). Furthermore, diminished social risk-taking is likely to have a negative impact on an individual's social support network, a factor which has been shown to contribute to negative outcomes in terms of anxiety, depression and psychiatric symptoms (George, Blazer, Hughes, & Fowler, 1989; Holahan & Moos, 1981; Pattison, Lleamas, & Hurd, 1979). Similarly, reduced risk-taking in recreational areas may also be associated with reduced behavioural activation and limited exposure to sources of external reinforcement, and may subsequently be implicated in the development and maintenance of co-morbid depression. It is also possible that treatment aimed at directly increasing social and recreational risk-taking, will assist in reducing social anxiety and secondary depression. Given the cross-sectional nature of the current study, future research is needed to investigate this possibility. Perhaps existing CBT protocols indirectly target this risk-avoidant bias through exposure therapy (Carey, 2010) and behavioural activation (for review, see Mazzucchelli, Kane, & Rees, 2009).

The finding that social anxiety was not associated with financial, ethical, and health and safety risk domains is supported by proponents of the domain-specific view of risk propensity (e.g., Blais & Weber, 2006; Nicholson et al., 2005b). A brief examination of the self-efficacy literature may also offer some insight into the domain-specific differences in self-reported risk-taking observed in this study. Studies, particularly within the organisational and decision-making literature, have shown that perceived self-efficacy is negatively associated with risk-avoidance. For example, one study demonstrated that reduced self-efficacy increased perceived threat and decreased perceived opportunities, subsequently promoting risk-avoidant choices (Krueger & Dickson, 1994). This relationship, however, is believed to be somewhat task-specific such that increasing self-efficacy on one task does not necessarily increase self-efficacy and risk-taking on another. Thus varying levels of self-efficacy within different contexts may be responsible for varying levels of domain-specific risk-taking (e.g., an individual who has low social self-efficacy may take few social risks, but may have high self-efficacy when it comes to financial investments and will subsequently be willing to take financial risks). This specificity may in part account for why the current sample demonstrated varying degrees of correlations between anxiety and various risk domains.

In line with this, there is some support for the presence of situation-specific self-efficacy differences in the anxiety disorders. Muris (2002) found that some specific domains of self-efficacy were especially associated with particular anxiety disorder symptoms in a large sample of normal adolescents. For example, emotional self-efficacy (or the ability to handle negative thoughts/affect) was most strongly correlated with generalised anxiety and panic/somatic concerns, while social self-efficacy was most strongly associated with social phobia. Nevertheless, in line with our findings on the behavioural measure of risk-avoidance, there is evidence to suggest that individuals with anxiety disorders and those with high trait

anxiety exhibit lower general levels of self-efficacy irrespective of context or domain (Maddux, 1991). If this is the case, we would expect individuals with clinical levels of anxiety to exhibit lower levels of self-efficacy and risk-taking across a range of domains and on domain non-specific behavioural measures, with perhaps an even lower level of self-efficacy and risk-taking in areas relevant to their diagnosis. Future studies examining the link between anxiety, risk-avoidance and self-efficacy would offer valuable insight into this area.

While BIS is an established predisposing factor to various forms of pathological anxiety, not all individuals with high BIS go on to develop anxiety disorders, suggesting that some factors may influence this developmental trajectory. If reliable and replicated in a longitudinal designs, the results of this study, particularly that risk-avoidance mediated the relationship between BIS sensitivity and social anxiety symptoms, offers some initial support for the proposed model of risk-avoidance as one potential pathway for the development of anxiety pathology (Maner & Schmidt, 2006). This is supported by recent research suggesting that certain cognitive processes, such as attentional biases to threat, may affect the relationship behavioural inhibition in children (highly related to BIS) and social anxiety symptomatology (Pérez-Edgar et al., 2011). Therefore, investigating potential mediating variables (like risk-avoidance) may prove valuable in determining which processes contribute to the development of anxiety and which psychological mechanisms may be potential targets of prevention interventions. Of course, due to the cross-sectional and non-experimental nature of this study, we are precluded from drawing any causal inferences; furthermore, there is research to suggest that conducting meditational analyses using a cross-sectional design is problematic, suggesting that any conclusions drawn from these results should be interpreted with caution (Maxwell & Cole, 2007). Additionally, given that we did not control for other potential mediating factors, we are unable to determine the relative contribution of risk-avoidance to the relationship between BIS and social anxiety. Nevertheless, if reliable and

replicable in longitudinal designs, this finding offers preliminary support for the potential dispositional association of risk-avoidance and indicates the need for further research in this area.

A particular strength of the current study was the use of a validated behavioural measure of risk-taking. As outlined previously, the majority of studies examining risk-avoidance in anxiety have utilised self-report instruments or forced-choice hypothetical risk scenarios, which pose potential threats to the reliability and validity of results (Schonberg et al., 2011). Interestingly, the relationship between social anxiety and performance on the BART in this study was substantially stronger than results obtained by Maner et al. (2007). This may be explained by the fact that the undergraduate population in this study exhibited a slightly higher mean score of social anxiety severity when compared to scores obtained in another normal undergraduate sample (Purdon et al., 2001). In addition to using behavioural measures of risk-taking, future studies may also benefit from incorporation of other behavioural measures that perhaps exhibit greater ecological validity and sensitivity with respect to anxiety (and risk-avoidance) as well as corroborating these results with measures of real-life risk-taking (e.g., traffic offenses).

There were several limitations to the current study, including the use of a non-clinical sample. Future investigations with anxiety disorder patients (not limited to social anxiety) are necessary in order to establish that the findings reported here can be generalised to a clinical sample and beyond social anxiety symptomatology. Nonetheless, due to the dimensional nature of SP (Kollman, Brown, Liverant, & Hofmann, 2006), we feel that the use of an analogue population provides a useful first step in examining the nature of risk-avoidance. In addition, as mentioned, the cross-sectional design of the current study is such that we are limited to demonstrating associations. Experimental and longitudinal studies are necessary in order to

further clarify the direction of the observed associations between BIS sensitivity, risk-avoidance, and social anxiety.

Implications for the Program of Research

The results of Study 1 contributed to the current body of literature by demonstrating that social anxiety is associated with both self-reported and behavioural measures of risk-avoidance, suggesting that those experiencing higher levels of social anxiety will be less likely to take risks in domains not limited to the disorder-specific avoidance associated with their anxiety pathology (in this case, the social domain). This study also demonstrated the potentially complex and domain-specific nature of risk-taking by showing that risk-avoidance was not consistently associated with anxiety across all behavioural domains. Furthermore, this study also found that risk-avoidance mediated the relationship between a dispositional vulnerability to anxiety (behavioural inhibition sensitivity; BIS) and social anxiety symptomatology, providing initial evidence for the proposed model of risk-avoidance as a pathway for the development of pathological social anxiety.

CHAPTER 3

AN ONLINE STUDY OF RISK-AVOIDANCE AND CLINICAL ANXIETY

STUDY 2

Page

STUDY 2: Risk-Avoidance and Anxiety in a Clinical Sample

Introduction 61

Method 63

- Participants 63
- Measures 65
- Procedure 68

Results 69

- Participant Characteristics 69
- Comparison of Self-report Risk-Taking Scores between the Anxious and Control Groups 69
- Comparison of CCT Scores between the Anxiety Disorder and Control Groups 70
- Association between Risk-Taking and Symptom Measures 73

Discussion 76

Implications for the Program of Research 81

STUDY 2

An Online Study of Risk-Avoidance and Clinical Anxiety

Introduction

As we have seen, there is mounting evidence for the presence of a risk-avoidant bias in those who are pathologically anxious. Study 1 provided additional support for the safety bias by replicating and extending Maner et al.'s (2007) study, demonstrating significant correlations between self-report and behavioural measures of risk-avoidance and social anxiety symptomatology. Furthermore, risk-avoidance was shown to mediate the relationship between a dispositional vulnerability to anxiety (behavioural inhibition sensitivity; BIS) and social anxiety symptomatology, providing initial evidence for the proposed model of risk-avoidance as a pathway for the development of pathological social anxiety.

To further investigate risk-avoidance and anxiety, additional studies are needed to establish whether clinically anxious individuals also exhibit reduced affinity for taking risks; therefore, Study 2 sought to measure risk-avoidance in a clinically anxious sample using multiple indices of risk-taking. In addition to the *Domain-Specific Risk-Taking Scale* (DOSPERT; Blais & Weber, 2006) used in Study 1, this study also utilised the *Everyday Risk Inventory* (ERI), a measure originally designed to assess risk-avoidant behaviour in individuals with obsessive-compulsive disorder (OCD; Cicolini & Rees, 2003; Steketee & Frost, 1994). The ERI was designed to be more sensitive to the assessment of avoidance of common everyday risks, in contrast to the DOSPERT, which was originally designed to assess maladaptive risky behaviour. Furthermore, the ERI has shown sensitivity in differentiating clinical from non-clinical OCD samples (Cicolini & Rees, 2003; Steketee & Frost, 1994).

As noted in Chapter 1 and 2, risk-taking can be measured using both self-report and behavioural indices. Given that self-report and behavioural measures are likely to capture

different aspects of the risk-taking construct, it is preferable to assess both (Mishra & Lalumière, 2011; Schonberg et al., 2011; Weber, 2010). Interestingly, only a handful of studies have directly examined pathological anxiety and risk-taking using behavioural measures. While anxiety symptomatology has been associated with risk-avoidance on the BART (Lorian & Grisham, 2010; Maner et al., 2007), results using the IGT have been inconsistent. Some studies have shown anxiety to impair performance on the IGT (e.g., Miu et al., 2008b; Preston et al., 2007), while others have shown anxiety to improve performance on the IGT (e.g., Garon et al., 2006; Kirsch & Windmann, 2009; Mueller et al., 2010). In addition to methodological concerns that may shed some light on these inconsistent findings (see Dunn et al., 2006), both tasks have been criticised for their limited decomposability, precluding investigation into the more complex factors that drive decision-making behaviour (Schonberg et al., 2011). In other words, the BART and IGT have not allowed investigators to assess the components used when deciding whether to take a risk. In particular, (i) the probability of a negative outcome, (ii) the utility or gain of the positive outcome, and (iii) the cost of the negative outcome.

To overcome the limitations of the BART and IGT, this study utilised a novel behavioural risk-taking task, the *Columbia Card Task* (CCT; Figner et al., 2009) . Like the BART, the CCT is a dynamic decision-making task involving incrementally increasing risk. Unlike the BART and IGT, however, the CCT allows for the measurement of information use by determining which three factors (i.e., outcome probability, gain amount, and loss amount) have been taken into account when deciding the outcome (Figner et al., 2009). While previous research has demonstrated that anxious people are less likely to take risks if they perceive the subjective cost (rather than probability) to be higher, (e.g., Maner & Schmidt, 2006; Mitte, 2007) and are more likely to interpret ambiguous stimuli as threatening (e.g., Mathews et al., 1997; Matthews et al., 2011), no studies have examined how clinically

anxious people use information when making risky decisions. Previous studies using the CCT have shown risk-taking and complexity of information use to be inversely related, such that greater use of the three factors is related to more risk-avoidant behaviour (Figner et al., 2009). In line with this, we predict anxious individuals to show greater risk-avoidance and show greater use of information relative to non-clinical controls (i.e., anxious individuals will show greater reduction in the number of cards chosen on the CCT when presented with high risk information across all three factors). Given that this is the first study to examine risk-taking and anxiety on the CCT, we did not have any specific predictions about which components of information anxious individuals will be more likely to employ relative to non-clinical controls.

Overall, we hypothesised clinically anxious individuals to be more risk-averse on all indices of risk-taking relative to non-clinical controls. Furthermore, we hypothesised symptoms of psychological distress, in particular anxiety, stress and depression, would be correlated with risk-avoidance.

Method

Participants

Anxiety Disorder (AD) Group. All participants were diagnosed via telephone administration of the Mini International Neuropsychiatric Interview, conducted by a registered psychologist (Version 6.0.0, MINI; Sheehan et al., 1998). The MINI is a well-validated structured clinical interview designed to assess the presence of 17 common Axis I mental disorders according to DSM-IV and ICD-10 criteria. Good inter-rater (Kappa =.88-1.00) and test-retest reliability (Kappa = .52-.85) have been established. Likewise, adequate diagnostic concordance for anxiety disorders has been established with other diagnostic instruments, including the Composite International Diagnostic Interview (CIDI; Kappa = .36-.68; Sensitivity = .46-.67; Specificity = .72-.97; Sheehan et al., 1998) and Structured Clinical

Interview for DSM (SCID; Kappa = .55-.80; Sensitivity = .62-.91; Specificity = .86-.98). It is of note that while there is no direct evidence to support the reliability and validity of telephone administration of the MINI, there exists ample evidence that supports no significant differences between administration of structured clinical interviews (e.g., ADIS and SCID) via telephone and in face-to-face settings (e.g., Aziz & Kenford, 2004; Crippa et al., 2008; Lyneham & Rapee, 2005).

Exclusion criteria included concurrent psychotic ideation, organic brain dysfunction, and alcohol/substance-abuse. A total of 44 individuals originally responded to an online advertisement for anxious individuals in the Sydney region. Seven were excluded for meeting one or more of the exclusion criteria and the remaining six were excluded because they did not meet diagnostic criteria for any of the anxiety disorders.

The final anxiety disorder sample comprised 31 individuals (mean age = 32.77 years, *SD* = 7.99; range = 21–50 years, 8 male/ 23 female) with primary diagnoses of social phobia (SP; *n* = 16), generalised anxiety disorder (GAD; *n* = 8), panic disorder without agoraphobia (PD; *n* = 1), panic disorder with agoraphobia (PDAg; *n* = 2) or obsessive-compulsive disorder (OCD; *n* = 4). Of the sample, 10% (*n* = 3) met criteria for only one disorder, 39% (*n* = 12) met criteria for two, 23% (*n* = 7) met criteria for three and 29% (*n* = 9) met criteria for four or more anxiety or affective disorders. Proportions of patients meeting criteria for each anxiety diagnosis were as follows: SP = 68%, GAD = 71%, PD with or without agoraphobia = 58%, OCD = 42% and posttraumatic stress disorder (PTSD) = 16%. Of the sample, 74% (*n* = 23) also met criteria for major depressive disorder (MDD).

Control Group. Control participants for this study were 27 non-clinical subjects (mean age = 33.48 years, *SD* = 9.97; range = 24–60 years, 11 male/ 16 female). Participants were recruited through an online advertisement targeting Sydney residents. Inclusion criteria required that individuals have no history of anxiety, depression, neurological disorders,

substance-abuse, alcohol use disorders or other mental health problems, as determined by a telephone screening interview using the MINI (Version 6.0.0, MINI; Sheehan et al., 1998).

Measures

The study page, entitled "Anxiety and Risk-Taking" was designed using Key Survey v6.9 software and consisted of the below components. Following completion of the self-report measures, respondents were directed to a page containing detailed instructions for completion of the online version of the CCT. Scripts for the program were provided by the original developers (Figner et al., 2009).

***Demographic Questionnaire*.** Participants were asked to provide information about their age, gender, marital status, highest level of education attained and income.

Depression Anxiety and Stress Scales (DASS-21). Symptoms of depression, anxiety and stress were assessed using the 21-item version of the DASS (DASS-21; Lovibond & Lovibond, 1995). The DASS-21 consists of three subscales (Depression, Anxiety, and Stress) containing seven items asking respondents to rate the extent that they experienced each emotion over the last week (e.g., *"I felt sad and depressed"*) on a four-point Likert scale (0 – *Did not apply to me at all*, 4 – *Applies to me very much, or most of the time*). Both the paper-and-pencil and Internet administered versions of this measure have been shown to have excellent psychometric properties, including excellent internal reliability (α = .93 - .95; Zlomke, 2009) and adequate external validity (Antony, Bieling, Cox, Enns, & Swinson, 1998). Internal consistency for the current sample was high (Total, α = .95; Depression, α = .94; Anxiety, α = .85; Stress, α = .90).

Indices of Risk-Avoidance.

Domain-Specific Risk-Taking Scale (DOSPERT). Participants' risk-avoidance in various settings was assessed using the 30-item version of the DOSPERT (Blais & Weber, 2006; see Chapter 2 for detailed description). In the current sample, the total score (α = .88)

and all five subscales were examined, Social (α = .74), Recreational (α = .84), Financial (α = .73), Ethical (α = .67) and Health and Safety (α = .65).

Everyday Risk Inventory (ERI). Risk-avoidance was also assessed using the modified version (Australian version, ERI-AUS; Cicolini & Rees, 2003; see Appendix 2) of the ERI (Steketee & Frost, 1994). The ERI is a 32-item measure asking respondents to rate the likelihood (1 – *I would never do this*, 5 – *I would definitely do this*) that they would partake in a number of ordinary activities encountered in everyday life (e.g., "*Go on a holiday without a specific itinerary*," "*Drive in heavy rain to do an errand you could postpone*," "*Allow a stranger to come into your home to use your phone"*). The ERI-AUS, developed by Cicolini and Rees (2003), includes modified items that are more applicable to an Australian sample (e.g., the original question "*Drink from a mountain stream*" was modified to "*Drink from a flowing bush creek*"). The total score is taken to be the sum of all questions (range 32 – 160). As the ERI was originally developed to measure risk-avoidance in OCD, a reduced OCD non-specific total score (range 18 – 90) can also be calculated, excluding items that relate to contamination and checking (Cicolini & Rees, 2003).The original ERI has been shown to have sound psychometric properties, including excellent internal consistency (α = .91), test-retest reliability (*r* = .93) as well as good convergent (*r* = .72) and fair divergent (*r* = -.46) validity. The ERI-AUS has also been shown to have good internal consistency (total score, α = .87; OCD non-specific total score, α = .84). Internal consistency in the current sample was high (Total score, α = .92; OCD non-specific total score, α = .88).

Columbia Card Task (CCT). Risk-taking was also assessed using the CCT (Figner et al., 2009). The CCT is a computer task involving 32 cards, displayed in four rows of eight cards each (see Figure 3.1). Each of the 32 cards is either a *gain card* (adds a specified gain amount to the trial payoff) or a *loss card* (subtracts a specific loss amount from the trial payoff). Each trial varies the number of loss cards (1 or 3 cards out of 32), amount of gain per

gain card (10 or 30 points), and amount of loss per loss card (250 or 750 points). Along with the trial number, this information is displayed at the top of the screen for each trial; however, respondents are not given the location of the loss cards. In each trial, the respondent is expected to select (or 'turn over') as many cards they wish. Players are given feedback for the amount gained/lost in that trial only once they choose to 'STOP' the trial and move onto the next round. If a loss card is selected in any trial, all points earned by subsequent cards are overridden. Given all possible combinations of the three game parameters (probability of a loss, gain amount and loss amount), presenting each of the 8 combinations of factor levels twice resulted in 16 trials. Trials were randomly ordered within each of the two blocks of eight trials.

On the CCT, risk-taking is operationalised by the total number of cards chosen across all trials, with a smaller number of cards chosen being indicative of greater risk-avoidance. Information use on the CCT can also be assessed across trials – that is, whether individuals take into account the three game parameters (as above) when deciding how many cards to choose. An optimal strategy on the CCT involves taking into account all three factors (see Figner et al., 2009). Furthermore, preliminary psychometric properties have been established for the CCT, with several advantages being acknowledged over other dynamic risk-taking tasks (Figner et al., 2009).

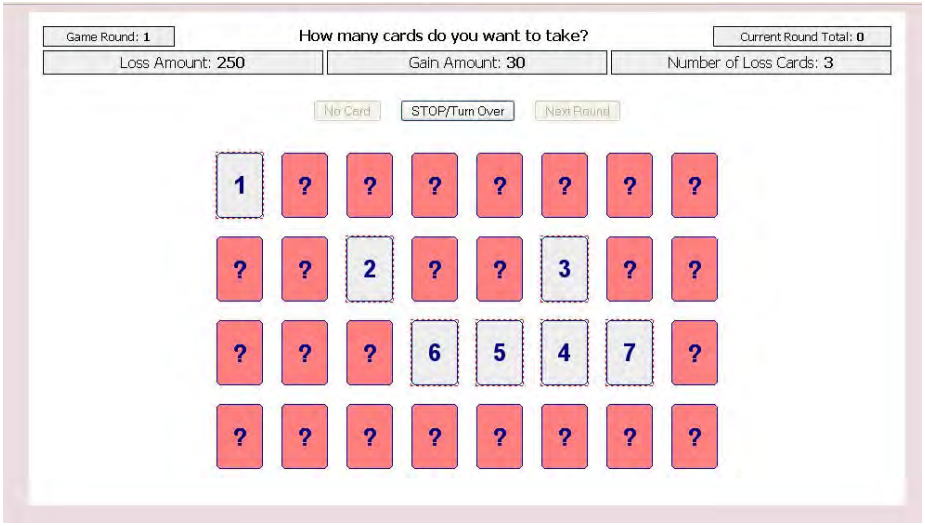

Figure 3.1. The Columbia Card Task (CCT; Figner et al., 2009)

Procedure

Following the screening process, participants were emailed a link to access the online survey (www.unswanxiety.nfshost.com). All participants gave their informed consent (see Appendix 2) to participate in this study and were paid $15-20 via PayPal (amount was contingent on their performance in the online card task) in exchange for participation. The experimental procedures complied with ethical guidelines as approved by the University of New South Wales.

Table 3.1

Demographic Information for Anxiety Disorder and Control Groups

	Anxiety Disorder (n = 31)		Control (n = 27)	
Variable	*N*	*%*	*n*	*%*
Age	32.77 (*SD* = 7.99)		33.48 (*SD* = 9.97)	
Gender				
Male	8	25.8	11	40.7
Female	23	74.2	16	59.3
Marital Status				
Never Married	16	51.6	12	44.4
Married	7	22.6	12	44.4
Divorced	5	16.1	3	11.1
Other	3	9.7	0	-
Education				
< High School	2	6.5	0	-
High School Diploma	3	9.7	4	14.8
Other Qualification	7	22.6	4	14.8
Undergraduate Degree	13	41.9	16	59.3
Postgraduate Degree	6	19.4	3	11.1
Income				
< $10,000	6	19.4	9	33.3
$10,000 - $29,999	15	48.4	6	22.2
$30,000 - $49,999	3	9.7	4	14.8
$50,000 - $69,999	3	9.7	4	14.8
$70,000 - $99,999	1	3.2	4	14.8
$100,000 - $149,000	2	6.5	0	-
> $150,000	0	-	0	-

Results

Participant Characteristics

Demographic characteristics of the AD and control groups are presented in Table 3.1. There were no significant between-group differences in age, gender, marital status, education, or income (*p*s > .05). Both groups were predominantly married or had never been married, and the majority had received education above a high school diploma level. As seen in Table 3.2, the AD group showed significantly higher scores on the DASS relative to the control group. Compared to previous studies utilising clinically anxious samples, the AD group was comparable on the Stress and Anxiety subscales, but reported higher scores on the Depression subscale (Antony et al., 1998; Brown, Chorpita, Korotitsch, & Barlow, 1997). The control group was comparable to non-clinical controls recruited from the community in a previous sample (Antony et al., 1998).

Comparison of Self-report Risk-Taking Scores between the Anxiety Disorder and Control Groups

Results for comparison of self-reported risk-taking scores between AD and control groups are presented in Table 3.2. In order to test whether there was a significant difference in risk propensity (on the DOSPERT subscales) between the AD and control groups, a one-way multivariate analysis of variance (MANOVA) was conducted, entering group (AD vs. control) as the independent variable and DOSPERT subscale scores as the dependent variables. Preliminary testing of assumptions indicated no serious violations. Analyses revealed a significant multivariate main effect for group, Wilks' $\lambda = .71$, F (5, 52) = 4.17, $p <$ .05, $\eta^2 = 0.29$. Main effects were further examined using a series of ANOVAs (i.e., analysis of variance), with Bonferroni corrections ($\alpha = .05/5 = .01$). Analyses revealed a significant group effect for the Social, Recreational, and Financial subscales (adjusted *p*s < .01) but not for the remaining subscales (adjusted *p*s > .01; see Table 3.2 for *M*s and *SD*s). A univariate

ANOVA analysis was further conducted to examine group differences on the ERI-AUS. Results revealed that the AD and control groups did not differ significantly, either for the total score or the reduced non OCD-specific total score (*p*s > .05). Given that age and gender are both believed to influence risk-taking, analyses were repeated controlling for age and gender, which revealed no significant effects on risk-taking (*p*s > .05).

In the AD group, DOSPERT scores were slightly higher than those in a clinically anxious sample used in Maner & Schmidt's (2006) study. Likewise, DOSPERT scores in the control group were similar to those found in prior community samples (Lorian & Grisham, 2011; Lorian et al., 2011a) and, as would be expected, slightly lower than those from undergraduate student samples (Blais & Weber, 2006). While total and reduced scores on the ERI-AUS in the AD group were comparable to a small sample of clinical OCD patients (Cicolini & Rees, 2003), ERI-AUS scores in the control group (Total, $M = 82.22$, $SD = 21.08$; Reduced, $M = 42.15$, $SD = 12.11$) were somewhat lower than those in a previous Australian non-clinical sample (Total, $M = 97.87$, $SD = 19.75$; Reduced, $M = 55.32$, no SD reported).

Comparison of CCT Scores between the Anxiety Disorder and Control Groups

A one-way ANOVA was conducted to examine between-group differences (AD vs control) in risk-taking on the CCT, with the total number of cards chosen in the task as the dependent variable (Figure 3.2). Results showed that the AD group chose fewer total cards relative to the control group, $F(1, 55) = 4.29$, $p < .05$, $\eta^2 = 0.07$, indicating significantly greater risk-avoidance in the AD group. Repeated-measures ANOVAs conducted with number of cards chosen as the dependent variable (averaged across four blocks of four consecutive trials) were conducted to examine whether the AD and control groups differed in approach to the task and risk-taking across duration of the trials. Results demonstrated a significant effect of time on risk-taking, $F(3, 52) = 3.83$, $p < .02$, $\eta^2 = 0.18$, indicating that

risk-taking did change significantly over the duration of the task for both groups. There was, however, no significant interaction between groups across trials (Time x Group), $F(3, 52) = .37$, $p > .05$, $\eta^2 = 0.02$, suggesting that individuals in the AD did not vary risk-taking significantly differently to controls across the duration of the CCT. Trend analyses showed a significant effect for a quadratic relationship, $F(1, 54) = 10.71$, $p < .01$, $\eta^2 = 0.17$ (see Figure 3.3).

Table 3.2

Mean Scores, Standard Deviations, and Between-Group Comparisons

	Anxiety Disorder (n = 31)		Control (n = 27)		Between-group comparisons		
Variable	*M*	*SD*	*M*	*SD*	$F_{(1,56)}$	*p*	η^2
DASS							
Total	56.58	18.25	8.52	8.09	159.63	<.001	0.74
Depression	23.35	9.82	3.11	4.01	100.06	<.001	0.64
Anxiety	12.26	7.86	1.41	2.14	48.24	<.001	0.46
Stress	20.97	7.55	4.00	3.84	111.06	<.001	0.67
DOSPERT							
Total	88.00	16.98	101.96	24.10	6.63	.01	0.11
Social	25.58	6.71	31.00	5.78	10.69	.002	0.16
Recreational	16.16	7.91	22.15	8.28	7.92	.007	0.12
Financial	11.68	4.48	16.59	7.88	8.81	.004	0.14
Ethical	15.71	5.95	15.22	6.64	.09	.77	0.00
Health and Safety	16.55	4.60	17.00	7.19	.08	.77	0.00
ERI							
Total	78.94	16.33	82.22	21.08	.45	.51	0.01
Reduced†	40.30	9.43	42.15	12.11	.42	.52	0.00

Note. η^2 = eta squared, index of effect size. DASS = Depression Anxiety Stress Scale; DOSPERT = Domain-Specific Risk-Taking Scale; ERI = Everyday Risk Inventory.

† Mean total score following removal of items 1, 5, 6, 7, 8, 10, 11, 12, 13, 14, 23, 25, 27, 29, 32.

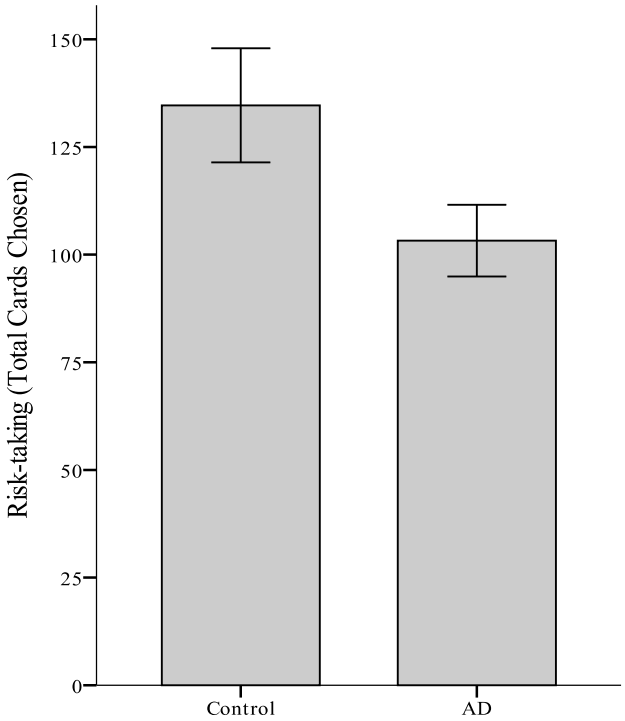

Figure 3.2. Between-group comparison of mean total cards chosen on the Columbia Card Task (CCT). Error bars based on *SEM*.

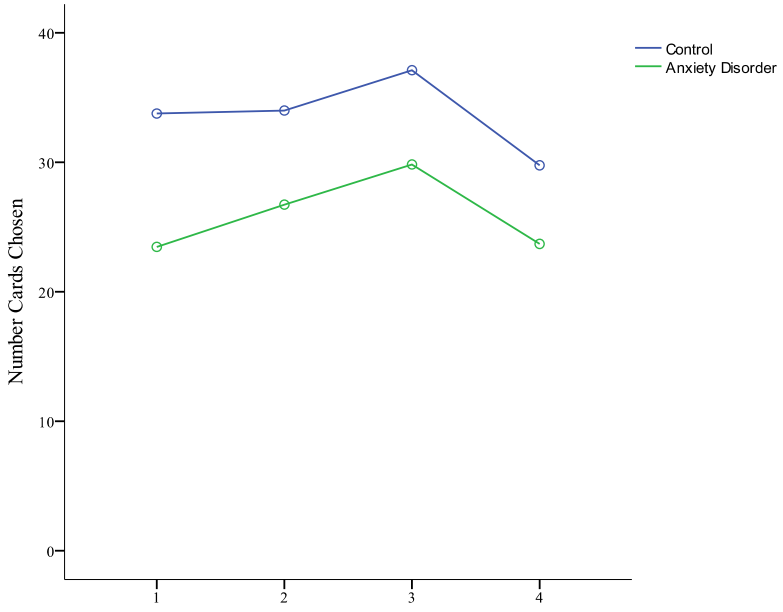

Figure 3.3. Mean number of cards chosen across trials (i.e., mean across four trials collapsed) on the Columbia Card Task (CCT).

Information Use. Information use was analysed between groups with a 2 x 2 x 2 x 2 x 2 (Probability x Gain Amount x Loss Amount x Block x Group) repeated-measures ANOVA, in which the first four factors were within-subject and the last factor was between-subjects. Nonsignificant interactions of group with all three card game factors indicated that information use did not differ between control and AD groups: Probability x Group, $F(1, 53) = .06$, $p > .05$, $\eta^2 = 0.00$; Gain x Group, $F(1, 53) = .01$, $p > .05$, $\eta^2 = 0.00$; Loss x Group, $F(1, 53) = .00$, $p > .05$, $\eta^2 = 0.00$. Significant effects for Probability, $F(1, 53) = 54.81$, $p < .001$, $\eta^2 = 0.51$, Gain Amount, $F(1, 53) = 10.28$, $p < .01$, $\eta^2 = 0.16$, and Loss Amount, $F(1, 53) = 19.42$, $p < .001$, $\eta^2 = 0.27$, indicated that all three factors were taken into account when deciding how many cards to turn over, with factor probability having the strongest effect, followed by loss amount and gain amount, respectively. A nonsignificant effect for Block, $F(1, 53) = .04$, $p > .05$, $\eta^2 = 0.00$, indicated that the number of cards chosen did not differ between the first and second blocks of the task.

Association between Risk-Taking and Symptom Measures

To examine associations between risk-taking and symptoms of depression, anxiety, and stress, bivariate Pearson correlation coefficients were calculated for the entire sample (see Table 3.5). Total DOSPERT score was found to be significantly associated with depression and stress (*p*s < .05), and approached a significant association with anxiety ($p < .10$). At the subscale level of the DOSPERT, the Social subscale was significantly negatively associated with all subscales of the DASS (*p*s < .05), such that higher depressive, anxiety and stress symptomatology was associated with greater risk-aversion. The Recreational subscale, on the other hand, was only significantly negatively associated with depression but not anxiety or stress (*p*s > .05), while the Financial subscale was significantly negatively associated with anxiety and stress ($p < .05$), but not depression ($p > .05$). Correlations between the DASS and the remaining DOSPERT subscales (i.e., Ethical and Health and Safety) and both the total and reduced ERI-AUS scores

were nonsignificant (*p*s > .05). While the correlation coefficient between risk-taking on the CCT and the DASS total score approached significance, $r = -.23$, $p < .10$, associations between the CCT and the individual subscales were nonsignificant (*p*s > .05).

Table 3.3

Pearson Bivariate Correlation Coefficients of Risk-Taking and Symptom Measures

Measure		DOS total	Social	Recreational	Financial	Ethical	Health & Safety	ERI	ERI †	CCT
DASS	Total	-.26*	-.37**	-.26*	-.30*	.08	.02	-.12	-.10	-.23[a]
	Depression	-.28*	-.32*	-.37**	-.20	.00	-.03	-.13	-.14	-.21
	Anxiety	-.24[a]	-.35**	-.09	-.26*	.07	.05	-.14	-.10	-.21
	Stress	-.26*	-.33*	-.21	-.29*	.16	.04	-.06	-.02	-.20

Note. DASS = Depression Anxiety Stress Scale; DOS = Domain-Specific Risk-Taking Scale; ERI = Everyday Risk Inventory; CCT = Columbia Card Task, total no. cards chosen.

[a]$p \leq .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

† Mean total score following removal of items 1, 5, 6, 7, 8, 10, 11, 12, 13, 14, 23, 25, 27, 29, 32

Discussion

This study sought to extend previous research by comparing risk-taking in a clinically anxious sample using both self-report and behavioural indices. As hypothesised, individuals in the AD group showed significantly greater risk-avoidance in social, recreational, and financial risk-taking domains and took fewer risks on a dynamic risk-taking task; however, contrary to our hypotheses, clinically anxious individuals were not significantly more risk-avoidant across ethical, health and safety or everyday risk-taking activities. Furthermore, in agreement with our predictions, correlational analyses revealed that risk-avoidance was associated with anxiety, stress, and depression. These results suggest that, in accordance with previous findings (Maner et al., 2007), clinically anxious individuals show a reduced tendency to take risks across a number of behavioural domains (albeit not consistently) and also exhibit significantly greater risk-avoidant behaviour on a dynamic risk-taking task.

In line with Study 1, anxious individuals were not consistently risk-avoidant across all domains of risk-taking on the DOSPERT. This finding is consistent with the domain-specific view of risk-taking, such that risk-taking preferences are not always consistent across contexts and are influenced by a myriad of factors (see Hanoch et al., 2006; Weber, 2010; Weber et al., 2002). Particularly on the DOSPERT, this finding may also reflect that both clinical and control groups report risk-avoidant preferences in the ethical and health and safety domains and will therefore show little difference in reported scores. For instance, given the nature of the items on these subscales (e.g., Ethical, *"Cheat on an exam"*; Health and Safety, *"Engage in unprotected sex"*), risk-taking may only be evident in individuals exhibiting maladaptive and impulsive behaviour and therefore these subscales may be less sensitive to overly risk-avoidant behaviour. Nevertheless, this study provides novel evidence of a risk-avoidant bias in those with clinical levels of anxiety that is not limited to a specific behavioural domain and is apparent at both a self-report and behavioural level.

Consistent with our hypotheses and previous research, this study also found significant associations between risk-avoidance and symptoms of psychological distress (i.e., anxiety, stress, and depression). Given the correlational nature of these findings, however, we are unable to draw conclusions about the directionality of this relationship; that is, does psychological distress affect risk-avoidance or vice versa? These results are consistent with previous research proposing risk-avoidant behaviour is a component of both anxiety and depression (Chapman et al., 2007; Mitte, 2007; Williams et al., 2009); however, these findings may also contradict the notion that risk-avoidance is unique to anxiety (e.g., Maner & Schmidt, 2006; Mitte, 2007). At the subscale level, results revealed social risk-avoidance was associated with anxiety, stress, and depression. Moreover, recreational risk-avoidance was only associated with depression, financial risk-avoidance was only associated with anxiety and stress, and risk-aversion in the ethical and health and safety domains were not associated with anxiety, stress, or depression at all. These results imply that particular risk domains may be differentially associated with aspects of anxious and depressive symptomatology, and adds credence to the complexity of the relationship between risk-avoidance and anxiety. No doubt, these results warrant replication and further research is needed to assess the unique contribution of risk-avoidance to anxiety.

In contrast to studies examining risk-taking in OCD (Cicolini & Rees, 2003; Steketee & Frost, 1994), even after removing OCD-specific items, our study did not find anxious individuals to be significantly more risk-averse relative to controls on a measure of everyday risk-taking. Under the assumption that all day-to-day activities involve some degree of risk, the ERI measures the likelihood an individual will engage in specific day-to-day activities that include some possibility of a negative outcome. One reason for this finding may be the nature of our control sample, which exhibited lower scores on the ERI relative to previous control samples (Cicolini & Rees, 2003). As seen on the DOSPERT, it is also possible that anxious individuals exhibit risk-aversion in some behavioural domains but not in others; however, given that there

are no established subscales of the ERI, we were precluded from examining such domain-specific differences. The lack of difference may also reflect the difficulties in assessing risk-taking using self-report measures that ask individuals to predict their engagement in specific behaviours. Indeed, there exists significant variability in the measurement of individual risk-taking preferences, with different measures assessing different components of the risk-taking construct (e.g., some measures may assess risky personality while others may assess future discounting or variance preference; Mishra & Lalumière, 2011). Such methodological issues need to be addressed in future studies in order to establish whether clinically anxious individuals (not limited to an OCD diagnosis) are also more risk-averse in more common everyday activities.

A novel aspect of this study was the use of a dynamic risk-taking task, which allowed for examination of information use during risk-taking behaviour. As outlined previously, deciding on an optimal risk-taking strategy involves taking into account the probability of a loss, the gain amount, and the loss amount. Interestingly, our results indicated no significant group effect (suggesting there is no difference in how anxious individuals and non-clinical controls use information on the CCT). In line with previous research which suggests people tend to focus more on potential losses than gains when making risky decisions (e.g., Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001), it appears that both anxious and healthy individuals paid least attention to positive outcomes (i.e., gain amount) when deciding how many cards to select. Furthermore, our study showed both anxious and healthy individuals' risk-taking behaviour to be influenced most strongly by probability of loss rather than size of the loss. Interestingly, research suggests that affect, including situational anxiety, can make individuals insensitive to changes in probabilities, suggesting that particularly in situations involving affect-laden consequences, individuals will ignore the probability of negative outcomes and focus, instead, on the size of the loss (Rottenstreich & Hsee, 2001).

However, in line with past studies using the CCT (see Figner et al., 2009), sensitivity to probabilities was observed, possibly because the CCT did not involve affect-laden consequences and thus did not induce situational anxiety. Alternatively, due to the complexity of the CCT, probability information may have been easier to integrate into the decision-making process.

It is possible that with increased power a significant group effect may have been apparent, implying that anxious individuals may factor in more information and may be more sensitive to provided information when making risky decisions. Indeed, greater information use has been associated with more risk-avoidant behaviour on the CCT (Figner et al., 2009). These findings are also consistent with research showing that individuals high in trait anxiety pay more attention to threatening information and spend greater time searching for information about probabilities and costs on a tactical decision-making task (Matthews et al., 2011). It has also been suggested that decision-making in anxiety may be associated with use of additional cognitive resources in order to temporarily assist decision-making (Righi et al., 2009). This notion is consistent with Eysenck, Derakshan, Santos and Calvo's (2011; 2007) *attentional control theory*, which proposes that anxiety impairs the goal-directed attentional system and increases the stimulus-driven (or threat-related) attentional system allowing individuals to direct cognitive processes to respond appropriately to threat. It is possible, then, that on the CCT, anxious individuals pay more attention and subsequently are more influenced by available information relative to non-anxious individuals. Clearly more research is needed to clarify the impact of anxiety on information use on the CCT.

How anxious individuals use information when making decisions may have important clinical implications for the treatment of anxiety. For example, that anxious people may factor in information about the probability and cost of negative outcomes as well as the utility of positive outcomes lends support to the use of cognitive-behavioural therapy (CBT) protocols that

challenge beliefs through explicit provision of information about probabilities and costs associated with feared outcomes. Perhaps provision of information about the utility of positive outcomes may also assist in encouraging risk-taking in treatment (e.g., during exposure-based tasks). While similar suggestions have been implemented in some CBT protocols, research is needed to assess whether inclusion of such information is of therapeutic benefit (see Longmore & Worrell, 2007).

Several limitations should be considered when interpreting these findings. Self-report and behavioural risk-taking measures are believed to assess different aspects of the risk-taking construct (Mishra & Lalumière, 2011); however, given that various state (e.g., state anxiety and motivation; Schonberg et al., 2011) and individual factors (e.g., intelligence, numeracy, etc.; Parker & Fischhoff, 2005; Peters et al., 2006b) may affect performance on behavioural risk-taking tasks, future studies should control for such variables. Furthermore, the popularity of Internet-based studies is increasing and some experimental tasks have been shown to uphold their psychometric properties when administered over the Internet (e.g., the Stroop task; Linnman, Carlbring, Åhman, Andersson, & Andersson, 2006). It is unknown, however, whether more complex behavioural risk-taking measures can be administered reliably and validly online; therefore, future studies corroborating our results utilising different forms of task administration are needed. In addition, our small sample size precluded us from comparing risk-avoidance across the various anxiety disorders. It is possible that different patterns of risk-avoidance are evident across the different disorders, therefore future studies utilising larger clinically anxious samples and assessment of disorder-specific symptoms will allow for examination of the transdiagnostic nature of the safety bias.

Implications for the Program of Research

Study 2 contributed to the current literature on risk-avoidance and anxiety by demonstrating that clinically anxious individuals are more risk-avoidant relative to controls, both on self-report and behavioural measures of risk-taking. Moreover, risk-avoidance was significantly associated with components of psychological distress, namely anxiety, stress, and depression; however, analyses at the subscale level revealed differential unique associations between risk domains and anxiety or depressive symptoms. This study was the first to demonstrate these associations in a clinical sample using an objective behavioural risk-taking measure other than the IGT. The use of a novel dynamic measure of risk-taking, the CCT, also allowed us to investigate information use. Results suggested that anxious individuals may factor in more information and may be more sensitive to provided information, namely the probability and cost of negative outcomes and the utility of positive outcomes, when making risky decisions.

CHAPTER 4

RISK-AVOIDANCE IN AN ANXIOUS TREATMENT-SEEKING SAMPLE

STUDY 3

	Page
STUDY 3: Risk-Avoidance in an Anxious Treatment-Seeking Sample	
Introduction	83
Method	85
Participants	85
Measures	86
Procedure	88
Results	89
Participant Characteristics	89
Comparison of Risk-Taking Scores between the Anxiety Disorder and Control Groups	90
Association between Risk-Taking and Symptom Measures in the Anxiety Disorder Group	91
Association between Risk-Taking and Other Measures in the Anxiety Disorder Group	92
Does Risk-Avoidance Predict Symptoms of Anxiety Pathology?	94
Discussion	97
Implications for the Program of Research	101

STUDY 3

Risk-Avoidance in an Anxious Treatment-Seeking Sample

Introduction

So far, this program of research has contributed to this literature by showing that self-report and behavioural risk-avoidance are associated with both social anxiety symptomatology (Study 1) and clinical anxiety (Study 2). As noted in Chapter 1, there is growing support for the presence of a risk-avoidant bias that is evident across anxiety disorders. It has been argued that individuals who are anxious are less likely and willing to take perceived risks across multiple behavioural domains (e.g., social, recreational, financial, etc.), and this bias is believed to be implicated in the development and maintenance of pathological anxiety through widespread avoidance and subsequent maintenance of maladaptive risk-related appraisals (Maner et al., 2007; Maner & Schmidt, 2006). Indeed, risk-avoidance has been found to be associated with high trait anxiety (e.g., Eisenberg et al., 1998; Maner & Schmidt, 2006) as well as symptoms of social phobia (SP; Kashdan et al., 2006; Lorian & Grisham, 2010; Maner et al., 2007), obsessive-compulsive disorder (OCD; Cavedini, Gorini, & Bellodi, 2006a; Cicolini & Rees, 2003; Nielen et al., 2002; Starcke, Tuschen-Caffier, Markowitsch, & Brand, 2010b) and generalised anxiety disorder (GAD; Mueller et al., 2010).

Although evidence is accumulating, there has been minimal research investigating the characteristics of risk-avoidance across anxiety disorders and across the specific risk-taking domains (see argument for domain-specific approach for risk-taking; Weber, 2010; Weber et al., 2002). For example, Maner et al. (2007) found clinically anxious individuals to be more risk-averse relative to individuals with mood disorders, learning disabilities and healthy controls; however, whether there were differences between primary anxiety disorder diagnoses or across the specific domains of risk-taking was not examined. It remains to be

seen, therefore, whether individuals with anxiety disorders are more risk-averse across all situations and whether risk-avoidance is common to all anxiety disorders or specific to certain diagnoses.

While it has been proposed that risk-avoidance is implicated in the development and maintenance of anxiety disorders (see Maner & Schmidt, 2006), little has been done to systematically investigate the contribution of this bias to specific anxiety symptomatology. Given the considerable overlap between risk-aversion and vulnerability factors to anxiety (e.g., neuroticism; Paulus et al., 2003), risk-avoidance may contribute uniquely to the presence of anxiety symptomatology as a transdiagnostic factor. To date, only Study 1 of this program of research has directly investigated this link, showing risk-avoidance to partially mediate the relationship between a dispositional vulnerability to anxiety (i.e., Behavioural Inhibition System sensitivity, BIS; Gray, 1970) and social anxiety symptomatology (Lorian & Grisham, 2010). Clearly, more research is needed to investigate whether risk-avoidance contributes to anxiety pathology across disorders. In order to establish whether risk-avoidance is a transdiagnostic factor that underlies anxiety pathology, the following questions need to be answered: (i) Does risk-avoidance correlate with symptoms of specific anxiety and depressive disorders?; and, (ii) does risk-avoidance explain unique variance in symptoms of anxiety and depressive disorders over and above established vulnerability factors, such as neuroticism?

With this in mind, the first aim of this study was to replicate work by Maner et al. (2007) and our findings in Study 2 by examining differences in self-reported risk-avoidance between clinically anxious patients and non-clinical controls. In addition to using a larger, clinic-based sample (in contrast to an online clinical sample as in Study 2), this study intends to further explore the relationship between specific clinical anxiety symptom measures (in contrast to the DASS, used in Study 2) and risk-avoidance, whilst also taking into account

underlying personality factors. Thus, the second aim of this study was to extend the previous line of research by examining the relationship between risk-avoidance and symptoms of anxiety disorders, specifically SP, GAD and panic disorder with agoraphobia (PDAg). Since risk-avoidance is hypothesised to be a transdiagnostic construct (see Chapter 1), we predicted that measures of risk-avoidance would account for unique variance in the aforementioned anxiety symptoms above and beyond the influence of neuroticism and other anxiety or depressive symptoms.

Method

Participants

Anxiety Disorder (AD) Group. The AD sample comprised 67 patients (mean age = 35.88 years, *SD* = 11.26; range = 19–68 years, 35 male/ 32 female) with a primary diagnosis of social phobia (SP; *n* = 40), generalised anxiety disorder (GAD; *n* = 13) or panic disorder with or without agoraphobia (PD; *n* = 14) recruited from a specialist outpatient anxiety disorders clinic. Of the sample, 20% (*n* = 13) met criteria for only one disorder, 37% (*n* = 25) met criteria for two, 27% (*n* = 18) met criteria for three and 16% (*n* = 11) met criteria for four or more anxiety or affective disorders. Proportions of patients meeting criteria for each anxiety or mood diagnosis were as follows: SP = 73%, GAD = 45%, PD = 25%, obsessive-compulsive disorder (OCD) = 6%, and major depressive disorder (MDD) = 34%. All participants had been diagnosed via face-to-face semi-structured clinical interview with an experienced Consultant Psychiatrist, which was later confirmed by the administration of the *Anxiety Disorders Interview Schedule for DSM-IV* (ADIS-IV; Brown, Di Nardo, & Barlow, 1994) by a Clinical Psychologist. Exclusion criteria included concurrent psychotic ideation, organic brain dysfunction or significant alcohol/substance-abuse. While the original sample included 90 patients, nine were excluded for having incomplete or missing datasets. An additional nine individuals without a primary diagnosis of SP, GAD or PD were also

excluded as the small sample sizes precluded comparison across groups (i.e., no diagnosis, *n* =3; major depressive disorder, MDD, *n* = 5; OCD, *n* = 5; specific phobia, *n* = 1).

Control Group. Control participants for this study were 58 healthy subjects (mean age = 29.17 years, *SD* = 10.25; range = 18–60 years, 25 male/ 33 female). Participants were recruited through a classified advertisement targeting Sydney based viewers placed online from February to March of 2010. Inclusion criteria required that individuals have no history of anxiety, depression, neurological disorders, substance-abuse, alcohol use disorders or other mental health problems, as determined by a telephone screening using the Mini International Neuropsychiatric Interview (Version 6.0.0, MINI; Sheehan et al., 1998).

Measures

Index of Risk-Avoidance.

Domain-Specific Risk-Taking Scale (DOSPERT). Participants' risk propensity was assessed using the 30-item version of the DOSPERT (Blais & Weber, 2006; see Chapter 2 for detailed description). In the current sample, the total score (α = .81) and all five subscales were examined, Social (α = .72), Recreational (α = .73), Financial (α = .58), Health and Safety (α = .66) and Ethical (α = .76).

Primary Symptom Measures.

Agoraphobia Cognitions Questionnaire/Body Sensations Questionnaire (ACQ/BSQ). The ACQ and BSQ (Chambless, Caputo, Bright, & Gallagher, 1984) are measures of the cognitive and physical symptoms of panic disorder, respectively. The ACQ contains 14 common agoraphobic thoughts (e.g., *"I am going to pass out"*), and asks individuals to rate how often the thought is experienced when nervous or frightened (1 – *Thought never occurs*, 5 – *Thought always occurs*). The BSQ contains 17-items asking individuals to rate on a 5-point scale (1 – *Not at all*, 5 – *Extremely*) how frightening certain body sensations are in feared situations (e.g., *"Heart palpitations"*). Both the ACQ and BSQ have been shown to have

excellent psychometric properties, including internal reliability, construct, and discriminant validity (Chambless, Beck, Gracely, & Grisham, 2000; Chambless et al., 1984; Chambless & Gracely, 1989). In the current sample, for ACQ, α = .77 and for BSQ, α = .91.

Penn-State Worry Questionnaire (PSWQ). GAD symptom severity, specifically the characteristic of excessive and uncontrollable worry, was measured using the 16-item PSWQ (Meyer, Miller, Metzger, & Borkovec, 1990). Each question is rated on a 5-point Likert scale (1 – *Not at all typical of me*, 5 – *Very typical of me)* and a total score with range 0 to 80 is calculated by summing all items (reverse scoring for items 1, 3, 8, 10 and 11). The PSWQ has been found to possess high levels of internal-consistency (*α* = .86–.95; current study, α = .88), test-retest reliability (*r* = .74 - .93) as well as good convergent and divergent validity (Molina & Borkovec, 1994).

Social Phobia Scale (SPS) and Social Interaction and Anxiety Scale (SIAS). The SPS and SIAS (Mattick & Clarke, 1998) are widely used measures of SP symptom severity. The SPS measures anxiety experienced in situations where the individual is the focus of attention or being observed (e.g., eating, drinking, or writing, etc.), while the SIAS measures the level of anxiety experienced in one-on-one and group social contexts (e.g., nervousness when speaking to authority or talking to an attractive person of the opposite sex, etc.). Both scales ask individuals to rate 20 items on a 5-point Likert scale (0 – *Not at all characteristic*, 4 – *Extremely characteristic*). The possible range of scores for each of the scales is 0 to 80. Both the SPS and the SIAS have been shown to have high internal consistency (α = .89 and α = .94, respectively), test-retest reliability (Mattick & Clarke, 1998), sensitivity to change (Cox, Ross, Swinson, & Direnfeld, 1998), as well as high discriminant and construct validity for the assessment of social phobia (Heimberg et al., 1992; Mattick & Clarke, 1998). Internal consistency for the current sample was very high (SPS, α = .92; SIAS, α = .85)

Secondary Measures.

Eysenck Personality Questionnaire (EPQ). The Neuroticism (23-items) and Extraversion (21-items) subscales of the widely used EPQ (Eysenck & Eysenck, 1975) were included to assess the respective personality traits. Reliability and validity of the EPQ subscales have been documented extensively (see Barrett, Petrides, Eysenck, & Eysenck, 1998; current sample: Neuroticism, $\alpha = .84$; Extraversion, $\alpha = .87$).

Beck Depression Inventory (BDI-II). The BDI-II (Beck, Steer, & Brown, 1996) is a commonly used measure of depression symptom severity in adults. It contains 21-items scored on a 4-point Likert scale, and a total score is obtained by summing all items (with a higher total score indicating greater severity of depressive symptoms; range, 0 – 63). The psychometric properties of the BDI-II have been well established (see Dozois, Dobson, & Ahnberg, 1998; current sample, $\alpha = .93$).

Kessler Psychological Distress Scale (K-10). The K-10 (Kessler et al., 2003) was used as an overall measure of global distress and impairment. The K-10 consists of 10 5-point Likert items (1 – *None of the time*, 5 – *All of the time*) assessing distress experienced as a result of anxiety and depression over the previous four week period, with total scores (range 0 – 50) over 17 suggesting the presence of a mental health disorder (Andrews & Slade, 2001). Excellent psychometric properties have been demonstrated (Andrews & Slade, 2001; current sample, $\alpha = .93$).

Procedure

AD Group. All patients gave their informed consent for their de-identified data to be used for research purposes (see Appendix 3) and study measures were included as part of an intake assessment battery administered at the time of diagnostic interview.

Control Group. Following the telephone screening process, participants were emailed a link to access the online survey containing demographic questions and the DOSPERT.

Participants gave their informed consent to participate in this study (see Appendix 3) and were entered into a draw for $50 in exchange for their participation. The experimental procedures complied with ethical guidelines as approved by the University of New South Wales.

Results

Participant Characteristics

Demographic characteristics of the anxious and control groups are presented in Table 4.1. There were no significant between-group differences in gender, marital status and education (*p*s > .05). There was, however, a significant difference in age between groups, $t(123) = -3.46$, $p < .01$, with the control group being slightly younger than the anxious group. Both groups had predominantly never been married and the majority had received education above a high school diploma level.

Table 4.1
Demographic Information for Anxiety Disorder and Control Groups

	Anxiety Disorder (*n* = 67)		Control (*n* = 58)	
Variable	*n*	%	*n*	%
Age	35.88 (*SD* = 11.26)		29.17 (*SD* = 10.25)	
Gender				
Male	35	52.2	25	43.1
Female	32	47.8	33	56.9
Marital Status				
Never Married	39	58.2	36	62.1
Married	12	17.9	18	31.0
Divorced	7	10.4	1	1.7
Other	9	13.5	3	5.2
Missing	0	-	0	-
Education				
< High School	3	5.2	1	1.7
High School Diploma	16	27.6	16	27.6
Other Qualification	10	17.2	14	24.1
Undergraduate Degree	23	39.7	13	22.4
Postgraduate Degree	6	10.3	14	24.1
Missing	9	-	0	-

Comparison of Risk-Taking Scores between the Anxiety Disorder and Control Groups

Results for comparison of risk-taking scores between anxious and control groups are presented in Table 4.2. To examine differences in risk propensity between the anxious and control groups, a multivariate analysis of covariance (MANCOVA) was conducted, using group (AD vs. control) as the independent variable, the five subscales of DOSPERT as the dependent variables, and age as covariate. Preliminary testing of assumptions indicated no serious violations. Analyses revealed a significant multivariate main effect for group, Wilks' $\lambda = .67$, F (5, 118) = 11.68, $p < .05$, $\eta^2 = 0.33$. When the results for the dependent variables were examined separately using a series of univariate ANCOVAs (i.e., analysis of covariance), controlling for age, results revealed a main group effect for overall risk-taking on the DOSPERT, $F(1, 121) = 18.38$, $p < .001$, $\eta^2 = 0.13$. Upon closer examination of subscales, analyses revealed a significant group effect for the Social, Recreational and Health and Safety subscales (adjusted ps < .01; see Table 4.2). The effect of group on the Financial and Ethical subscales, however, was not significant (adjusted ps > .05).

Table 4.2

Mean Scores, Standard Deviations, and Between-Group Comparisons (ANCOVA), Adjusting for Age

	Anxiety Disorder (n = 67)		Control (n = 58)		Between-group comparisons		
Variable	*M*	*SD*	*M*	*SD*	$F_{(1,121)}$	*p*	η^2
DOSPERT							
Total	81.40	20.43	100.76	21.30	18.38	<.001	0.13
Social	24.85	6.89	29.62	5.37	16.87	<.001	0.12
Recreational	13.84	7.41	22.66	8.59	26.72	<.001	0.18
Financial	13.89	5.69	16.62	7.21	3.43	.07	0.03
Ethical	15.90	5.31	15.00	5.78	1.69	.20	0.01
Health & Safety	12.94	4.56	16.86	6.73	9.37	<.001	0.07

Note. η^2 = eta squared, index of effect size. DOSPERT = Domain-Specific Risk-Taking Scale.

To examine risk-avoidance between anxiety diagnoses, a multivariate analysis of variance (MANOVA) was conducted, using primary diagnosis as the independent variable and the five subscales of DOSPERT as the dependent variables. Preliminary testing of assumptions indicated no serious violations. Analyses revealed no significant multivariate main effect for primary diagnosis, Wilks' $\lambda = .78$, $F\ (1, 120) = 1.56$, $p > .05$, $\eta^2 = 0.12$, indicating no significant differences between diagnoses in risk-avoidance across domains.

Risk-taking scores in the control group were comparable to those found in the non-clinical control sample in Study 2 and, as would be expected, slightly lower than those from undergraduate student samples (Blais & Weber, 2006; Lorian & Grisham, 2010). Likewise, risk-taking scores in the anxious group were comparable to the online clinically anxious population used in Study 2 (Lorian & Grisham, 2011) and slightly higher than those in Maner & Schmidt's (2006) study.

Association between Risk-Taking and Symptom Measures in the Anxiety Disorder Group

To examine associations between risk-taking and symptom measures, bivariate Pearson correlation coefficients were calculated (see Table 4.3). Total DOSPERT score approached a significant negative association with GAD symptoms (PSWQ) and demonstrated a trend towards a positive association with social anxiety symptoms (SIAS; $ps \leq .10$). All other correlations between the DOSPERT total score and symptoms measures were nonsignificant ($ps > .05$).

Analyses at the subscale level revealed the Social subscale of the DOSPERT to be significantly negatively associated with symptoms of depression (BDI-II) while the Recreational subscale was negatively associated with panic symptoms (ACQ) and (marginally) positively associated with social anxiety symptoms (SIAS). On the other hand, ethical risk-taking was significantly associated with GAD symptoms (PSWQ), while the Financial and Health and Safety subscales were not significantly associated with any symptom measures ($ps > .05$).

Association between Risk-Taking and Other Measures in the Anxiety Disorder Group

Bivariate Pearson correlation coefficients were also calculated to examine associations between risk-taking and other measures, including personality, and psychological distress (see Table 4.3). For personality variables as determined by the EPQ, only the Social subscale was significantly positively associated with extroversion ($p < .001$), while marginally significant associations were found between neuroticism and the Social and Health and Safety subscales ($ps \leq .10$). No significant correlations were revealed between psychological distress (K-10) and all domains of risk-taking ($ps > .05$).

Table 4.3

Symptom Measure Means and Standard Deviations Mean Scores, Standard Deviations, and Pearson Bivariate Correlation Coefficients Between Risk-Taking and Symptom Measures for Anxiety Disorder Group

Measure	*M*	*SD*	DOS Total	Social	Recreational	Financial	Ethical	Health & Safety
EPQ- neuroticism	16.39	5.11	.03	-.24[a]	.04	.06	.09	.23[a]
EPQ- extroversion	7.19	4.53	.15	.45[***]	.07	-.05	.06	-.18
ACQ	30.26	8.39	-.25	-.28	-.34[*]	-.02	-.11	-.01
BSQ	40.12	13.76	-.17	-.17	-.19	.00	-.11	-.04
PSWQ	62.79	11.88	-.29[a]	-.19	-.23	.01	-.38[*]	-.21
SIAS	51.71	12.47	.27[a]	.13	.26[a]	.15	.23	.11
SPS	38.79	12.47	.12	.11	.24	.03	-.02	-.05
BDI-II	20.42	11.94	-.08	-.27[*]	-.03	-.01	.07	-.02
K-10	30.09	9.44	.14	-.11	.24	.11	.11	.14

Note. EPQ = Eysenck Personality Questionnaire; ACQ = Agoraphobic Cognitions Questionnaire; BSQ = Bodily Sensations Questionnaire; PSWQ = Penn State Worry Questionnaire; SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; BDI-II = Beck Depression Inventory-II; K-10 = Kessler Psychological Distress Scale; DOS = Domain-Specific Risk-Taking Scale.

[a]$p \leq .10$, [*] $p < .05$, [**] $p < .01$, [***] $p < .001$

Does Risk-Avoidance Predict Symptoms of Anxiety Pathology?

Several hierarchical linear regressions were conducted in order to ascertain whether DOSPERT subscales (i.e., those found to significantly correlate with disorder symptoms as described above) predicted panic disorder/agoraphobia (ACQ/BSQ composite score), GAD (PSWQ), social anxiety (SIAS/SPS composite score), and depression (BDI-II), with the respective symptom measure serving as the dependent variable. Given that the K-10 did not correlate with any measures of risk-taking, it was excluded from regression analyses. Furthermore, given high correlations between the ACQ and BSQ, and the SIAS and SPS, suggesting multicollinearity, two composite scores were calculated, one for symptoms of PD (ACQ/BSQ) and one for symptoms of SP (SIAS/SPS). The ACQ and BSQ were highly correlated with their composite score (*r*s = .89 and .96, respectively, *p*s < .001), as were the SIAS and SPS (*r*s = .86 and .92, respectively, *p*s < .001). For each of the models, neuroticism was entered as a covariate into the first block, the DOSPERT subscales that correlated with the dependent variable were entered into the second block, and all remaining symptom measures were entered into the third block.

As shown in Table 4.4, neuroticism significantly predicted all criterion variables in Step 1, and remained significant in Step 2 for all criterion variables (*p*s < .05). In Step 2, the Recreational subscale uniquely explained a significant portion of variance in the SIAS/SPS and ACQ/BSQ criterion variables (*p*s < .05). In addition, in Step 2, the Ethical subscale explained a significant unique portion of the variance in the PSWQ criterion variable (*p* < .05), while the Social subscale explained a significant unique portion in the BDI-II criterion variable (*p* < .05). For all criterion variables, addition of remaining symptom measures in Step 3 did not explain a significant amount of additional variance (*p*s > .05). Overall, after controlling for neuroticism, the Recreational subscale predicted SP and PD symptoms, the Ethical subscale predicted GAD symptoms, while the Social subscale predicted depression symptoms. Moreover, comorbid

symptoms did not account for any significant additional variance beyond that of neuroticism and risk-avoidance.

Table 4.4

Results from Hierarchical Linear Regressions for Anxiety Symptom Measures Controlling for Neuroticism and Symptom Measures

Criterion	Predictors	R^2	ΔR^2	*B*	*SE B*	β	*t*	Part *r*
ACQ/BSQ	Step 1							
	Neuroticism	.32**		.51	.24	.35	2.11*	.44
	Step 2	.43**	.11*					
	Neuroticism			2.94	.87	.55	3.40**	.55
	Recreational			-1.06	.50	-.34	-2.10*	-.34
	Step 3	.50*	.06					
	Neuroticism			2.79	1.23	.52	2.27*	.37
	Recreational			-1.17	.63	-.38	-1.87[a]	-.31
	PSWQ			.38	.38	.21	1.00	.08
	SIAS/SPS			.08	.17	.10	.47	.16
	BDI-II			-.50	.39	-.26	-1.29	-.21
PSWQ	Step 1							
	Neuroticism	.22*		1.38	.45	.53	3.44**	.47
	Step 2	.48**	.25**					
	Neuroticism			1.51	.45	.52	3.34**	.52
	Ethical			-1.11	.34	-.50	-3.25**	-.50
	Step 3	.63**	.15					
	Neuroticism			.68	.64	.23	1.06	.15
	Ethical			-1.25	.36	-.57	-3.50**	-.49
	ACQ/BSQ			.03	.10	.05	.24	.03
	SIAS/SPS			.03	.07	.07	.44	.06
	BDI-II			.47	.17	.45	2.76*	.39

SIAS/SPS	Step 1	.30**						
	Neuroticism			3.83	1.22	.55	3.13**	.55
	Step 2	.43**	.13*					
	Neuroticism			3.95	1.13	.56	3.50**	.56
	Recreational			1.47	.66	.36	2.25*	.36
	Step 3	.45*	.02					
	Neuroticism			3.07	1.76	.44	1.75[a]	.30
	Recreational			1.80	.84	.44	2.15*	.37
	ACQ/BSQ			.15	.31	.11	.47	.08
	PSWQ			.18	.53	.08	.34	.06
	BDI-II			.15	.55	.06	.28	.05
BDI-II	Step 1							
	Neuroticism	.24*		1.38	.51	.49	2.71*	.49
	Step 2	.37**	.32*					
	Neuroticism			1.25	.48	.44	2.61*	.44
	Social			-.82	.38	-.37	-2.16*	-.36
	Step 3	.49*	.12					
	Neuroticism			1.29	.67	.46	1.92[a]	.31
	Social			-.89	.39	-.40	-2.30*	-.38
	ACQ/BSQ			-.17	.11	-.32	-1.50	-.25
	PSWQ			.34	.19	.35	1.81[a]	.30
	SIAS/SPS			.00	.08	-.01	-.04	-.01

Note. Δ denotes change. ACQ = Agoraphobic Cognitions Questionnaire; BSQ = Bodily Sensations Questionnaire; PSWQ = Penn State Worry Questionnaire; SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; BDI-II = Beck Depression Inventory-II.

[a] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Discussion

This study is one of the first to examine the contribution of risk-avoidance across domains to anxiety symptomatology in a clinically anxious treatment-seeking sample. The first aim of this study was to contrast risk-avoidance between individuals with anxiety disorders and non-clinical control participants. Consistent with our hypotheses, we found the anxiety disorder group to be generally more risk-avoidant relative to control participants even after controlling for differences in age. This finding also applied at the subscale level for the social, recreational and health and safety domains, but not for the financial and ethical domains for which there were no significant between-group differences. These results suggest that, in accordance with previous findings (Maner & Schmidt, 2006) and the studies in this program of research, clinically anxious individuals show a reduced tendency to take risks across a number of behavioural domains.

Our second aim was to investigate the relationship between risk-avoidance and symptoms of SP, GAD, and PD. Interestingly, risk-avoidance was not found to be consistently associated with the various anxiety symptom measures. Contrary to our hypotheses, increased SP symptomatology was associated with increased recreational risk-taking. On the other hand, in partial support of our hypotheses, increased GAD symptomatology was associated with increased risk-avoidance in the ethical domain while increased PD symptomatology was associated with reduced recreational risk-taking. For non-anxiety symptoms, depression was associated with risk-avoidance in the social domain. Consistent with our hypotheses, psychological distress was not associated with any form of risk-taking.

In terms of disorder non-specific measures, our predictions were partially confirmed. Neuroticism was found to approach a significant relationship with reduced social risk-taking and increased health and safety risk-taking, which is consistent with previous research showing neuroticism to be negatively associated with the social domain and positively associated with the health and safety domain of the DOSPERT (Nicholson, Soane, Fenton-O'Creevy, & Willman,

2005a). However, contrary to previous research, risk-avoidance in the other domains was not associated with neuroticism, while extraversion was only associated with social risk-taking. Given the inconsistent associations of risk-avoidance with neuroticism, it is perhaps premature to conceptualise risk-avoidance as a transdiagnostic factor and thus, future studies are needed to shed light on this topic. Additionally, these results highlight the complexity of the risk-taking construct, supporting the notion that risk-avoidance is unlikely to be consistent across domains in pathological anxiety and is likely to also be a product of personality, experience and situational variables (Einav, Finkelstein, Pascu, & Cullen, 2010; Hanoch et al., 2006; Nicholson et al., 2005b).

This study also examined the unique contribution of risk-avoidance to anxiety pathology. Overall, we found risk-avoidance to explain most unique variance in symptoms of GAD, SP, and PD, respectively. In particular, we found recreational risk-avoidance to uniquely predict variance in both SP and PD symptomatology (albeit in inverse directions) and ethical risk-avoidance to predict GAD symptomatology, beyond the influence of neuroticism and other anxiety symptoms. In addition, consistent with evolutionary (e.g., Price, Sloman, Gardner Jr, Gilbert, & Rohde, 1994), developmental (Rubin, Coplan, & Bowker, 2009; Rubin, Hymel, & Mills, 1989), and clinical (e.g., Beesdo et al., 2007) research linking social withdrawal and anxiety with depression, social risk-avoidance uniquely predicted depressive symptomatology. Collectively, these results suggest that risk-avoidance in different domains may contribute uniquely to pathological anxiety and depression, distinctive from the influence of other underlying vulnerability, such as neuroticism and other anxiety pathology.

Given that no studies to date have examined the contribution of risk-avoidance to specific anxiety symptomatology, it is of particular interest that specific risk-taking domains predicted anxiety symptoms. Interestingly, risk-avoidance in the recreational domain predicted increased panic symptoms, which is in line with the CBT models of PD, highlighting the pivotal role of

interoceptive and behavioural avoidance (Craske et al., 1987; Salkovskis, 1991), such that individuals with PD are likely to avoid activities that provoke feared physiological reactions (which are likely to be evoked during recreational or physical risk-taking). This finding is also consistent with experimental research showing avoidant-coping to predict anxiety in response to physical panic symptoms (Spira, Zvolensky, Eifert, & Feldner, 2004). On the other hand, risk-avoidance in the ethical domain predicted increased GAD symptomatology. One possible explanation for this finding is that ethical risk-avoidance is associated with avoidance of worry-provoking, uncertain situations across domains (rather than specifically related to social, physical, financial or health and safety risks). This is in line with research linking worry to intolerance of uncertainty in decisions under ambiguous conditions, where outcomes are unknown (Dugas, Freeston, & Ladouceur, 1997; Dugas, Letarte, Rhéaume, Freeston, & Ladouceur, 1995; Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994; Ladouceur, Talbot, & Dugas, 1997), as differentiated from decisions under risk, whereby outcomes are known (see Loewenstein et al., 2001).

An interesting finding in our study was that risk-taking in the recreational domain positively predicted SP symptomatology. This is in contrast to previous studies that have found SP symptomatology to be associated with reduced risk-taking in samples high in social anxiety (Maner et al., 2007; Maner & Schmidt, 2006). However, there is evidence to suggest the existence of a disinhibited, risk-prone subtype of SP, which accounted for 21% of those with a primary diagnosis of SP in one large-scale study (Kashdan et al., 2006; Kashdan, Elhai, & Breen, 2008; Kashdan & McKnight, 2010; Kashdan et al., 2009). Likewise, some decision-making studies have found social anxiety to be associated with increased risk-taking on instrumental risk-taking tasks (e.g., Miu et al., 2008a). There is also some indirect evidence to suggest that recreational risk-taking serves an emotion regulatory function in those with alexithymia, which has been associated with social anxiety (e.g., 34% prevalence of alexithymia in SP; Cox,

Swinson, Shulman, & Bourdeau, 1995; see also Fukunishi, Kikuchi, Wogan, & Takubo, 1997). For example, one study suggested that high-risk activities, such as skydiving, may serve as a means of regulating emotion for those with emotional difficulties (Woodman et al., 2009). Alternatively, the association between recreational risk-taking and social phobia symptoms may simply reflect avoidance of social activities, given the solitary nature of the activities on the Recreational subscale of the DOSPERT (e.g., skydiving, bungee jumping, skiing, whitewater rafting etc.) It is evident, nonetheless, that further studies are needed to clarify the nature of SP and risk-prone behaviour.

There are a number of important clinical implications of the present findings. If reliable, it may be that individuals presenting with SP and PD would benefit from directly targeting risk-related cognitions and appraisals in recreational domains (which may be indirectly targeted in current CBT protocols through behavioural activation and interoceptive exposure), while individuals presenting with GAD would benefit from challenging more global risk-related beliefs (as also suggested by the intolerance of uncertainty literature e.g., McEvoy & Mahoney, 2011). Furthermore, while behavioural activation is advocated in CBT for depression, as suggested by the results of this study, perhaps directly targeting social withdrawal by increasing social risk-taking may assist in alleviating depressive symptoms. Developmentally, increasing risk-taking in social and recreational domains, as well as in situations of uncertainty, may serve as a protective factor against pathological anxiety and depression.

Several limitations of this study should be acknowledged. First, this study employed a cross-sectional design, precluding investigation of causal relationships; future experimental and longitudinal research designs are needed to establish causal relationships between risk-avoidance and anxiety symptoms. Second, we used self-report measures to assess risk-avoidance, therefore results may be affected by the biases inherent in self-report measures. It is recommended that future studies use multiple validated self-report and behavioural indices to assess risk-avoidance

(e.g., Columbia Card Task, CCT, Figner et al., 2009; Balloon Analogue Risk Task, BART, Lejuez et al., 2002). Although individuals were excluded for severe forms of alcohol or substance abuse problems and other problems likely to interfere with treatment, other disorders that may impact impulsivity and risk-taking (e.g., impulse-control disorders, personality disorders; Goudriaan et al., 2005; Haaland & Landrø, 2007) were not explicitly assessed. It is also noted that the measures used to assess symptoms of PD and GAD are not specific to these disorders (i.e., these indices are elevated across other anxiety disorders), precluding any conclusions about the contribution of risk-avoidance to the specific disorders. Future studies using groups categorised on the basis of primary diagnosis as well as disorder-specific measures (e.g., Generalized Anxiety Disorder Questionnaire for the DSM-IV, GAD-Q-IV, Newman et al., 2002; Panic Disorder Severity Scale, PDSS, Shear et al.,1997) will assist in further elucidating the impact of risk-avoidance on specific disorders. Despite these limitations, this study offers a novel and unique perspective regarding the relationship between risk-avoidance and anxiety pathology.

Implications for the Program of Research

Study 3 offered further support for the association between risk-avoidance and pathological anxiety by demonstrating that treatment-seeking anxious individuals report greater risk-avoidance relative to non-clinical controls across several behavioural domains on a domain-specific self-report measure of risk-taking (DOSPERT). Results showed that particular domains of risk-avoidance predicted anxiety symptomatology across disorders above and beyond the contribution of neuroticism, suggesting that risk-avoidance may uniquely contribute to anxiety pathology as a transdiagnostic factor. In particular, (i) recreational risk-avoidance predicted PD, (ii) recreational risk-taking predicted SP, (iii) ethical risk-avoidance predicted GAD, and (iv) social risk-avoidance predicted depression. These results offer further support for the association between risk-avoidance and anxiety pathology and also suggest that the contribution of risk-

avoidance to anxiety pathology may be, to some degree, complicated by domain and disorder-specificity.

CHAPTER 5

CLINICAL IMPLICATIONS OF RISK-AVOIDANCE AND ANXIETY: TREATMENT-SEEKING

STUDY 4*

	Page
STUDY 4: An Online Study of Risk-Avoidance and Treatment-Seeking in Pathological Anxiety	
Introduction	104
Method	106
Participants	106
Measures	108
Procedure	111
Results	113
Participant Characteristics	113
Comparison of Risk-Taking Scores between the Anxiety Disorder and Control Groups	114
Association between Risk-Taking and Symptom Measures	118
Barriers to Treatment	118
Treatment-Seeking and Risk-Avoidance	119
Discussion	121
Implications for the Program of Research	126

* Study published: Lorian, C. N., & Grisham, J. R. (2011). Clinical implications of risk-aversion: an online study of risk-avoidance and treatment utilization in pathological anxiety. *Journal of Anxiety Disorders, 25*, 840-848.

STUDY 4

An Online Study of Risk-Avoidance and Treatment-Seeking in Pathological Anxiety

Introduction

So far, Study 1 established that risk-avoidance may mediate the relationship between a dispositional vulnerability to anxiety and social anxiety pathology in an undergraduate sample. Study 2 and 3 showed that clinically anxious individuals are more likely than non-clinical controls to exhibit risk-avoidant tendencies across a number of risk domains and that risk-avoidance in specific domains may contribute differentially to each anxiety disorder. Like the current program of research, much of the previous literature investigating decision-making and anxiety has focussed on establishing a theoretical and empirical understanding of risk-avoidance. However, the potential clinical implications – such as whether risk-avoidance affects treatment-seeking or treatment outcome in anxious individuals – have not yet been investigated. The present study intends to examine how risk-avoidance in an online anxious sample relates to willingness to seek treatment.

As noted in Chapter 1, a large body of literature has been devoted to the improvement of current treatment protocols. Nevertheless, efficacious treatments are of little use if they are not being accessed by those who need them. Within the literature, a number of barriers that affect the likelihood of seeking treatment have been identified including *approach* factors, which increase the likelihood of seeking treatment (e.g., level of distress) and *avoidance* factors, which decrease the likelihood of seeking treatment (e.g., fear of symptoms getting worse; Kushner & Sher, 1989, 1991; Vogel & Wester, 2003). Anxious individuals, in particular, have been shown to be less likely, and generally take longer after symptom onset, to seek treatment than other clinical disorders (Wang et al., 2007a).

In light of the underutilisation of treatment for anxiety disorders, one factor that may contribute to treatment delay and avoidance of seeking treatment altogether is the

overestimation of risky outcomes and subsequent risk-avoidant choices associated with the safety bias. Based on the findings so far in this thesis, it is possible that anxious individuals perceive psychological treatment as potentially risky and therefore may be reluctant to seek help despite the long-term benefits. In support of this, Vogel and Wester (2003) proposed that the decision to seek treatment depends on the appraisal of perceived risks (e.g., disclosure to a stranger) and benefits (e.g., reduction of impairment) associated with seeking psychological services. Indeed, studies have demonstrated that both perceived risks and benefits predict attitudes and intentions to seek treatment (Shaffer, Vogel, & Wei, 2006; Vogel, Gentile, & Kaplan, 2008; Vogel, Wade, & Hackler, 2008; Vogel, Wester, & Larson, 2007; Vogel et al., 2006; Vogel, Wester, Wei, & Boysen, 2005). For instance, perceived risks have been shown to predict reduced treatment-seeking for individuals who had previously experienced a distressing event, while perceived benefits have been shown to predict treatment-seeking behaviour more generally (Vogel et al., 2005). The association between risk-avoidance and anxiety may therefore contribute to the decision to seek treatment. Perhaps investigating attitudes towards risk-taking in individuals who have never sought treatment may offer valuable insight into understanding the personal factors that prevent anxious people from seeking help.

The current study is among a small, albeit expanding body of clinical research that utilises an online sample and methodology. The use of the Internet as a psychological research medium has gained significant popularity over the last decade (Denissen, Neumann, & van Zalk, 2010; Skitka & Sargis, 2006). Among a myriad of advantages (e.g., both time and cost efficiency; see Denissen et al., 2010), online psychological research allows researchers greater access to samples that are underrepresented or difficult to recruit in other settings. This applies particularly to individuals suffering from anxiety disorders, given the

avoidant nature of the pathology. Investigating risk-avoidance and treatment-seeking in an online sample will allow for a valuable examination of a less accessible population.

In this Study, we examined risk-avoidance and its association with treatment-seeking in an online sample of individuals meeting diagnostic criteria for social phobia (SP), obsessive-compulsive disorder (OCD) or generalised anxiety disorder (GAD). We hypothesised that anxious individuals would exhibit significantly more risk-avoidance, when compared to an online sample of non-clinical control participants. Furthermore, we hypothesised that risk-avoidance would predict future willingness to seek treatment. Given the paucity of previous research on this topic, we made no firm predictions regarding whether risk-avoidance and treatment-seeking would differ between anxiety disorder diagnoses.

Method

Participants

A total of 307 participants (109 M, 198 F), recruited from various Internet websites that advertised online psychological research, completed the online survey and a total of 209 individuals comprised the final study sample. In order to ensure sample quality, strict inclusion criteria were applied to assign participants into anxiety disorder (n = 92) and control (n = 117) groups. A total of 49 participants were excluded for not meeting one or more inclusion criteria for either the anxiety disorder (n = 35) and control (n = 14) groups. Individuals in the anxiety disorder group were further categorised on the basis of their primary anxiety disorder diagnosis: social phobia (SP; n = 33), obsessive-compulsive disorder (OCD; n = 19), and generalised anxiety disorder (GAD; n = 40). Due to the small number of individuals with a primary diagnosis of panic disorder (PD; n = 10) and posttraumatic stress disorder (PTSD; n = 5), they were excluded from all analyses. In addition, 11 respondents were excluded due to inconsistent or careless responding and 14 respondents were excluded as they endorsed one or

more exclusion criteria. Overall, 43 respondents initiated but did not submit a completed survey. Demographic information for the final study sample is presented in Table 5.1.

All participants were screened for the presence of an anxiety disorder (according to the current DSM-IV-TR; American Psychiatric Association, 2000) using the Web-Based Depression and Anxiety Test (WB-DAT; Farvolden, McBride, Bagby, & Ravitz, 2003; see below). Individuals endorsing DSM-IV-TR criteria for SP, OCD and GAD with moderate or higher severity (≥2 on a 0 to 4 scale on a question asking about impact of specific symptoms on day-to-day functioning) were assigned into the anxiety disorder group. Individuals meeting criteria for SP and OCD were required to complete additional symptom severity scales – SIAS and OCI-R – and clinical cut-off scores were used to further control assignment into the diagnostic categories. Assignment into the GAD group was based on clinical cut-off scores of the Stress subscale of the DASS. As mentioned previously, 35 participants were not included as they did not meet clinical cut-off scores on symptom severity scales despite meeting criteria according to their responses on the WB-DAT. For those meeting criteria for more than one anxiety disorder, a primary diagnosis was determined by the highest rating of severity and day-to-day interference. In the case that a primary diagnosis could not be established (i.e., where two or more diagnoses were rated of equally high interference), participants were not included in the anxiety disorder sample (n = 9).

Anxiety Disorder (AD) Group. Ninety-two adults who had a single (n = 40) or coexistent (n = 52) diagnosis of SP, OCD or GAD comprised the anxiety disorder group (see Table 5.2). Anxiety disorder subgroups did not differ on the demographic information collected (ps > .05).

Control Group. The control group consisted of 117 participants who: i) did not endorse criteria for a mood or anxiety disorder; (ii) had not been previously diagnosed with an anxiety disorder by a medical or healthcare professional; (iii) scored below one standard deviation

below the mean of the symptom severity scales (SIAS and OCI-R); and, (iv) fell within the normal range on all subscales of the DASS.

Measures

Demographic Questionnaire. Participants were asked to provide information about their age, gender, marital status, primary language spoken at home, ethnicity, country of residence and highest level of education attained.

Exclusion Criteria. Participants were asked to indicate whether they were over the age of 18 years old, and whether they were currently affected by (i) substance or alcohol abuse/dependence, (ii) psychotic ideation/psychosis, (iii) brain-injury or other neurological impairment. Those who met exclusion criteria were directed to the 'thank you' page of the study.

Web-based Depression and Anxiety Test (WB-DAT). Questions from the WB-DAT (Farvolden, McBride, Bagby, & Ravitz, 2003) were administered in order to assess all respondents for the presence of SP, OCD, GAD, PD, and PTSD according to criteria from the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; text revision; DSM-IV-TR; American Psychiatric Association, 2000). The WB-DAT is a web-based self-report screening measure that asks respondents about the presence of depression or anxiety symptomatology and the level of resulting interference with everyday life, similar to the *Structured Clinical Interview for the DSM-IV Axis I Disorders* (SCID-I/P; First, Spitzer, Gibbon, & Williams, 1996). The WB-DAT is designed in a branched fashion, consisting of a series of preliminary dichotomous (yes/no) response questions relevant to each anxiety or mood disorder (e.g., *"Have you ever had a sudden period of intense fear, anxiety or discomfort?"*, *"Do you have an excessive fear of, or do you avoid social or work situations because you feel embarrassed, humiliated, or feel that people are judging you?"*); if endorsed, respondents are asked a series disorder-specific questions about symptoms and severity relevant to the preliminary question

which correspond to DSM-IV-TR diagnostic criteria (e.g., *"Have you ever spent a month or more worrying about having an anxiety attack or what might happen if you had another one?"*, *"How much does your fear or avoidance of the above situations interfere with your normal daily life?"*, 0 – *No interference*, 4 – *Extreme/Severe interference*). The WB-DAT has been shown to have considerable face validity and has been shown to be reasonably accurate in identifying patients who meet SCID-I/P criteria for mood or anxiety disorders. More specifically, diagnoses according to the WB-DAT have been found to have acceptable to good agreement (r = .57 - .70), sensitivity (r = .63 - .95) and specificity (r = .87 - .97) with the SCID-I/P for SP, OCD, GAD, PD, and PTSD (see Farvolden et al., 2003).

Diagnostic Measures.

Social Interaction Anxiety Scale (SIAS). Social anxiety symptom severity was measured by the SIAS (Mattick & Clarke, 1998; previously described in Chapter 2). Internet administration of the SIAS has been shown to have similar psychometric properties to a paper-and-pencil format (Hedman et al., 2010). A cut-off score (> 36) was used to identify a potential SP diagnosis (Peters, 2005). Internal consistency in the current sample was high (α = .90).

Obsessive-Compulsive Inventory- Revised (OCI-R). To assess OCD symptom severity, participants' symptoms were assessed using the total score of the OCI-R (Foa et al., 2002). The OCI-R is an efficient, reliable, valid and sensitive instrument containing 18 questions relating to symptom severity and symptom type in OCD and its use in Internet research has been validated (Coles, Cook, & Blake, 2007). For the purpose of this study, a cut-off score on the OCI-R (≥ 21) was used to identify a potential OCD diagnosis (Abramowitz, Tolin, & Diefenbach, 2005). The OCI-R demonstrated a high internal consistency in the current sample (α = .89).

Depression Anxiety and Stress Scales (DASS-21). To measure symptoms of overall distress as well as depression, anxiety and stress, the DASS-21 was administered (Lovibond &

Lovibond, 1995; detailed description provided in Chapter 3). Both the paper-and-pencil and Internet administered versions of this measure have been shown to have excellent psychometric properties (see Zlomke, 2009; current sample, α = .92 - .94). In addition to assessing scores of depression, anxiety and stress, a cut-off score of 14 on the Stress subscale of the DASS was used to substantiate the presence of a diagnosis of GAD; the Stress subscale has been shown to have excellent discriminant validity for detecting the presence of a GAD diagnosis, comparable to that of specific GAD measures (Brown et al., 1997; Gloster et al., 2008).

Indices of Risk-Avoidance.

Domain-Specific Risk-Taking Scale (DOSPERT). Participants' risk-avoidance in various settings was assessed using the DOSPERT (Blais & Weber, 2006; previously described in Chapter 2). In the current sample, the total score (α = .83) and all five subscales were examined, Social (α = .69), Recreational (α = .85), Financial (α = .70), Health and Safety (α = .64) and Ethical (α = .65).

Generalised Risk-Taking Orientation. As a measure of generalised risk-avoidance, respondents were also asked to provide a rating of their perceived risk-taking orientation (1 – *Extremely risk-avoidant*, 10 – *Extremely risky; "In terms of taking risks in your day to day life, how would you classify yourself on a scale of 1-10? Please note that 1 indicates that you avoid taking any risks at all costs and 10 indicates that you engage in extremely risky and dangerous behaviours"*). A single item rated on a Likert-type-type scale has been shown to be a valid and reliable way of assessing generalised risk orientation in different settings (Dohmen et al., 2011; Maestas & Pollock, 2010).

Assessment of Treatment-seeking. Three questions, designed by the study investigators, were included to determine whether individuals with a suspected anxiety disorder had previously or were at the time of the study engaging in any form of treatment for their anxiety. If current or previous treatment was reported, respondents were required to specify the

modality(ies) (i.e., medication, individual therapy/counselling, group therapy/counselling, self-help or other). If no prior treatment-seeking was reported, participants were asked to provide the primary reason for not seeking treatment (blind-coded later into anxiety-related, beliefs about treatment, external factors and lack of severity). A further three questions asked participants to rate (0 – *Extremely Unlikely*, 4 – *Extremely Likely*), the likelihood that they would: (i) seek treatment for their anxiety, irrespective of modality, (ii) seek individual therapy/counselling, and (iii) seek group therapy/counselling for their anxiety in the future.

Procedure

The study page, entitled "Anxiety and Risk-Taking" was designed using Key Survey v6.9 software. In order to reduce respondent attrition and errors inherent in web-based research, the visual design and formatting of the website followed guidelines proposed by Dillman, Tortora, & Bowker (1998; e.g., limiting colours and using a visual progress bar; see also Denissen et al., 2010). Prior to proceeding with the survey, all participants were required to accept the terms of an information and consent statement (see Appendix 4) by checking a box and were informed that they could withdraw from the study at any time by exiting the browser. An optional US$150 prize lottery, to be paid via PayPal, was provided as an incentive for those who completed the study. Other safeguards offered by Key Survey software were also put in place to limit people from taking the survey more than once. All data was checked for careless responding – according to criteria outlined in Johnson (2005) (see also Denissen et al., 2010) – and those identified were subsequently excluded from analyses. The survey was designed in a 'branched' fashion, such that individuals assigned to the control group (i.e., see inclusion criteria above) were not required to fill out symptom severity measures and those meeting criteria for one or more of the clinical groups were directed to complete the corresponding symptom severity measure.

Table 5.1

Demographic Information for Control Group and Anxiety Disorder Subgroups

	Control (n = 117)		SP (n = 33)		OCD (n = 19)		GAD (n = 40)	
	n	(%)	n	(%)	n	(%)	n	(%)
Age	23.5	(SD = 6.0)	25.3	(SD = 8.3)	23.5	(SD = 6.6)	25.4	(SD = 8.0)
Gender								
Male	44	(37.6)	6	(18.2)	4	(21.1)	3	(7.5)
Female	73	(62.4)	27	(81.8)	15	(78.9)	37	(92.5)
Marital Status								
Married	10	(8.5)	4	(12.1)	0	(0.0)	10	(25.0)
Separated	0	(0.0)	1	(3.0)	0	(0.0)	0	(0.0)
Divorced	2	(1.7)	1	(3.0)	0	(0.0)	0	(0.0)
Single	94	(80.3)	25	(75.8)	16	(84.2)	27	(67.5)
Other	11	(9.4)	2	(6.1)	3	(15.8)	3	(7.5)
Primary Language								
English	90	(76.9)	29	(87.9)	13	(68.4)	35	(87.5)
Other	27	(23.1)	4	(12.1)	6	(31.6)	5	(12.5)
Ethnicity								
African American	4	(3.4)	0	(0.0)	0	(0.0)	0	(0.0)
Asian	32	(27.4)	8	(24.2)	5	(26.3)	7	(17.5)
Caucasian	70	(59.8)	22	(66.7)	8	(42.1)	26	(65.0)
Hispanic	5	(4.3)	0	(.0)	0	(.0)	2	(5.0)
Other	6	(5.1)	3	(9.1)	6	(31.6)	5	(12.5)
Country								
Australia	64	(54.7)	17	(51.5)	15	(78.9)	16	(40.0)
Canada	5	(4.3)	0	(0.0)	0	(0.0)	1	(2.5)
New Zealand	1	(0.9)	0	(0.0)	0	(0.0)	0	(0.0)
United Kingdom	5	(4.3)	1	(3.0)	0	(0.0)	2	(5.0)
USA	38	(32.5)	14	(42.4)	4	(21.1)	18	(45.0)
Other	4	(3.4)	1	(3.0)	0	(0.0)	3	(7.5)
Education								
High School/GED	33	(28.2)	10	(30.3)	5	(26.3)	8	(20.0)
Some University	43	(36.8)	15	(45.5)	8	(42.1)	19	(47.5)
Undergraduate	26	(22.2)	5	(15.2)	5	(26.3)	9	(22.5)
Postgraduate	15	(12.8)	3	(9.1)	1	(5.3)	4	(10.0)

Note. SP = social phobia; OCD = obsessive-compulsive disorder; GAD = generalised anxiety disorder.

Results

Participant Characteristics

The control and anxiety disorder groups did not differ with respect to age, marital status, primary language, ethnicity, country of residence and education (*p*s > .05; see Table 5.1 for *M*s and *SD*s). While the control group did differ from the anxiety disorder groups with respect to gender, $\chi^2(3, N = 209) = 15.93$, $p \leq .001$, (Control: 44 Males/73 Females; SP: 6 Males/27 Females; OCD: 4 Males/15 Females; GAD: 3 Males/37 Females), subsequent analyses revealed no significant gender main effect on risk-avoidance, $F(1, 180) = 2.31$, $p > .05$, or Gender x Diagnosis interaction, $F(3,180) = 1.77$, $p > .05$. As expected, control participants demonstrated significantly lower means on all subscales of the DASS when compared to clinical participants (*p*s < .05; see Table 5.2 for *M*s and *SD*s of all self-report measures administered).

Table 5.2.

Mean Scores and Standard Deviations for Self-report Measures for Control and Anxiety Disorder Subgroups

	Control (n = 117)		SP (n = 33)		OCD (n = 19)		GAD (n = 40)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
DASS								
Total	8.49	6.38	47.45	24.66	46.89	20.94	47.56	22.25
Stress	3.80	4.07	17.03	8.46	18.00	9.10	18.11	8.75
Anxiety	1.57	1.86	11.33	8.52	13.00	7.14	12.46	8.20
Depression	2.68	2.71	19.09	11.61	15.89	11.03	17.08	10.27
SIAS			51.45	10.57	43.20	14.59	40.92	12.33
OCI-R			24.90	12.28	31.37	9.14	21.75	11.83

Note. DASS = Depression, Anxiety and Stress Scale; SIAS = Social Interaction Anxiety Scale; OCI-R = Obsessive-Compulsive Inventory Revised.

Social phobia. Overall mean severity level (i.e., interference of symptoms on day-to-day functioning as measured by the WB-DAT) of individuals in the SP group (n = 33) was 3.39 (SD = .66) out of a possible 5 points. Mean SIAS score for this sample was 51.45 (SD = 10.57), slightly lower than the figures reported by Erwin et al. (2004) for an online sample of individuals endorsing criteria for social phobia (M = 58.93, SD = 12.72). Thirteen participants (39%) were determined to have more than one coexisting anxiety disorder diagnosis (GAD, 30%; PTSD, 3%; OCD, 6%; PD, 18%; Ag, 15%).

Obsessive-compulsive disorder. Within the OCD group (n = 19), overall mean severity level on the WB-DAT was 3.53 (SD = .77). Mean OCI-R score was 31.37 (SD = 9.14), which is slightly higher than scores reported by OCD participants in another recent online study (M = 28.62, SD = 12.96; Jelinek, Hottenrott, & Moritz, 2009). Fourteen participants (74%) met criteria for more than one anxiety disorder (GAD, 42%; PTSD, 5%; SP, 31%; PD, 31%; Ag, 26%).

Generalised Anxiety Disorder. Forty participants received a primary diagnosis of GAD. Mean severity for this sample on the WB-DAT was 3.89 (SD = .65) while mean DASS Stress subscale score was 18.11 (SD = 8.75), which is comparable to samples used to test discriminant validity on the DASS (e.g., Brown et al., 1997). Twenty-five participants endorsed criteria for additional anxiety disorders: PTSD (3%), SP (38%), OCD (15%), PD (35%) and Ag (15%).

Comparison of Risk-Taking Scores between Anxiety Disorder and Control Groups

A multivariate analysis of variance (MANOVA) was conducted to compare risk-avoidance between the control, SP, OCD and GAD groups, as measured by the DOSPERT subscales. Preliminary testing of assumptions indicated no serious violations. Results demonstrated a significant multivariate group effect, Wilks' λ = .78, F (15, 508) = 3.25, p <. 001, η^2 = 0.08. Main effects were further examined using a series of univariate ANOVAs, using Bonferroni corrections. Analyses revealed a significant difference between groups on

total DOSPERT scores and self-rated risk-taking (adjusted *p*s < .001). A summary of ANOVA results can be found in Table 5.3. Post hoc comparisons using the Tukey HSD test indicated that the mean score for overall risk-taking on the DOSPERT in control participants was significantly higher than those in the SP and GAD groups (*p*s < .05), but not when compared to the OCD group (*p* = .63; see Figure 5.1 and Table 5.3 for *M*s and *SD*s). Similarly, self-rated risk-taking in the control group was significantly higher than the SP group (*p* < .001) and approached significance in the GAD group (*p* < .10), but was not significant for OCD participants (*p* = .14; see Figure 5.2).

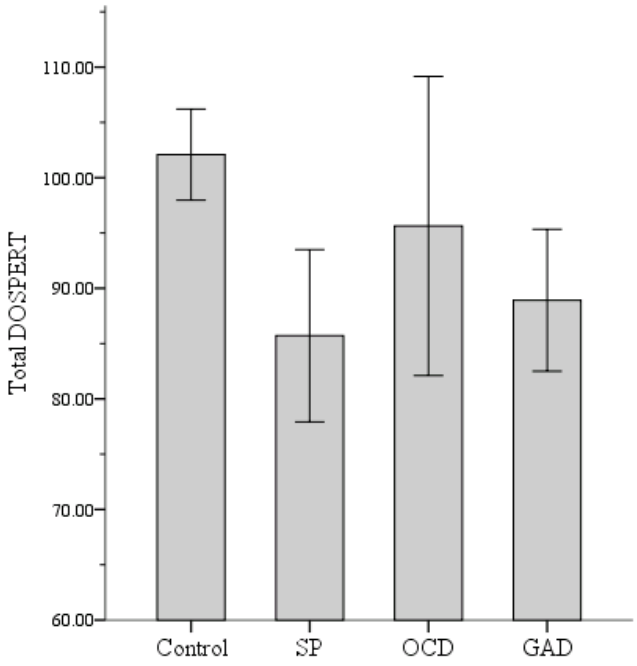

Figure 5.1. Mean total Domain-Specific Risk-Taking (DOSPERT) scale between control, social phobia (SP), obsessive-compulsive disorder (OCD) and generalised anxiety disorder (GAD) subgroups. Error bars based on *SEM*.

Table 5.3

Mean Scores, Standard Deviations, and Analysis of Variance (ANOVA) Results for Risk-Taking Scores Between the Control and Anxiety Disorder Subgroups

	Control (n = 117)		SP (n = 33)		OCD (n = 19)		GAD (n = 40)		Between-group comparisons		
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	$F_{(3,202)}$	*p*	η^2
DOSPERT											
Total	102.09	20.77	85.71	21.69	95.64	29.49	88.92	19.28	6.30	< .001	0.09
Social	29.96	5.57	24.66	7.03	27.32	7.72	26.95	5.84	7.52	< .001	0.10
Recreational	24.02	9.14	17.09	8.48	20.37	10.55	16.84	8.36	9.11	< .001	0.12
Financial	15.35	5.76	13.02	4.27	14.89	6.74	12.19	5.96	3.74	.01	0.05
Ethical	14.96	5.98	13.27	5.67	14.79	6.46	14.15	5.37	0.77	.51	0.01
Health & Safety	17.80	6.91	16.88	6.78	18.26	8.29	18.67	6.96	0.42	.74	0.01
Self Rated Risk-Taking	5.59	1.71	3.69	1.77	4.61	2.17	4.76	1.84	10.09	< .001	0.14

Note. η^2 = eta squared, index of effect size. SP = social phobia; OCD = obsessive-compulsive disorder; GAD = generalised anxiety disorder. DOSPERT = Domain-specific Risk-Taking Scale.

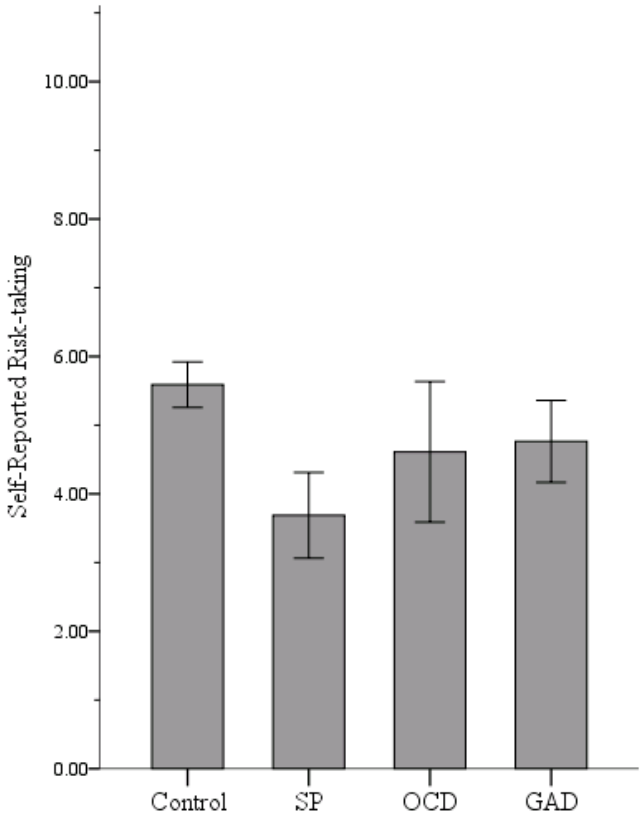

Figure 5.2. Mean self-reported risk-taking score between control, social phobia (SP), obsessive-compulsive disorder (OCD) and generalised anxiety disorder (GAD) subgroups. Error bars based on *SEM*.

Further examination of the DOSPERT subscales revealed significant differences between groups for the Social, Recreational and Financial subscales (adjusted *p*s ≤ .01) , but not the Health and Safety or Ethical subscales (adjusted *p*s > .01; see Table 5.3). Post hoc analyses indicated that the control group was significantly higher on the Social and Recreational subscales relative to SP and GAD participants (*p*s < .05). Risk-taking on the Financial subscale was found to be significantly higher in the control group when compared to the GAD ($p < .05$), but not when compared to the SP ($p = .17$) or OCD ($p = .99$) groups (see Table 5.3 for *M*s and *SD*s).

Association between Risk-Taking and Symptom Measures

Correlational analyses were conducted to examine the relationship between self-reported symptom severity and risk-avoidance as measured by the DOSPERT (see Table 5.3 for *M*s and *SD*s). Social anxiety was found to be significantly negatively correlated with the DOSPERT total score (r = -.31, p < .001) as well as the Social (r = -.43, p < .001), Recreational (r = -.33, p < .001) and Financial subscales (r = -.26, p < .05). The relationships between social anxiety and the Health and Safety (r = -.08, p = .49) and Ethical (r = .06, p = .60) subscales, however, were nonsignificant (ps > .05). Consistent with these results, the negative association between social anxiety and overall self-reported risk-taking approached significance (r = -.20, p < .10).

Contrary to hypotheses, GAD symptomatology was not significantly associated with risk-taking (Total: r = .15, p = .38; Social: r = .05, p = .76; Recreational: r = .08, p = .62; Financial: r = .15, p = .35; Health and Safety: r = .08, p = .63; Ethical: r = -.17, p = .31; Self-rated: r = .21, p = .22). Likewise, obsessive-compulsive symptomatology did not correlate significantly with any subscale of the DOSPERT (Total: r = .12, p = .40; Social: r = -.08, p = .57; Recreational: r = .08, p = .56; Financial: r = .18, p = .19; Health and Safety: r = .13, p = .34; Ethical: r = -.02, p = .91) or overall self-reported risk-taking, r = -.01, p = .95. Similarly, the depression, anxiety, and stress scales did not correlate significantly with any subscale of the DOSPERT (ps > .05).

Barriers to Treatment

Descriptive statistical analyses were conducted to examine the primary barriers to treatment. Of the individuals who had not previously sought treatment for their anxiety (n = 38), a significant proportion (n = 18; 47%) reported that the primary reason for refraining from treatment was related to their anxiety (e.g., discomfort with disclosure, stigma-related concerns, worries about what others may think or fear that symptoms will worsen). Ten individuals

(26%) reported not seeking treatment because of their beliefs about treatment (e.g., questionable utility or effectiveness of treatment, belief that symptoms will remit without treatment or the belief that problems should be resolved alone or with the support of friends/family). Five individuals (13%) reported not seeking treatment due to external factors (e.g., lack of time, money or accessibility), and the remaining 13% (n = 5) reported not seeking treatment due to the belief that their anxiety symptoms were not severe enough to warrant intervention.

Treatment-Seeking and Risk-Avoidance

Correlational analyses were conducted to examine whether risk-avoidance is related to an individual's willingness to seek treatment among those who had never sought treatment (n = 38; see Table 5.4 for correlation coefficients). Willingness to seek treatment of any modality (general) was found to be significantly positively associated with the Social subscale of the DOSPERT and self-rated risk-taking, but not DOSPERT total score or any of the other domains. Willingness to seek individual therapy/counselling was found to be significantly positively associated with self-reported risk-taking and only the Ethical subscale of the DOSPERT (ps < .05). No significant correlations were determined for risk-taking and willingness to seek group therapy/counselling (ps > .05; see Table 5.4).

To examine treatment-seeking preferences between primary anxiety diagnoses in those who had never before sought treatment, a one-way MANOVA was conducted, using primary diagnosis as the independent variable, whilst entering self-rated risk-taking as a covariate. Three dependent variables were used: willingness to seek any modality of treatment, individual therapy/counselling and group therapy/counselling. Preliminary testing of assumptions indicated no serious violations. Analyses revealed no significant multivariate main effect for primary diagnosis, F (6, 94) = 1.96, p > .05; η^2 = 0.11. When the results for the dependent variables were examined separately, the effects of primary diagnosis were also non-significant

(*p*s > .05), indicating no differences between diagnoses in willingness to seek treatment after controlling for differences in self-rated risk-taking.

Table 5. 4

Bivariate Pearson Correlations of Risk-Taking Propensity and Treatment-seeking in Anxiety Disorder Participants Who Have Never Sought Treatment

	Future Treatment		
Measure	General	Individual	Group
DOSPERT			
Total	.28	.36	-.22
Social	.53*	.25	-.09
Recreational	.17	.25	-.25
Financial	.14	.24	-.15
Health & Safety	-.04	.21	-.31
Ethical	.32	.49*	.05
Self Rated Risk-Taking	.42*	.61**	-.20

Note. DOSPERT = Domain-Specific Risk-Taking Scale.

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

Discussion

The present study investigated risk-avoidance in an anxious online sample and how it related to treatment-seeking. We predicted that clinically anxious individuals would report greater risk-avoidance and this would be positively correlated with willingness to seek treatment in individuals who had never before sought help. Consistent with these predictions, SP and GAD individuals reported significantly less risky behaviour in the real world when compared to non-clinical controls. Furthermore, willingness to seek treatment was found to be positively associated with social risk-taking and an overall self-rating of risk-taking behaviour in clinically anxious individuals who had not sought treatment, and willingness to seek treatment did not differ with respect to primary diagnosis. These results suggest that certain individual cognitive factors may contribute to the decision to seek treatment and may provide an interesting avenue of future investigation for increasing service utilisation and treatment-seeking in anxious populations.

Differences between groups were also examined with respect to specific risk-taking domains. Results revealed that individuals with SP and GAD were significantly more risk-averse compared to controls, but only within the social and recreational domains. Furthermore, only the GAD group was significantly more risk-averse within the financial domain. Surprisingly, individuals with OCD did not differ significantly from controls in any of the risk domains. These results suggest that the idea of a ‘global’ – or domain non-specific – risk-avoidant bias is perhaps more complex than initially proposed by Maner and Schmidt (2006), and appears consistent with our previous findings, as well as proponents of a domain-specific view of risk-taking (e.g., Hanoch et al., 2006). As we have seen, the degree to which a person avoids risks is likely to be influenced by a myriad of factors (e.g., situational variables, familiarity, locus of control, etc.; Weber, 2010) that may exert their effects at different stages of the decision-making process. Nevertheless, the results of the current study provide additional

support for the idea that individuals who suffer from pathological anxiety (particularly SP and GAD) have an increased tendency toward risk-avoidant behaviour in domains that are not limited to their disorder and highlight the need for careful assessment of risk-taking across various behavioural contexts.

Interestingly, our study found no significant differences in risk-avoidance between participants with a primary diagnosis of OCD and non-clinical controls. This finding is in opposition to previous studies that have found evidence of more pronounced risk-avoidance in individuals with OCD (e.g.,Cicolini & Rees, 2003; Steketee & Frost, 1994). While this finding may be the result of limited power due to the small number of individuals with OCD in our sample, there is an emerging (albeit inconsistent; see Starcke, Tuschen-Caffier, Markowitsch, & Brand, 2010a) literature suggesting that individuals with OCD exhibit unique neurobiological abnormalities, expressed as cognitive and decision-making impairments that are likely to impact on subsequent risk-taking behaviour (e.g., Cavedini et al., 2006a). Nevertheless, future research investigating risk-avoidance in large clinically anxious populations is warranted to establish the consistency of risk-avoidance across specific disorders.

This study also examined willingness to seek-treatment in relation to risk-avoidance and anxiety disorder diagnoses. Whilst the decision to utilise mental health services is influenced by a number of factors ranging from individual to systemic (see Collins, Westra, Dozois, & Burns, 2004), psychological factors, particularly risk-avoidance, are of particular interest to this study. Our study found that over 40% of the anxiety disorder sample had never sought treatment and of those, a further 47% cited avoidance factors as being the primary reason for this decision. This is consistent with literature suggesting that a large proportion of individuals meeting diagnostic criteria for an anxiety disorder are unwilling to seek help largely due to psychological factors (e.g., their attitudes towards treatment; Vogel et al., 2007) as opposed to

other factors (e.g., accessibility and mental health literacy; Coles & Coleman, 2010; Collins et al., 2004; for opposing argument see Mohr et al., 2006; Mohr et al., 2010a). Furthermore, longitudinal studies examining failure to treat mild mental health concerns (i.e., longer treatment delays) have been shown to predict greater psychiatric comorbidity, symptom severity, and social and occupational dysfunction (Wang et al., 2007b), highlighting a need to facilitate individuals seeking treatment at an earlier stage of their pathology.

As predicted, our study found a relationship between risk-avoidance and willingness to seek treatment, and subsequent analyses revealed that willingness to seek treatment did not differ between anxiety disorders. While this finding is correlational in nature and we did not control for other factors related to treatment-seeking (e.g., impairment etc.), if reliable, there may be important potential implications of such a result. As with any risky decision, the final decision to get treatment is made by weighing up the perceived pros and cons of the available options. As shown in one study (Shaffer et al., 2006), it is often not until the symptoms are too severe for the individual to handle that they will take that final step, suggesting that it is only at this point that the perceived costs of not receiving help outweigh the costs of receiving it. If anxious individuals are likely to overestimate the probability and cost of a negative outcomes across different domains, then it is also likely that they will overestimate the negative impact of seeking treatment. This idea is also supported by the finding in this study that individuals who previously sought treatment reported greater willingness to seek treatment again in the future (possibly by helping create more realistic appraisals of the impact of treatment).

Given that risk-avoidance and high perceived costs of seeking treatment may contribute to significant time delays and the decision to get help, we must consider how to assist individuals in overcoming these barriers. Surprisingly, the literature on methods of improving treatment-seeking is sparse and studied attempts have demonstrated little success. One study, for instance, found that a brief 15 minute presentation at an Australian school (accompanied by

a booklet on mental health) was associated with increased awareness but did not improve treatment-seeking intentions or behaviour three weeks later (Rickwood, Deane, Wilson, & Ciarrochi, 2005). Similarly, a recent randomised controlled trial (RCT) found no evidence that providing information about depression in the form of e-cards increased treatment-seeking intentions or behaviour in young adults (Costin et al., 2009).

However, another way this problem has been addressed is through the development of online CBT treatment programs (e.g., eCentreClinic, www.ecentreclinic.org; formerly VirtualClinic) which assist individuals with accessibility of treatment as well as overcoming some common perceived costs associated with treatment (e.g., anonymity, stigma, face-to-face disclosure). While Internet-based interventions have demonstrated efficacy at reducing symptoms of anxiety (e.g., Andrews & Titov, 2010; Robinson et al., 2010; Titov, Andrews, Johnston, & Robinson, 2010a; Titov, Andrews, Kemp, & Robinson, 2010b; Titov et al., 2009), there is also some evidence that online interventions may facilitate future face-to-face treatment-seeking. For example, an Internet-based cognitive-behavioural skills training website targeting depression (but not a depression information site), for example, was associated with increased reports of help seeking for CBT (Christensen, Leach, Barney, Mackinnon, & Griffiths, 2006). In line with this, there is some evidence that providing information about the effectiveness of treatment options for depression may increase treatment-seeking behaviour (Jorm et al., 2003). While this literature has not directly examined treatment-seeking in anxiety disorders, it lends support for the continued investigation of interventions aimed at reducing barriers to treatment.

If risk-avoidance plays a role in the decision to get help, future research may wish to investigate interventions directly targeting risk-avoidant decision-making in order to improve treatment-seeking. For example, a brief online intervention may be designed to educate individuals about (i) Vogel and Wester's (2003) model of treatment-seeking decision-making,

(ii) ways in which risk-aversion impacts the decision to get help, (iii) costs and benefits of seeking or not seeking help, and (iv) challenging myths about psychological intervention to target perceived costs.

A unique aspect of the current study was the use of an online sample. Particularly relevant to anxious and non-treatment-seeking populations, the Internet offers access to a sample that may not otherwise volunteer for psychological research or attend more standard settings for sampling (e.g., outpatient treatment centre). Despite the potential benefits of Internet research, there are a number of limitations. Firstly, Internet research is prone to sampling and self-selection biases. For example, our sample (with the exception of those with a primary diagnosis of SP) exhibited greater treatment-seeking (approximately 60%) relative to large-scale epidemiological data that have investigated treatment-seeking in anxiety disorders in various countries (e.g., 25%; Wang et al., 2007). Furthermore, our anxious sample was lower in symptom severity, younger and had a greater proportion of individuals who had never been married in comparison to an online sample of socially anxious individuals (Erwin et al., 2004) and samples of anxious individuals recruited from an Australian-based anxiety outpatient clinic, as well as an Australian Internet-based treatment program and national survey data (Titov et al., 2010b). Nevertheless, it has been argued that open-access Internet surveys are comparable to studies utilising other methods of non-random sampling (Couper, 2007) and, in fact, may be more representative than some traditional recruitment sources (e.g., undergraduate samples; Denissen, et al., 2010). Future studies investigating risk-avoidance and treatment-seeking in a more generalisable, non-Internet populations are certainly needed. Secondly, Internet clinical research also raises the question of diagnostic validity. Although strict criteria (self-report measures and a validated Internet-administered diagnostic schedule) were employed to categorise individuals on the basis of primary DSM-IV-TR diagnosis, the validity and reliability of Internet-administered diagnostic interviews have not been robustly

established. It should also be noted that, despite literature to support the discriminant validity of the Stress subscale of the DASS in the diagnostic classification of GAD (Brown et al., 1997; Gloster et al., 2008), the lack of a GAD-specific symptom measure (e.g., PSWQ, GAD-7) may have threatened the validity with which this diagnostic group was classified. This consideration should be taken into account for future online studies wishing to classify groups on the basis of primary diagnosis.

Our study was also limited by difficulties inherent in the use of self-report measures for assessing risk-taking (see Lejuez et al., 2002). Future studies would benefit from the development and use of self-report measures that exhibit greater sensitivity and specificity for the measurement of risk-avoidance (in contrast to maladaptive risk-seeking behaviour), incorporation of behavioural indices of risk-taking (e.g., Figner et al., 2009) as well as corroborating these results with measures of real-life risk-taking (e.g., traffic offenses). Furthermore, future studies may wish to control for known predictors of treatment-seeking (e.g., psychological distress; Deane & Chamberlain, 1994) in order to establish the unique contribution of risk-avoidance to the decision to seek help. Despite these limitations, this study offers a novel and unique perspective regarding the potential implications on treatment-seeking and mental health service utilisation of a risk-avoidant bias in anxiety disorders.

Implications for the Program of Research

Study 4 demonstrated further evidence for the association between risk-avoidance and clinical anxiety pathology by showing that an online sample of individuals meeting diagnostic criteria for SP and GAD reported greater risk-avoidance relative to non-clinical controls across a number of risk-taking domains (both on the DOSPERT and on a single-item measure of risk-taking propensity). Contrary to expectations, however, individuals meeting diagnostic criteria for OCD did not report significantly greater risk-avoidance relative to controls highlighting the need for further investigation. This study also explored the clinical implications of risk-avoidance by

examining its relation to treatment-seeking. Results revealed that aspects of risk-avoidance were associated with treatment-seeking in those who had never before sought treatment, suggesting that the safety bias may play a role in the decision to seek help. These findings underscore the potential utility in investigating the clinical implications of risk-avoidance.

CHAPTER 6

TREATMENT IMPLICATIONS OF RISK-AVOIDANCE: CHANGES IN RISK-TAKING

STUDY 5* & 6

	Page
Introduction	130
Study 5: Changes in Risk-Taking Over the Course of an Internet-delivered Cognitive-Behavioural Therapy (CBT) Treatment for Generalised Anxiety Disorder (GAD)	
Introduction	132
Method	133
Participants	133
Measures	133
Procedure	136
Results	137
Participant Characteristics	137
Pre-Treatment Differences	138
Treatment Completion	139
Treatment Outcome	139
Risk-Taking as a Possible Mediator	144
Discussion	151

*Study In Press: Lorian, C. N., Titov, N., & Grisham, J. R. (2011). Changes in risk-taking over the course of an Internet-delivered cognitive behavioural therapy treatment for generalized anxiety disorder. *Journal of Anxiety Disorders, In Press*.

Study 6: No Risk, No Gain: Changes in Risk-Taking over Cognitive-Behavioural Group Therapy (CBGT) for Anxiety

Introduction 156

Method 156

Participants 156

Measures 157

Procedure 158

Results 159

Participant Characteristics 159

Pre-treatment Scores 159

Treatment Completion 160

Treatment Outcome 160

Changes in Risk-Taking 161

Association between Risk-Taking and Treatment Outcomes 165

Discussion 167

Implications for the Program of Research 171

Introduction

As we have seen, a growing body of literature suggests that people with anxiety disorders are likely to exhibit a pervasive tendency to avoid perceived risks across multiple behavioural domains. This thesis has thus far examined risk-avoidance using self-report and behavioural measures in undergraduate (Study 1) and anxious populations (Studies 2, 3, and 4), including online and clinic-based samples. Results from these studies provide growing support for the relationship between risk-avoidance and pathological anxiety that is associated with a number of anxiety disorders and across several behavioural contexts (i.e., social, recreational, and financial). In addition to empirically examining this relationship, the preceding Chapter (Study 4) investigated a possible clinical implication of the safety bias by examining the relationship between risk-taking attitudes and treatment-seeking in an online anxious sample. Findings demonstrated that risk-avoidance was associated with treatment-seeking in those who had never before sought treatment, suggesting that certain individual cognitive factors may contribute to the decision to seek treatment. In this Chapter, we will further investigate the clinical implications of risk-avoidance by examining whether risk-avoidant behaviour is modifiable in anxious patients; that is, does risk-avoidance change over the course of CBT? Specifically, we conducted two studies that investigated change in risk-avoidance over the course of an Internet-based cognitive-behavioural therapy (iCBT) treatment for generalised anxiety disorder (GAD) and a group CBT (CBGT) treatment for social phobia (SP) or panic disorder with agoraphobia (PDAg).

As noted previously, CBT protocols generally involve strategies designed to target maladaptive cognitions and behaviours that maintain anxiety (e.g., cognitive challenging, graded exposure, etc.;Andrews, 2003). If risk-avoidance contributes to the maintenance of pathological anxiety as proposed by Maner and Schmidt (2006), then it may be of benefit to investigate where risk-avoidance can be reduced and how this is related to symptom

reduction. While research has established that CBT is effective in reducing disorder-specific avoidance behaviours (e.g., agoraphobic avoidance in PD or subtle safety behaviours in SP; Cuming et al., 2009; Gloster et al., 2011), surprisingly few studies have examined whether risk propensity changes following CBT (Aklin et al., 2009; West et al., 1970), and no studies have investigated risk-avoidance as a treatment outcome in clinically anxious populations. As discussed in Chapter 1, there are several reasons to believe that CBT treatment of anxiety will be associated with reduced risk-aversion. In particular, CBT is believed to affect cognitive (e.g., risk appraisals; Clark & Beck, 2010), dispositional (e.g., harm avoidance; Quilty et al., 2010), neurobiological (e.g., Porto et al., 2009), and transdiagnostic (e.g., self-efficacy; Carey, 2010) factors that are implicated in risk-avoidant decision-making. Furthermore, emotion regulation strategies (i.e., cognitive reappraisal) have been shown to reduce risk-aversion on the BART (Heilman et al., 2010), suggesting that the active components of CBT are likely to also have an effect on risk-avoidance. Collectively, this research supports the hypothesis that risk-avoidance will reduce following CBT treatment for anxiety.

With this in mind, Chapter 6 will detail two studies investigating change in risk-avoidance (as measured by the Domain-Specific Risk-Taking scale, DOSPERT; Blais & Weber, 2006) over the course of CBT treatment for anxiety. Particularly, Study 5 will examine social and recreational risk-avoidance over the course of an six-lesson Internet-based cognitive-behavioural therapy (iCBT) treatment for generalised anxiety disorder (GAD). Study 6 will later examine change across a number of domains of risk-avoidance over the course of a clinic-based group CBT (CBGT) treatment for social phobia (SP) or panic disorder with agoraphobia (PDAg).

STUDY 5

Changes in Risk-Taking over the Course of An Internet-delivered Cognitive-Behavioural Therapy (CBT) Treatment for Generalised Anxiety Disorder (GAD)

Introduction

This study intends to contribute to the current program of research by investigating whether self-reported risk-avoidance in specific domains (particularly, social and recreational risk-taking) changes over the course of an six-lesson iCBT treatment for GAD. The present study was conducted as part of a broader study of iCBT for GAD (see Titov et al., 2009) and is, to our knowledge, the first study to examine risk propensity as a treatment outcome in anxious individuals. GAD is of particular interest to this study as the content of anxious thoughts and resulting avoidance is not limited to specific situations or domains (e.g., as in SP or PD, etc.; Hoyer, Becker, & Roth, 2001; Roemer, Molina, & Borkovec, 1997; Roemer, Salters, Raffa, & Orsillo, 2005). Furthermore, this study focussed on social and recreational risk-avoidance as previous studies (i.e., Studies 1, 2, 3, and 4) have shown that these domains were most associated with clinical anxiety and may be most sensitive to (but not exclusive to) the nature of GAD pathology . These were also selected as these subscales were believed to be most relevant to the content of the iCBT program.

Specifically, we hypothesised that both social and recreational risk-avoidance would decrease in individuals undergoing CBT treatment. Given that risk-avoidance has been proposed to maintain pathological anxiety (Maner & Schmidt, 2006), we also predicted that change in risk-avoidance would mediate the relationship between treatment and change on outcome measures (i.e., symptom severity and impairment), in contrast to change in risk-avoidance being a function of treatment outcome.

Method

Participants

A total of 44 individuals were recruited into the clinical sample and randomised into either the treatment (*n* = 24) or control (*n* = 21) group. Details of participant flow are reported in Figure 1 of Titov et al. (2009).

Measures

Participants applied online via a website (www.virtualclinic.org.au) that provided information about several mental disorders, including GAD. Applicants completed several screening questionnaires about the presence and severity of symptoms of anxiety and depression as described below.

Exclusion Criteria. Participants were excluded if they (i) were not a resident of Australia, (ii) were less than 18 years of age, (iii) had limited access to a computer/Internet/printer, (iv) were currently participating in CBT, (v) were using illicit drugs or consuming more than three standard drinks per day, (vi) had a history of psychotic ideation/psychosis (schizophrenia or bipolar disorder) or were experiencing current severe symptoms of depression (defined as a total score > 23 or responding > 2 to Question 9, suicidal ideation, on the *Patient Health Questionnaire-9*, PHQ-9; Meyer et al., 1990), and (vii) if taking medication, had been taking the same dose for less than one month or intending to change that dose during the course of the program. Those who met exclusion criteria were directed to an on-screen message and email thanking them for their application, and encouraging them to discuss their symptoms with their physician.

Eligible participants were contacted via telephone for a structured diagnostic interview (Mini International Neuropsychiatric Interview Version 5.0.0, MINI; Sheehan et al., 1998) to verify whether they met *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; text revision; DSM-IV-TR; American Psychiatric Association, 2000) criteria for

GAD. Participants who satisfied inclusion criteria were informed about the details of the study and were asked to complete and return a consent form via mail or email (see Appendix 5). Ethics for this study was obtained from the Human Research Ethics Committees of St Vincent's Hospital, Sydney, and the University of New South Wales. The main trial was registered on the Australian and New Zealand Clinical Trials Registry as ACTRN12609000136202.

Demographic Questionnaire. Participants were asked to provide information about their age, gender, marital status, state of residence (within Australia), highest level of education attained and employment (see Table 6.1). Participants were also asked whether they had previously engaged in any form of treatment for GAD symptoms and whether they were currently taking any medication for their anxiety although no information on dosage was collected.

Technology. To establish that treatment effects were not due to differences in experience with computers and Internet, participants were asked to rate their familiarity with computers (1 – *Not at all familiar*, 5 – *Extremely familiar*) and estimate their weekly hours of Internet usage. Participants were also asked whether they had ever used the Internet to seek information or help for their mental health.

GAD Symptom Severity.

Generalized Anxiety Disorder 7-Item Scale (GAD-7). The presence and severity of GAD symptomatology (according to the DSM-IV-TR; American Psychiatric Association, 2000) was assessed using the reliable and valid GAD-7 (Spitzer, Kroenke, Williams, & Lowe, 2006). Individuals are asked to rate seven items based on their experience of specific GAD relevant symptoms over the preceding two weeks (0 – *Not at all*, 3 – *Nearly every day*). The GAD-7 has been shown to have good internal consistency and test–retest reliability as

well as convergent, construct, criterion, procedural and factorial validity for the diagnosis of GAD (e.g., Ruiz et al., 2010; Swinson, 2006; current sample, α = .80).

Penn-State Worry Questionnaire (PSWQ). GAD symptom severity, specifically the characteristic of excessive and uncontrollable worry, was measured using the 16-item PSWQ (Meyer et al., 1990; see Chapter 4 for detailed description). Internal consistency in the current sample was high (α = .88).

Impairment.

Patient Health Questionnaire (PHQ-9). The presence and severity of depressive symptoms were assessed using the nine item PHQ-9 (Kroenke, Spitzer, & Williams, 2001). This measure assesses nine key symptoms of depression (rated 0-3, total score range 0 - 27). The psychometric properties of the PHQ-9 have been well established (Arroll et al., 2010; current study, α = .84).

Kessler Psychological Distress Scale (K-10). The K-10 (Kessler et al., 2003) was used as an overall measure of global distress and impairment (see Chapter 4 for detailed description). The current sample demonstrated good internal consistency (α = .89).

Sheehan Disability Scale (SDS). The SDS (Sheehan, 1983) consists of three 10-point Likert items designed to measure the extent to which three major sectors (work, social life, home life) are impaired by one's panic, anxiety, phobic, or depressive symptoms. Adequate reliability and validity have been demonstrated (Leon, Olfson, Portera, Farber, & Sheehan, 1997; Leon, Shear, Portera, & Klerman, 1992; Sheehan, Harnett-Sheehan, & Raj, 1996; current sample, α = .88).

Indices of Risk-Avoidance.

Domain-Specific Risk-Taking Scale (DOSPERT). Participants' risk propensity was assessed using 12-items consisting of the Social (current sample, α = .71) and Recreational (current sample, α = .91) subscales of the DOSPERT (Blais & Weber, 2006; see Chapter 2 for

detailed description). Given high correlations between the Social and Recreational subscales, suggesting multicollinearity, the composite score (sum of subscales) was used. The Social and Recreational subscales were highly correlated with their composite score (*r*s = .83 and .89, respectively, *p*s < .001).

Procedure

Treatment. Treatment group participants received access to the *Worry program*, an iCBT program that has been shown to reduce symptoms of GAD (Robinson et al., 2010; Titov et al., 2009). The Worry program consists of six online lessons, printable summary and homework assignments, automatic emails, and additional resource documents. The six online lessons are released in a staggered fashion over 10 weeks and represent best practice principles used in CBT programs for anxiety and worry including (i) cognitive therapy, (ii) challenging meta-beliefs about worry, (iii) graded exposure, (iv) challenging core beliefs, (v) assertiveness, (vi) behavioural activation, and (vii) relapse prevention (Barlow, 2002). Participants are expected to complete the homework tasks prior to completing the next lesson, and to complete all lessons within 10 weeks. In addition, participants received weekly email or brief telephone contact (< 10 minutes) with a registered Clinical Psychologist. This weekly contact involved troubleshooting any problems the participant encountered with CBT techniques, answering any questions, and providing encouragement to apply the skills learned within the Lessons. In addition, automatic emails were sent to congratulate participants for completing each lesson, to remind them to complete materials, and to notify them of new resources. Control group participants received no treatment for 11 weeks and then received the intervention described above.

Results

Participant Characteristics

Characteristics of the groups are presented in Table 6.1. One-way analysis of variance (ANOVA) and chi-square (χ^2) analyses revealed no significant between-group differences in age, gender, marital status, education, employment, weekly use of the Internet, or previous use of Internet for finding information or help for their mental health, $F(1, 43) = .56 – .72$, $p > .05$; χ^2 tests, ps > .05. No information about participants' ethnicity was collected.

Treatment Group. Treatment group participants (n = 24, 7 Males/17 Females) had a mean age of 42.50 years (SD = 13.84). Of the 24 participants, eight (33%) were married, seven (29%) had never been married, five (21%) were divorced, and four (17%) were in de facto relationships. Overall, the sample was well educated and predominantly employed (see Table 6.1 for details).

Control Group. Participants (n = 21, 5 Males/15 Females) in the control group had an average age of 45.85 years (SD = 11.96). The control group participants were predominantly married (70%). The remainder of participants were never married (n = 2; 10%), in de facto relationships (n = 2; 10%) and divorced (n = 2; 10%). The majority of participants in the control group had completed education above a high school diploma level and had varying types of employment (see Table 6.1 for details).

Previous Treatment. Of the 44 participants, 20 (46%) reported previously receiving treatment for their GAD symptoms. The distribution of past treatment-seeking, however, was not equal between groups, with more than twice as many treatment-seekers in the treatment group compared to the control group – a difference that was statistically significant, χ^2 (1, N = 44) = 6.19, $p < .05$. Given the differing frequencies, all analysis of covariance (ANCOVA) analyses (described below) were repeated using previous treatment as a second independent variable. For all outcomes, however, results indicated no significant main effect of previous

treatment ($F < 1$), and the interaction between group and previous treatment was also nonsignificant ($F < 1$). Thirteen of the 44 participants (30%) reported current medication use for their GAD symptoms, however no significant between-group differences were found ($p < .05$).

Technology Use. The sample reported using the Internet an average of 13.33 hours per week (*SD* = 13.90). In addition, 26 participants (59%) reported having used the Internet to get information or help for their mental health. Between-group comparisons revealed no significant differences in technology use (*p*s > .05).

Pre-Treatment Differences

Symptom Severity and Impairment.

One-way ANOVAs, using Bonferroni corrections, showed that no significant differences between groups existed on all measures of symptom severity (GAD-7 and PSWQ) and impairment (PHQ-9, K-10 and SDS) at pre-treatment, $F(1, 43) = .03\text{-}1.61$, adjusted *p*s > .02 (see Table 6.2 for *M*s and *SD*s). Pre-treatment levels of symptom severity and impairment were of a similar magnitude to those reported in other online CBT treatment trials for GAD (Robinson et al., 2010; Titov et al., 2010a; Titov et al., 2010b).

Risk-Taking. One-way ANOVAs, using a Bonferroni adjusted alpha level of .03 (.05/2), indicated no between-group differences on the pre-treatment measures of social and recreational risk-taking, $F(1, 43) = .35\text{-}.52$, adjusted *p*s > .03 (as determined by the DOSPERT; see Table 6.2 for *M*s and *SD*s). These scores were comparable to a sample of individuals with a primary diagnosis of GAD in a recent online study (Lorian & Grisham, 2011). Based on normative data reported by Blais and Weber (2006) and as described by Weber et al. (2002), participants were categorised into risk-averse (1 *SD* below the mean), risk-neutral and risk-seeking (1 *SD* above the mean). At pre-treatment, the majority (≥ 50%) of participants in the treatment and control groups were identified as risk-averse for both social and recreational risk-taking (see Table 6.3 for distributions). Chi-square analyses

revealed no significant between-group differences on distribution of risk-taking: Social, $\chi^2(2, N = 44) = .50$, $p > .05$; Recreational, $\chi^2(2, N = 44) = .59$, $p > .05$.

Treatment Completion

This study employed an intention-to-treat (ITT) design in which pre-treatment scores were used in place of post-treatment scores for those whose did not complete post-treatment measures (see Nich & Carroll, 2002). Overall, post-treatment data was collected from 21/24 (88%) and 19/20 (95%) of the treatment and control group participants, respectively.

Treatment Outcome

Differences between Groups after Treatment. Univariate ANCOVAs on post-treatment outcome measures were conducted in which the respective pre-treatment outcome variable was entered as a covariate. The treatment group differed significantly from the control group on all measures of symptom severity (GAD-7 and PSWQ) and overall impairment (PHQ-9, K-10, and SDS; *p*s <.05; see Table 6.4).

A univariate ANCOVA was also conducted on overall risk-taking (as indexed by the composite of the social and recreational DOSPERT subscales) to examine whether there was a greater change in risk-taking following treatment relative to those in the control group (see Table 6.2 for *M*s and *SD*s). Post-treatment risk-taking scores were entered as the dependent variables, group (treatment vs. control) as the dependent variable and pre-treatment risk-taking scores as a covariate. Analyses revealed a significant effect for the total DOSPERT score, such that the treatment group demonstrated a greater positive change in risk-taking pre-to-post treatment compared to the control group ($p < .05$; see Table 6.4). Effect sizes (Cohen's *d*) were calculated between the treatment and control groups at post-treatment (see Table 6.4). Large effect sizes were observed for all measures of symptom severity and impairment ($d = 0.78 – 1.24$) while a medium effect size was observed for risk-taking ($d = 0.51$).

Table 6.1

Demographic Information for Treatment and Control Groups

	Treatment (n = 24)		Control (n = 20)			Treatment (n = 24)		Control (n = 20)	
Variable	*n*	*%*	*n*	*%*	Variable	*n*	*%*	*n*	*%*
Age	42.50 (*SD* = 13.84)		45.85 (*SD* = 11.96)		Location				
Gender					ACT	0	0.0	1	5.0
Male	7	29.2	5	25.0	NSW	16	66.7	11	55.0
Female	17	70.8	15	75.0	QLD	3	12.5	0	0.0
Marital Status					SA	2	8.3	1	5.0
Never Married	7	29.2	2	10.0	TAS	1	4.2	0	0.0
Married	8	33.3	14	70.0	VIC	2	8.3	5	25.0
De Facto	4	16.7	2	10.0	WA	0	0.0	2	10.0
Divorced	5	20.8	2	10.0	Employment				
Education					Full time	7	29.2	6	30.0
< High School	2	8.3	1	5.0	Part time	9	37.5	3	15.0
High School	5	20.8	2	10.0	Student	2	8.3	1	5.0
Other Qualification	4	16.7	6	30.0	At home parent	1	4.2	3	15.0
Undergraduate	9	37.5	9	45.0	Unemployed	2	8.3	2	10.0
Postgraduate	4	16.7	2	10.0	Seeking work	2	8.3	1	5.0
					Reg. sick/disabled	0	0.0	1	5.0
					Retired	1	4.2	3	15.0

Table 6.2

Mean Scores, Standard Deviations and Within-Group Change (t test) Results for Treatment and Control Groups

	Pre-treatment				Post-treatment				Within-group change		Effect size	
	Treatment (n = 24)		Control (n = 21)		Treatment (n = 24)		Control (n = 21)		Treatment (n = 24)	Control (n = 21)	Treatment (n = 24)	Control (n = 21)
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*t*	*t*	*d*	*d*
GAD-7	14.33	4.50	13.62	3.51	6.79	4.33	12.29	4.26	8.10***	2.05[a]	1.67	.34
PSWQ	66.13	8.25	66.33	12.70	56.75	10.78	66.14	8.70	6.15***	-.74	.98	.02
PHQ-9	11.58	5.24	13.00	6.19	6.71	5.73	11.76	6.18	5.13***	.93	.90	.20
K-10	26.21	7.03	28.81	7.31	20.25	7.08	26.86	7.63	5.44***	1.03	.75	.26
SDS	13.17	9.30	16.38	8.96	7.58	7.76	15.00	10.34	3.11**	.78	.62	.14
DOSPERT	39.92	15.15	40.05	15.57	45.00	15.65	37.10	15.33	-2.76*	1.41	-.33	.19

Note. d is an index of effect size (Cohen's *d*). Intention to treat design utilised whereby the last value was carried forward for missing participants at post-treatment (n = 5). GAD-7 = Generalised Anxiety Disorder 7-Item Scale, PSWQ = Penn-State Worry Questionnaire, PHQ-9 = Patient Health Questionnaire, K-10 = Kessler Psychological Distress Scale, SDS = Sheehan Disability Scale, DOSPERT = Domain-Specific Risk-Taking Scale (Social and Recreational composite).

[a]$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$

Table 6.3

Distribution and Percentages of Individuals Who are Risk-Averse, Risk-Neutral and Risk-Seeking in Treatment and Control Groups Before and After Internet CBT Treatment

		Treatment (n = 24)			Control (n = 20)		
DOSPERT Subscale		Averse	Neutral	Seeking	Averse	Neutral	Seeking
Pre - Treatment	Social	12 (50.0%)	10 (41.7%)	2 (8.3%)	12 (60.0%)	7 (35.0%)	1 (5.0%)
	Recreational	17 (70.8%)	5 (20.8%)	2 (8.3%)	12 (60.0%)	6 (30.0%)	2 (10.0%)
Post - Treatment	Social	9 (37.5%)	13 (54.2%)	2 (8.3%)	13 (65.0%)	6 (30.0%)	1 (5.0%)
	Recreational	13 (54.2%)	8 (33.3%)	3 (2.3%)	15 (75.0%)	4 (20.0%)	1 (5.0%)

Note. DOSPERT = Domain-Specific Risk-Taking. Classification of risk-averse (1 *SD* below mean) and risk-seeking (1 *SD* above mean) is based on normative data from Blais & Weber (2006): Social: M = 32.42, SD = 6.44; Recreational: M = 23.01, SD = 9.40.

Table 6.4

Between-Group Differences at Post-Treatment Adjusting for Pre-Treatment Scores (ANCOVA)

Variable	$F_{(1,42)}$	*p*	*d*
GAD-7	27.38	< .001	1.24
PSWQ	12.89	< .001	0.96
PHQ-9	8.65	.01	0.86
K-10	6.93	.002	0.81
SDS	5.71	.02	0.78
DOSPERT	8.78	.01	0.51

Note. d is an index of effect size (Cohen's *d*). GAD-7 = Generalised Anxiety Disorder 7-Item Scale; PSWQ = Penn-State Worry Questionnaire; PHQ-9 = Patient Health Questionnaire; K-10 = Kessler Psychological Distress Scale; SDS = Sheehan Disability Scale; DOSPERT = Domain-Specific Risk-Taking Scale (Social and Recreational composite).

Within-Group Change. Repeated measures *t* tests with Bonferroni adjustments (see Table 6.2) on the pre- to post-treatment scores demonstrated significant improvement on all symptom severity and impairment outcome measures for the treatment group (adjusted *p*s < .01). Alternatively, the control group did not change significantly on any measures (adjusted *p*s > .02-.03).

Repeated measures *t* tests between pre- and post- DOSPERT scores (see Table 6.2) indicated that total risk-taking scores increased significantly in the treatment group ($p < .05$). Average change in risk-taking within the control group was not significant for total risk-taking, ($p > .05$).

As described previously, 12 (50%) of the treatment group were classified as risk-averse within the social domain and 17 (71%) within the recreational domain at pre-treatment. At post-treatment, however, the proportion of risk-averse individuals decreased to 9 (38%) and 13 (54%), in social and recreational domains, respectively. Conversely, the control group showed an increase in the proportion of risk-averse individuals (from 60% to 65% in the social domain and 60% to 75% in the recreational domain). See Table 6.3 for distributions and percentages.

In summary, in line with our hypotheses, the results show significant improvement on all measures of symptom severity, impairment, and risk-taking for those who received CBT treatment. This is in contrast to those in the control group, who demonstrated no significant change on outcome measures. Descriptive analyses indicated a reduction in the percentage of risk-averse individuals in the treatment group relative to those in the control group, who indicated an increase in percentage of risk-averse individuals.

Within-group effect sizes were calculated and are presented in Table 6.2. Within the treatment group, medium to very large pre-to-post treatment effect sizes (Cohen's *d*) were indicated for measures of symptom severity and impairment (d = 0.62 - 1.67). A small to medium effect size was observed for risk-taking (d = -0.33). Minimal to small effect sizes were found for the control group on outcome measures (d = 0.02 - 0.34) and a small positive effect size was found for the DOSPERT (d = 0.19).

Risk-Taking as a Possible Mediator

To test the hypothesis that change in risk-taking mediated treatment outcome (i.e., change in symptom severity and impairment), mediation analyses were conducted according to conditions outlined by Baron and Kenny (1986): (1) the independent variable (treatment group coded '+1' and control '-1') must be significantly associated with the dependent variable(s) (symptom severity - GAD-7 and PSWQ – and impairment - PHQ-9, K-10,

SDS)(path c) (2) the independent variable must be significantly associated with the mediator (risk-taking: composite of social and recreational subscales of the DOSPERT)(path a); (3) the mediator must be significantly associated with the dependent variable(s), corrected for the criterion (path b); and (4) when the criterion is regressed on both the dependent and mediator variables, the mediator is a unique predictor of the dependent variable, and the effects of the independent variable become nonsignificant (path c). An alternate mediation model (i.e., whether changes in risk-taking were mediated by changes in symptom severity and impairment) was also tested in which the independent variable was the intervention, the mediator variable was the respective outcome measure (GAD-7, PSWQ, PHQ-9, K-10, or SDS), and the dependent variable was risk-taking. If all pathways are significant then criteria for partial mediation is met, if all pathways are significant except path c, then criteria for full mediation is met. Change scores (post-treatment minus pre-treatment scores) were used for outcome and mediator variables.

As the intervention was significantly associated with all treatment outcomes (GAD-7, PSWQ, PHQ-9, K-10, and SDS) as well as the hypothesised mediator (DOSPERT), all measures were included in statistical analyses (see Table 6.4). Regression analyses revealed that, contrary to our hypotheses, change in risk-taking (DOSPERT) did not emerge as a significant partial or complete mediator between the intervention and outcome variables (*p*s > .05), with the exception of depression (PHQ-9); that is, the preconditions (pathways a, b, c, c') for DOSPERT as a partial or complete mediator were not fulfilled for GAD-7, PSWQ, K-10 and SDS (see Table 6.5 for complete statistics for mediation analyses). For depression, all conditions for complete mediation were met (see Figure 6.1); that is there was a significant effect of the intervention on PHQ-9, β = -3.73, $t(42) = -2.43$, $p < .02$; (2) there was a significant effect of the intervention on DOSPERT change scores, $\beta = 8.04$, $t(42) = 2.89$, $p < .01$; (3) there was a significant effect of the DOSPERT on the PHQ-9, controlling for the

intervention, β = -.19, $t(42)$ = -2.29, $p < .05$; and (4), while controlling for the DOSPERT, the effect of the intervention on the PHQ-9 was no longer significant, β = -2.24, $t(42)$ = -1.40, $p > .05$.

The strength of mediation was measured using the Sobel-test procedure (Sobel, 1982). As recommended for small samples, a nonparametric bootstrapping analysis (10,000 samples) was also conducted to confirm significance of the mediation relationship, significant if the 95% confidence intervals do not include 0 (Preacher & Hayes, 2004; Preacher et al., 2007). A macroextension for SPSS developed by Preacher and Hayes (2004) was used to assist with the above steps for mediation. Analyses revealed a marginally significant mediation effect, z = -1.49, $p < .10$, indicating that the change in the beta coefficient between intervention and PHQ-9 change scores from β = -3.73 to β = -2.24, when controlling for risk-taking, was significant. Results of bootstrapping analyses of the indirect effect confirmed this result (lower 95% CI = -3.39, upper 95% CI = .03).

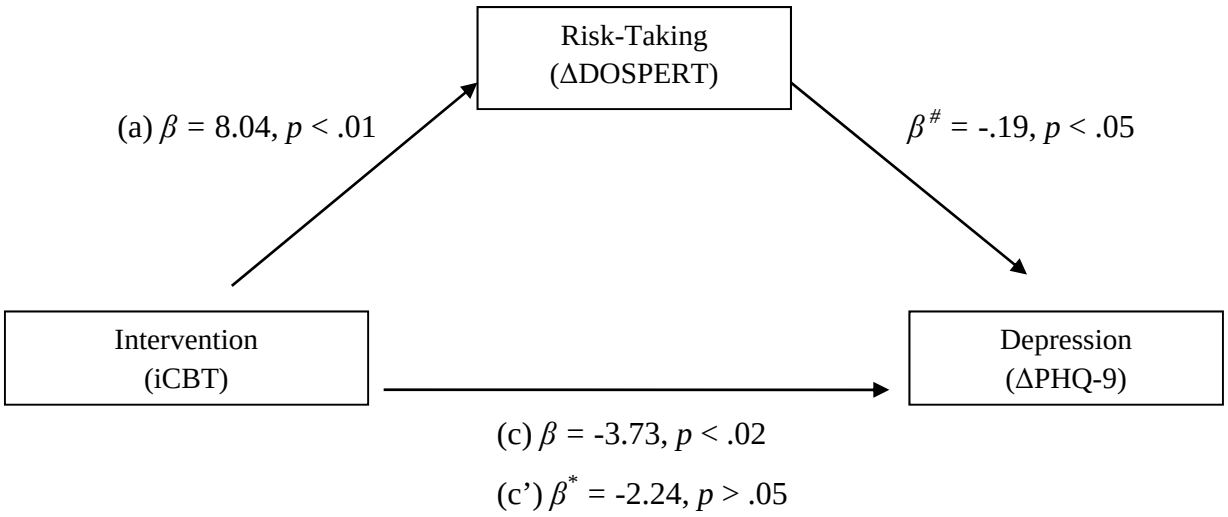

Figure 6.1. Results of the hypothesised mediation model with risk-taking (ΔDOSPERT) as a mediator between the intervention (Internet-based cognitive-behavioural therapy, iCBT) and depression (ΔPHQ-9). Δ denotes change, post-treatment – pre-treatment. (N = 44; * influence of risk-taking controlled for, # influence of intervention controlled for). A positive regression coefficient (β) for path (a) demonstrates greater positive change in risk-taking for treatment participants relative to the control group. A negative β # is indicative of an inverse relationship between change in risk-taking and change in depression.

Table 6.5

Main Results of Hypothesised Mediation Model Multiple Regression Analyses in Which Change in Risk-Taking Mediates Internet CBT Treatment Outcome (Change in Symptom Severity and Impairment)

	Step	Path	Independent Variable	Dependent Variable	β	*SE* β	*t*	Part *r*
GAD-7								
	1	c	Group	Δ GAD-7	-6.14	1.20	-5.14***	-.62***
	2	a	Group	Δ DOS	8.04	2.78	2.89*	.41**
	3	b	Δ DOS	Δ GAD-7	-.01	.07	-.16	-.27[a]
		c’	Group	Δ GAD-7	-6.06	1.32	-4.58***	
PSWQ								
	1	c	Group	Δ PSWQ	-11.38	2.97	-3.84**	-.51**
	2	a	Group	Δ DOS	8.04	2.78	2.89*	.41**
	3	b	Δ DOS	Δ PSWQ	.14	.17	.84	-.11
		c’	Group	Δ PSWQ	-12.49	3.26	-3.83**	
PHQ-9								
	1	c	Group	Δ PHQ-9	-3.73	1.53	-2.43*	-.35*
	2	a	Group	Δ DOS	8.04	2.78	2.87**	.41**
	3	b	Δ DOS	Δ PHQ-9	-.19	.08	-2.29*	-.43**
		c’	Group	Δ PHQ-9	-2.24	1.60	-1.40	
K-10								
	1	c	Group	Δ K-10	-4.56	1.73	-2.64*	-.38*
	2	a	Group	Δ DOS	8.04	2.78	2.89**	.41**
	3	b	Δ DOS	Δ K-10	-.12	.09	-1.28	-.32*
		c’	Group	Δ K-10	-3.58	1.87	-1.91[a]	
SDS								
	1	c	Group	Δ SDS	-4.38	2.41	-1.82[a]	-.27[a]
	2	a	Group	Δ DOS	8.04	2.78	2.89**	.41**
	3	b	Δ DOS	Δ SDS	-.09	.14	-.64	-.20
		c’	Group	Δ SDS	-3.69	2.66	-1.39	

Note. Δ denotes change in scores, post-treatment minus pre-treatment. GAD-7 = Generalized Anxiety Disorder 7-Item Scale, PSWQ = Penn-State Worry Questionnaire, PHQ-9 = Patient Health Questionnaire, K-10 = Kessler Psychological Distress Scale, SDS = Sheehan Disability Scale, DOS = Domain-Specific Risk-Taking Scale.

[a] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

To test the alternate mediational model (i.e., that change in symptom severity and impairment mediated the relationship between intervention and risk-taking) the above mediation analyses were repeated with the mediator exchanged for dependent variables. Similar to the above, preconditions (pathways a, b, c, c') were not fulfilled GAD-7, PSWQ, K-10 and SDS as partial or complete mediators (see Table 6.6 for complete statistics for alternate model mediation analyses). While conditions for partial mediation were met for PHQ-9 (pathways a, b, c, c' were all significant), this mediation effect was not significant (z = 2.28, p > .10). This indicates that the reduction in the beta coefficient between intervention and DOSPERT change scores from β = 8.04 to β = 5.76, when controlling for PHQ-9 change scores, was not significant (see Figure 6.2). This result was further confirmed by results based on 10000 bootstrapped samples (lower 95% CI = -.14, upper 95% CI = 5.36).

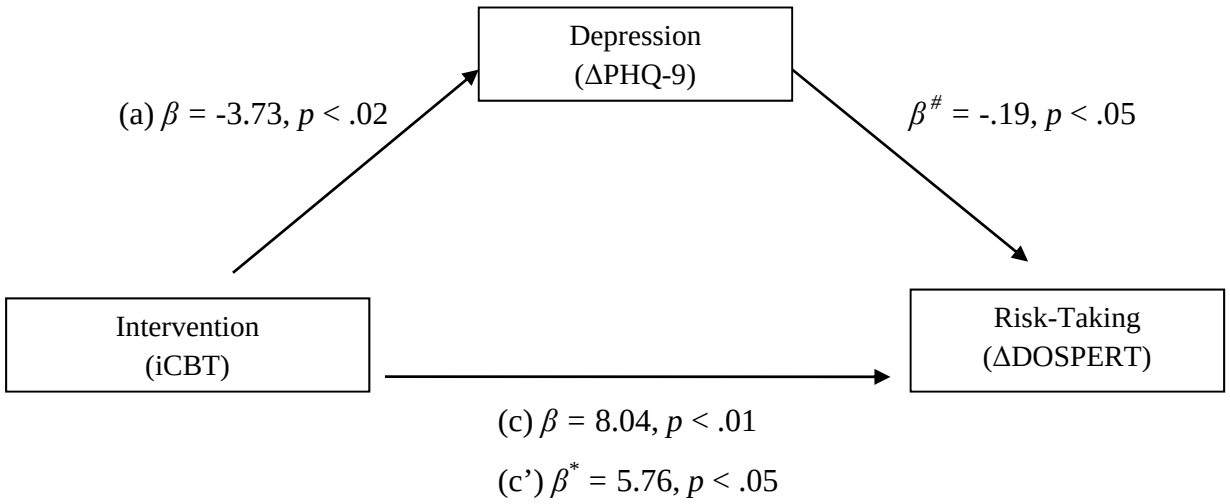

Figure 6.2. Results of the alternate mediation model with depression (ΔPHQ-9) as a mediator between the intervention (Internet-based cognitive-behavioural therapy, iCBT) and risk-taking (ΔDOSPERT). Δ denotes change, post-treatment – pre-treatment. (N = 44; * influence of depression controlled for, # influence of intervention controlled for). A negative regression coefficient (β) for path (a) demonstrates greater reduction of depression of treatment participants relative to the control group. A negative β # is indicative of an inverse relationship between change in risk-taking and change in depression.

Table 6.6

Main Results of Alternate Mediation Model Multiple Regression Analyses in Which Change in Symptom Severity and Impairment Mediates Change in Risk-Taking as a Result of Internet CBT Treatment

	Step	Path	Independent Variable	Dependent Variable	*β*	*SE β*	*T*	Part *r*
GAD-7								
	1	c	Group	Δ DOS	8.04	2.78	2.89**	.41**
	2	a	Group	Δ GAD-7	-6.14	1.20	-5.14***	-.62***
	3	b	Δ GAD-7	Δ DOS	-.06	.36	-.16	-.27[a]
		c’	Group	Δ DOS	7.69	3.60	2.14*	
PSWQ								
	1	c	Group	Δ DOS	8.04	2.78	2.89**	.41**
	2	a	Group	Δ PSWQ	-11.38	2.97	-3.84**	-.51**
	3	b	Δ PSWQ	Δ DOS	.12	.15	.84	-.11
		c’	Group	Δ DOS	9.43	3.25	2.90**	
PHQ-9								
	1	c	Group	Δ DOS	8.04	2.78	2.89**	.41**
	2	a	Group	Δ PHQ-9	-3.73	1.53	-2.43*	-.35*
	3	b	Δ PHQ-9	Δ DOS	-.61	.27	-2.29*	-.43**
		c’	Group	Δ DOS	5.76	2.83	2.03*	
K-10								
	1	c	Group	Δ DOS	8.04	2.78	2.89**	.41**
	2	a	Group	Δ K-10	-4.56	1.73	-2.64*	-.38*
	3	b	Δ K-10	Δ DOS	-.32	.25	-1.28	-.32*
		c’	Group	Δ DOS	6.60	2.98	2.21*	
SDS								
	1	c	Group	Δ DOS	8.04	2.78	2.89**	.41**
	2	a	Group	Δ SDS	-4.38	2.41	-1.82[a]	-.27[a]
	3	b	Δ SDS	Δ DOS	-.12	.18	-.64	-.20
		c’	Group	Δ DOS	7.53	2.91	2.59*	

Note. Δ denotes change in scores, post-treatment minus pre-treatment. GAD-7 = Generalized Anxiety Disorder 7-Item Scale; PSWQ = Penn-State Worry Questionnaire; PHQ-9 = Patient Health Questionnaire; K-10 = Kessler Psychological Distress Scale; SDS = Sheehan Disability Scale; DOS = Domain-Specific Risk-Taking Scale.

[a] $p < .10$ * $p < .05$, ** $p < .01$, *** $p < .001$

Overall, mediation analyses indicated that risk-taking change scores did not significantly mediate the relationship between treatment and changes in symptom severity or impairment, with the exception of depression. Risk-taking change scores, however, were found to be a marginally significant complete mediator between treatment and depression. Furthermore, mediation analyses of the alternate models confirmed the absence of any outcome measures as significant partial or complete mediators between treatment and change in risk-taking.

Discussion

This study examined risk-avoidance in the context of a six-lesson Internet-delivered CBT treatment program for GAD. Specifically, we examined change in self-reported social and recreational risk-taking over the course of treatment, and whether risk-taking mediated change in symptoms and impairment in response to treatment. To our knowledge, this is the first study investigating the relationship of risk-taking variables and treatment outcome in a clinically anxious population. We hypothesised that (i) risk-avoidance would decrease as a result of treatment, relative to individuals in the control group and, (ii) risk-taking would mediate changes in symptom severity and impairment as a result of treatment.

In general, the CBT treatment program in this study was effective, with patients in the treatment group showing significant improvement on measures of GAD symptom severity (GAD-7 and PSWQ) and impairment (PHQ-9, K-10 and SDS) relative to those in the control group (for detailed discussion of treatment outcomes see Titov et al., 2009). Overall, results confirmed our hypotheses, demonstrating that participants in the treatment group significantly increased risk-taking scores (i.e., reduced risk-avoidance) relative to the control group. This hypothesis was also supported by descriptive analyses showing a decrease in the proportion of risk-averse individuals in the treatment group (and an increase in risk-averse individuals in the control group). In partial support of our second hypothesis, mediation

analyses revealed risk-taking to be a significant mediator between CBT and reduction in depressive symptomatology; however, this was not the case for measures of GAD symptomatology and overall impairment. Reverse mediation analyses confirmed that the alternate model, in which reduction in GAD symptomatology and disability as a result of treatment leads to increased risk-taking, was not supported.

In general, the results of this study offer a novel contribution to both the risk and CBT literature, suggesting that risk-taking in domains that are not specific to the nature of pathology (GAD in this instance) can change as a result of CBT treatment. While treatment significantly reduced propensity to avoid risks in the social and recreational domains, the mechanisms underlying these changes are still not clear. From a cognitive and behavioural perspective, there are several possible mechanisms which may have accounted for change in risk-avoidance: (i) CBT directly challenged risk-related beliefs (e.g., “I cannot handle things going wrong”, “The world is a risky place”, “If I am cautious, nothing will go wrong,” etc.) which in turn simultaneously increased willingness to engage in risky behaviours, which helped resolve anxiety symptoms and impairment; (ii) CBT reduced anxiety symptomatology and functional impairment, and in experiencing less symptoms and disability, participants reported greater willingness to take future risks; (iii) CBT targeted a third variable (e.g., self-efficacy, intolerance of uncertainty, etc.) that simultaneously increased risk-taking propensity and decreased symptom severity and impairment. It is likely, however, that the actual relationships for change in risk-avoidance and other outcomes are a combination of the above possibilities. Consistent with research by Quilty and colleagues (2010; 2008), our results suggest that changes in social and recreational risk-taking are associated with changes in depressive symptomatology as a result of treatment. Interestingly, behavioural activation and graded exposure (a major component of CBT) involve effectively asking individuals to take perceived risks; that is, individuals are asked to gradually increase their physical activity or

engage in tasks that they find anxiety-provoking (which are no doubt ‘risky behaviours’ to those individuals).

Based on the results in this study, it is possible that the mechanisms underlying resolution of depression involve changes in risk-avoidance, whereas changes in GAD symptomatology and impairment may occur via alternative mechanisms. For example, perhaps CBT targets transdiagnostic constructs (e.g., self-efficacy), which affects risk-taking and GAD symptomatology separately. Indeed, it has been argued that change in personality traits, like harm-avoidance, occur independent to change in depression (De Fruyt, Van Leeuwen, Bagby, Rolland, & Rouillon, 2006); however, as suggested in previous literature (e.g., Maner & Schmidt, 2006), there exists a large overlap between risk-aversion and anxiety pathology, therefore it is possible that change in risk-taking and GAD symptomatology occur simultaneously, which precedes change in depression. It is of note that our sample excluded those reporting severe depression and we are therefore limited to individuals reporting low to moderate symptomatology. Moreover, given the small sample size, results of this study (particularly mediation analyses) should be interpreted with caution. Future studies are needed, incorporating larger samples, models of multiple mediators and outcomes, in addition to multiple measures of risk-avoidance, to investigate the mechanisms and direction of change with respect to risk-avoidance and treatment.

There are several limitations to this study, highlighting the need for future research examining risk-avoidance and treatment implications. As noted previously, there is limited literature investigating the clinical implications of risk-aversion. Given that this study only examined self-reported risk-taking propensity in two specific domains, future studies would benefit from using multiple risk-taking indices, including behavioural measures of risk-taking, additional self-report measures, measures of risk-taking attitudes and beliefs and real-world reflectors of risk-taking. Additionally, our study only examined change in risk

propensity as a result of a CBT online treatment for participants with a diagnosis of GAD; future studies need to address whether this result can be replicated in treatments for those with other anxiety disorder diagnoses or in a face-to-face setting. Furthermore, given the small sample size of this study, future studies utilising larger samples would assist in establishing significant power for statistical analyses and additional multilevel mediational models. An additional limitation is the use of a waiting-list comparison design. Given the numerous components of the iCBT intervention administered, multiple factors (which may not be unique to CBT; e.g., weekly contact with a clinician) may have been responsible for the reductions in risk-avoidance observed. Subsequently, we are precluded from concluding definitively whether CBT was, in fact, responsible for changes in risk-avoidance. Likewise, such a design does not allow for the measurement of between-group differences at follow-up, precluding assessment of the retention or consolidation of gains in risk-avoidance and symptoms. Future experimental and longitudinal studies, utilising concurrent multiple baseline designs, in which risk-taking and outcomes are measured throughout the course of treatment and at follow-up, would provide useful information about the nature of risk-avoidance and CBT. Additionally, given the lack of credible placebo treatment in this study, future studies would benefit from designs comparing CBT to an alternative treatment control group (e.g., supportive counselling). And lastly, not all variables that may affect treatment outcome were measured, including medication dosage and psychological factors, such as motivation, highlighting the need to exercise caution in interpreting these findings.

Despite these limitations, this research points to an interesting avenue of further investigation: Can we directly manipulate risk-avoidance in anxious individuals and can this help overcome their anxiety? This premise can already be seen in traditional exposure therapy; however, current exposure therapy paradigms for anxiety disorders generally target specific fears, beliefs and behaviours (e.g., social concerns in people with social phobia),

rather than the broad risk-avoidant bias that may maintain avoidant behaviour across multiple domains. Exposure and cognitive challenging techniques targeting risk-related attitudes or core beliefs (e.g., *"The world is a risky place"*, *"I cannot handle risks"*, *"Taking risks is dangerous,"* etc.), may assist with overcoming this bias. Studies investigating the direct manipulation of general risk-related beliefs and behaviours are needed to establish whether such an intervention may be of benefit to existing CBT protocols. Furthermore, research establishing ranges of 'healthy' risk-taking are needed, and investigation into the clinical utility of assessing specific risk-related core beliefs may also be of benefit.

STUDY 6

No Risk, No Gain: Changes in Risk-Taking over Cognitive-Behavioural Group Therapy (CBGT) for Anxiety

Introduction

Study 5 demonstrated that risk-avoidance in social and recreational domains can reduce as a result of Internet-based cognitive-behavioural therapy (iCBT) for GAD, and that change in risk-avoidance may mediate treatment outcome for depression. These results offer preliminary support for the hypothesis that CBT may target risk-avoidance indirectly in domains that are not specific to the nature of the anxiety pathology, and suggests that these changes may potentially underlie symptom resolution (at least for depression). Whether these findings can be replicated in other anxiety disorders, in a face-to-face setting and across a number of risk domains, however, has yet to be explored.

With this in mind, the primary aim of Study 6 was to investigate changes in risk-avoidance as a result of group CBT (CBGT) treatment, specifically for social phobia (SP) or panic disorder with agoraphobia (PDAg). This study will examine whether results from Study 5 can be replicated in a face-to-face treatment. Furthermore, this study will examine changes in risk-avoidance across all domains of the DOSPERT (rather than only social and recreational domains) in relation to changes in SP and PDAg symptomatology. Consistent with previous research, we expect self-reported risk-avoidance to decrease over the course of treatment. Furthermore, we expect reductions in risk-avoidance to be associated with improvements in SP and PDAg symptomatology.

Method

Participants

Participants for this study included 24 patients (mean age = 34.42, *SD* = 2.62; range = 19 – 68 years, 12 male/ 12 female) with a primary diagnosis of SP (*n* = 17; mean age = 35.53,

SD = 13.60; range = 19 – 68 years, 9 male/8 female) or PDAg (*n* = 7; mean age = 31.71, *SD* = 11.25; range = 20 – 53 years, 3 male/4 female), who were undergoing cognitive-behavioural group therapy (CBGT) for their respective primary diagnosis at the Clinical Research Unit for Anxiety and Depression (CRUfAD) at St Vincent's Hospital in Sydney, Australia. Data were included from four groups of five to eight patients.

Diagnoses were made via face-to-face interview with an experienced Consultant Psychiatrist and later confirmed by a structured diagnostic interview with a Clinical Psychologist (Anxiety Disorders Interview Schedule for DSM-IV, ADIS-IV; Brown, Di Nardo, & Barlow, 1994). Exclusion criteria included concurrent psychotic ideation, organic brain dysfunction, significant alcohol/substance-abuse, or self-harm/suicidality. All patients gave their informed consent (see Appendix 5) for their de-identified data to be used for research purposes and study measures were administered at the beginning and end of the treatment program.

Measures

Index of Risk-Avoidance.

Domain-Specific Risk-Taking Scale (DOSPERT). Participants' risk-taking propensity was assessed using the DOSPERT (Blais & Weber, 2006; see Chapter 2 for detailed description). In the current sample, all five subscales were examined: Social (α = .68), Recreational (α = .90), Financial (α = .58), Ethical (α = .72), and Health and Safety (α = .62).

Primary Symptom Measures.

Agoraphobia Cognitions Questionnaire/Body Sensations Questionnaire (ACQ/BSQ). The ACQ and BSQ (Chambless et al., 1984) were used to assess the cognitive (ACQ; current sample, α = .84) and physical (BSQ; current sample, α = .96) symptoms of panic disorder (see Chapter 4 for detailed description).

Social Phobia Scale (SPS) and Social Interaction and Anxiety Scale (SIAS). The SPS and SIAS (Mattick & Clarke, 1998) were used to assess social phobia symptomatology. Specifically, the SPS (current sample, α = .91) measures anxiety experienced in situations where the individual is the focus of attention, while the SIAS (current sample, α = .74) measures the level of anxiety experienced in one-on-one and group social contexts (see Chapter 4 for detailed description).

Secondary Measures.

Beck Depression Inventory (BDI-II). Depressive symptomatology was assessed using the popular 21-item BDI-II (Beck, Steer, & Brown, 1996; current sample, α = .95; see Chapter 4 for detailed description).

Kessler Psychological Distress Scale (K-10). The K-10 (Kessler et al., 2003) was used to assess distress experienced as a result of anxiety and depression over the previous four week period (current sample, α = .95; see Chapter 4 for detailed description).

Procedure

Treatment.

CBGT for Social Phobia. The 7-week SP CBGT program has been shown to be effective and is described in detail elsewhere (McEvoy, 2007). Treatment comprised seven 4-hour sessions conducted weekly. All sessions were highly structured and manualised to ensure treatment integrity. Treatment groups were led by four masters and doctoral level clinical psychologists experienced in the treatment of SP and the treatment protocol. In brief, treatment involved (a) psycho-education regarding the nature of social phobia and its cognitive-behavioural maintaining factors, (b) development of personalised formulations consistent with cognitive models of social phobia (Clark & Wells, 1995; Rapee & Heimberg, 1997), (c) cognitive restructuring, (d) graded exposure and behavioural experiments, (e) reduction of safety-seeking behaviours, (f) video feedback, (g) encouragement to shift

attention onto the task at hand when anxious, and (h) application of treatment principles (e.g. thought challenging, attention focusing, behavioural experiments) to repetitive negative thinking (i.e. worry, rumination, post-event processing) and associated meta-beliefs.

CBGT for Panic Disorder with Agoraphobia. The PDAg CBGT program comprised six 4-hour sessions conducted weekly, led by experienced masters and doctoral level clinical psychologists. Similar to the CBGT for SP, all sessions were manualised to ensure treatment integrity. The program involved (a) psycho-education regarding the nature of panic disorder and its cognitive-behavioural maintaining factors, (b) development of personalised formulations consistent with cognitive models of panic disorder (Clark, 1986), (c) arousal reduction skills, (b) cognitive restructuring, (e) graded exposure and interoceptive exposure exercises, (f) reduction of safety-seeking behaviours, and (g) assertiveness skills training.

Results

Participant Characteristics

There were no significant differences between SP and PD patients in age, gender, marital status or education (*p*s > .05). Participants had an average of 2.21 (*SD* = 1.10) diagnoses, with 19 (80%) patients meeting diagnostic criteria for SP, seven (29%) for PD, eight (33%) for GAD and eight (33%) for major depressive disorder (MDD). The sample was predominantly well educated with three (13%) patients having received a postgraduate qualification, 11 (44%) having completed an undergraduate degree, two (9%) having another qualification in addition to high school, five (22%) having finished high school, and three (13%) having less than a high school qualification. Sixteen (67%) had never been married while three (13%) were married, two (8%) were divorced and three (13%) did not specify.

Pre-treatment Scores

Those in the SP treatment groups did not differ significantly on demographics, the SPS, SIAS, BDI-II or measures of risk-taking (*p*s > .05) before treatment, therefore were

included as one group in analyses (see Table 6.8). While the panic group did not differ significantly from the SP group on the BDI-II, or K-10 (*p*s > .05), there was a significant difference between groups on the total DOSPERT score, $t(22) = 2.69$, $p < .05$, and particularly the Recreational subscale, $t(22) = 3.29$, $p < .01$ (see Table 6.9). Therefore, treatment group (SP vs. PD) was included as a between-subjects variable in all analyses. Pre-treatment symptom scores were considered to be within the clinical range (ACQ/BSQ, Chambless et al., 1984; Chambless & Gracely, 1989; SIAS/SPS, Mattick & Clarke, 1998) and were comparable to scores of SP and PD patients reported from similar outpatient clinic samples (e.g., McEvoy, Mahoney, Perini, & Kingsep, 2009; Titov et al., 2010b). BDI-II scores were in the mild range, while K-10 scores were in the severe range.

Treatment Completion

Like Study 5, this study employed an intention-to-treat (ITT) design in which pre-treatment scores were used in place of post-treatment scores for those whose did not complete post-treatment measures (see Nich & Carroll, 2002). While risk-taking data was collected from all participants at pre- and post-treatment, other post-treatment data was collected from 13/17 (76%) and 5/7 (71%) of the SP and PD group participants, respectively.

Treatment Outcome

Repeated measures *t* tests, with Bonferroni corrections, showed a significant reduction in scores on the SIAS, $t(16) = 4.07$, adjusted $p < .01$, $d = 0.96$, and on the SPS, $t(16) = 4.01$, adjusted $p < .01$, $d = 0.55$, from pre-treatment to post-treatment in the SP group (see Table 6.7 for *M*s and *SD*s). However, there were non-significant reductions in ACQ, $t(6) = 1.32$, adjusted $p > .01$, $d = 0.21$, and BSQ scores, $t(6) = .79$, adjusted $p > .01$, $d = 0.24$, in the PD group (see Table 6.7 for *M*s and *SD*s).

Repeated-measures analyses of variance (ANOVAs), controlling for group (SP vs. PD), revealed significant reductions in BDI-II scores, but not in K-10 scores over treatment,

with minimal to moderate effect sizes (Cohen, 1992; see Table 6.8 for *M*s, *SD*s, and effect sizes). No significant effect for group was revealed, $F(1, 22) = .00 – 2.38$, *p*s > .05.

Changes in Risk-Taking

Multiple mixed between-within subjects ANOVAs were conducted to assess the effect of treatment on the various measures of risk-taking, entering time as the within-subjects variable (pre- and post-treatment risk-taking scores) and treatment group type (SP vs. PD group) as the between-subjects factor. A summary of ANOVA results can be found in Table 6.9. Total risk-taking score on the DOSPERT was found to increase significantly from pre- to post-treatment, $F(1, 22) = 6.32$, $p < .05$, $\eta^2 = 0.22$. At the subscale level, significant increases in risk-taking were found on the Social and Recreational subscales (*p*s < .05), but not on the Financial, Ethical, or Health and Safety subscales, (*p*s > .05; see Table 6.9 for *M*s, *SD*s and effect sizes). For all above analyses there were no significant effects of group on change in risk-taking scores (*p*s > .05).

Table 6.7

Pre- and Post-Treatment Mean Scores and Standard Deviations of Primary Measures of Social Phobia (SP) and Panic Disorder with Agoraphobia (PDAg) Patients

	SP (n = 17)		PDAg (n = 7)	
	M	*SD*	*M*	*SD*
SIAS				
Pre-treatment	52.53	8.38		
Post-treatment	42.41	12.40		
SPS				
Pre-treatment	35.88	14.56		
Post-treatment	27.65	15.56		
ACQ				
Pre-treatment			34.50	11.95
Post-treatment			32.17	9.79
SPS				
Pre-treatment			46.00	15.72
Post-treatment			42.67	12.14

Note. SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; ACQ = Agoraphobic Cognitions Questionnaire; BSQ = Bodily Sensations Questionnaire.

Table 6.8

Pre- and Post-Treatment Mean Scores, Standard Deviations and Between-Group Comparisons (mixed ANOVA) of Secondary Measures of Social Phobia (SP) and Panic Disorder with Agoraphobia (PDAg) Patients

	Total Sample (N = 24)		SP (n = 17)		PDAg (n = 7)		Between Group Comparisons		
	M	*SD*	*M*	*SD*	*M*	*SD*	$F^*_{(1,22)}$	*p*	η^2
BDI-II							6.13	.02	0.23
Pre-treatment	15.74	13.18	15.94	11.33	15.17	18.80			
Post-treatment	10.13	9.26	10.35	9.16	9.50	10.41			
K-10							.74	.40	0.03
Pre-treatment	32.67	10.83	32.71	9.61	32.57	14.25			
Post-treatment	29.79	11.93	28.53	11.60	32.86	13.09			

Note. η^2 = eta squared, index of effect size. BDI-II = Beck Depression Inventory-II; K-10 = Kessler Psychological Distress Scale.

*Mixed ANOVAs controlled for treatment group (SP vs. PDAg).

Table 6.9

Pre- and Post-Treatment Mean Scores, Standard Deviations and Within Group Comparisons (Mixed ANOVA) of Risk-Taking Measures for Social Phobia (SP) and Panic Disorder with Agoraphobia (PDAg) Patients

	Total Sample (N = 24)		Social phobia (n = 17)		Panic disorder (n = 7)		Within Group Comparisons		
DOSPERT	*M*	*SD*	*M*	*SD*	*M*	*SD*	$F^*_{(1,22)}$	*p*	η^2
Total							6.32	.02	0.22
Pre-treatment	82.17	15.87	87.12	14.82	70.14	11.89			
Post-treatment	91.46	17.90	96.29	16.75	79.71	15.91			
Social							10.93	.003	0.33
Pre-treatment	24.71	5.36	24.88	4.81	24.29	6.95			
Post-treatment	27.54	5.21	26.82	3.32	29.29	8.34			
Recreational							16.10	.001	0.42
Pre-treatment	14.04	6.74	16.47	6.45	8.14	2.41			
Post-treatment	15.67	6.81	20.18	7.77	11.86	6.36			
Financial							1.26	.27	0.05
Pre-treatment	14.04	4.25	14.47	4.78	13.00	2.52			
Post-treatment	15.67	6.81	15.94	6.27	15.00	8.49			
Ethical							1.64	.21	0.07
Pre-treatment	15.92	5.23	16.88	4.48	13.57	6.50			
Post-treatment	14.67	4.98	15.76	4.82	12.00	4.65			
Health & Safety							2.31	.14	0.10
Pre-treatment	13.46	4.47	14.41	4.54	11.14	3.58			
Post-treatment	15.83	5.59	17.59	5.51	11.57	2.99			

Note. η^2 = eta squared, index of effect size. DOSPERT = Domain-Specific Risk-Taking Scale.

* Mixed ANOVAs controlled for treatment group (SP vs. PDAg).

Association between Risk-Taking and Treatment Outcomes

In order to see whether risk-taking was associated with treatment outcomes, bivariate Pearson correlations were calculated (see Table 6.10 for correlation coefficients) between subscales of the DOSPERT, BDI-II, K-10 as well as the symptom measures for SP (SIAS and SPS) and PD groups (ACQ and BSQ).

For the SP group, increases in DOSPERT total scores were significantly associated with reductions on the SPS and SIAS. At the subscale level, improvements on all subscales, except the Ethical subscale (i.e., Social, Recreational, Financial and Health and Safety), were associated with reductions on the SIAS (*p*s < .05; see Table 6.10 for correlation coefficients). However, only changes on the Social and Health and Safety subscales (and marginally on the Recreational subscale) were significantly associated with change on the SPS. For the PD group, changes in risk-taking on the DOSPERT were not significantly associated with any changes on the ACQ (*p*s > .05). However, increases in Recreational risk-taking on the DOSPERT were marginally significantly associated with reductions on the BSQ ($p < .10$).

For secondary measures, only increases on the Health and Safety subscale of the DOSPERT were significantly associated with reductions on the BDI-II ($p < .05$), while only increases on the Recreational and Financial subscales were marginally significantly associated with reductions on the K-10 (*p*s < .10).

Table 6.10

Pearson Bivariate Correlations between Risk-Taking (DOSPERT) and Treatment Outcome Change Scores (Using ITT Analyses)

Variable	Δ BDI-II	Δ K-10	Δ SIAS	Δ SPS	Δ ACQ	Δ BSQ
Δ DOSPERT						
Total	.30	.31	.86***	.66**	.12	-.02
Social	.18	-.06	.61**	.60*	.02	-.19
Recreational	.29	.38[a]	.79***	.48[a]	.43	.68[a]
Financial	-.04	.39[a]	.58**	.39	-.04	.00
Ethical	.15	.14	.35	.22	-.03	-.45
Health & Safety	.49*	.10	.82***	.70**	.27	.21

Note. Δ denotes change, post-treatment minus pre-treatment (and reverse for BDI-II, K-10, SPS, SIAS, ACQ, BSQ), such that a positive correlation coefficient is indicative of an association of a positive change in risk-taking and a reduction in outcome measure. ITT = Intention to treat; DOSPERT = Domain-Specific Risk-Taking Scale; BDI-II = Beck Depression Inventory-II; K-10 = Kessler Psychological Distress Scale; SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; ACQ = Agoraphobic Cognitions Questionnaire; BSQ = Bodily Sensations Questionnaire.

[a] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Discussion

The first aim of this study was to investigate changes in risk-taking following a course of CBGT for SP and PDAg. This study is first to examine self-reported risk-avoidance as a treatment outcome across multiple domains in an anxious treatment-seeking sample. Consistent with hypotheses, total risk-taking increased (i.e., risk-avoidance decreased) significantly as a result of treatment. Upon closer examination, it was revealed that in line with Study 5, only risk-avoidance in Social and Recreational domains reduced significantly following treatment, while the Financial, Ethical, and Health and Safety subscales did not.

The second aim of the present study was to examine whether changes in risk-avoidance were associated with treatment outcome. In partial support of our hypotheses, reductions in overall risk-avoidance were significantly associated with reductions in symptoms of SP, but not depression or psychological distress. At a subscale level, for the most part, reductions in risk-avoidance on all subscales were associated with reductions in SP symptoms, with the exception of the Ethical subscale. Reductions in risk-avoidance in the recreational domain were also marginally significantly associated with reductions in physical PDAg symptoms, and psychological distress, while reductions in the Health and Safety domain were associated reductions in depression.

The results of this study highlight the domain-specific and complex nature of risk-taking (see Weber, 2010), suggesting that changes in risk-taking as a result of treatment, like risk-taking preferences, are not consistent across behavioural contexts. There are several possible explanations for why there may have been smaller changes on the Financial, Ethical, or Health and Safety subscales. One possible reason is that risk-avoidance was not specifically targeted in treatment; it is possible that social and recreational risk-avoidance were targeted indirectly through components of CBT, such as thought-challenging, graded exposure (i.e., social situations or interoceptive exposure), behavioural activation, and

pleasant-events scheduling. The nature of current CBT protocols is such that specific cognitions and behaviours are targeted, with the intent that challenging specific fears will generalise to others. As suggested in our results, perhaps the generalisability of CBT skills is limited to the domains that are specifically targeted (i.e., social and recreational in this case). An interesting direction of future research would be to examine whether treatments for different disorders result in changes in different domains (e.g., change in Ethical domain following treatment for GAD, or change in Health and Safety following treatment for OCD). Likewise, future studies may wish to investigate whether challenging risk-avoidance directly and more generally (rather than specific domains) can bring about symptom change. An alternative explanation involves the potential overlap between some domains of risk-avoidance and disorder-specific avoidance. In other words, given there likely exists considerable overlap between measures of social avoidance (as a symptom of SP) and the Social and Recreational subscales of the DOSPERT, perhaps the change in social and recreational risk-avoidance observed in this study is merely a reflection of reduction in SP symptom severity, rather than general risk-avoidance. Future studies are needed, however, to further elucidate these findings.

A third explanation for the smaller changes on Financial, Ethical and Health and Safety subscales involves the nature of the measure used to assess risk-avoidance in these domains (i.e., the DOSPERT). It is possible that risk-avoidance is the more adaptive preference within the Financial, Ethical and Health and safety domains, suggesting that even if patients generally became less risk-averse after treatment, they may remain unwilling to engage in such behaviours (e.g., bathing without sunscreen, cheating on an exam, or leaving a child alone at home while running an errand). This is supported by previous studies in this thesis showing that anxious participants do not always differ significantly from healthy controls on these subscales and studies showing that non-clinical samples report lower scores

on these three domains relative to the Social and Recreational subscales (e.g., Blais & Weber, 2006). The nature of these items calls into question the validity of using these subscales to assess risk-avoidance in this particular population. Future research is needed to refine or develop sensitive and psychometrically sound multidimensional measures of risk-taking, that demonstrate discriminant validity for the purpose of identifying those who are risk-averse. A third possible explanation is that attitudes and behaviours in these domains may be particularly robust and subsequently more difficult to shift as a result of treatment; relative to social and recreational avoidance, it is possible that risk-taking in the financial, ethical and health and safety domains have closer ties to temporally stable dispositional variables and are therefore less malleable. For example, the ethical and health and safety domains have been found to be most strongly associated with dispositional variables (Blais & Weber, 2006; Soane, Dewberry, & Narendran, 2010; Weber et al., 2002; Weller & Tikir, 2011).

Another important finding in our study was that change in risk-taking across several domains was associated with change in SP symptoms. This finding is consistent with results of Study 1, which demonstrated relatively strong associations between social anxiety symptomatology and risk-avoidance across several domains. PDAg symptoms, on the other hand, were not generally associated with change in risk-avoidance – the one exception being the association between the recreational domain and the bodily sensations questionnaire (BSQ). There may be several explanations for the lack of association between risk-avoidance and measures of PDAg in this study. For instance, these results may reflect the methodological limitations of this study, such as limited statistical power due to the small number of individuals in the PDAg group. Alternatively, we found that the two CBGT treatments described in this study were effective in reducing symptoms of depression in both groups and SP symptoms in the SP group; however, CBGT was not effective in producing significant change in PDAg symptoms. Nonetheless, the lack of group effects on changes in

risk-taking suggest that CBT was associated with reduction in risk-avoidance for both individuals with SP and individuals with PDAg, irrespective of symptom change, but may explain the lack of association between risk-avoidance and PDAg symptoms. It is possible that risk-avoidance may be more strongly associated with particular anxiety disorders, such that the effect of risk-avoidance across domains is greater for SP than for PD, as suggested in Study 3. However, although the literature on risk-avoidance and anxiety is growing, systematic studies using larger clinical samples are needed to further investigate the relative influence of risk-avoidance across domains on anxiety disorder symptoms.

This study has several limitations that warrant consideration. First, our study utilised a small treatment sample consisting of predominantly individuals with primary SP or PDAg undergoing group treatment. These findings may not generalise to individuals with other anxiety disorders and it is possible that risk-avoidance will change differentially depending on diagnosis and treatment type. Second, this study did not use a control group, precluding us from concluding whether change in risk-avoidance was simply the result of passage of time. Third, the measures used in this study were limited to self-report and therefore may be affected by biases inherent in such measures. Future studies investigating risk-avoidance and treatment would benefit from the use of behavioural indices of risk-avoidance (e.g., Columbia Card Task, CCT; Figner et al., 2009) as well as real-world measures of risk-taking administered pre- and post-treatment. Fourth, we did not include follow-up measures in this study, which precluded assessment of the retention or consolidation of gains in risk-avoidance and symptoms. Fifth, this study did not examine medication use or other factors (e.g., rapport with clinician, motivation, etc.) which are likely to affect treatment outcome. And lastly, the design of this study was such that we were unable make any causal inferences about the mechanisms of change observed; that is, do changes in risk-avoidance lead to

changes in anxiety symptoms or vice versa? Future studies are needed to clarify the mechanisms involved in the association between risk-avoidance and symptom change.

In summary, Study 6 is one of the first to examine the effect of group treatment on domain-specific risk-avoidance in a clinical sample with SP and PD. Risk-avoidance, particularly in the social and recreational domains, reduced significantly following treatment and reductions in some domains were associated with changes anxiety symptomatology. Our results suggest that risk-avoidance decreases following CBGT, albeit not equally across all domains; furthermore, risk-avoidance may be an important process measure underlying some aspects of symptom change.

Implications for the Program of Research

The two studies described in this Chapter demonstrate that CBT treatment for clinical anxiety can reduce risk-avoidance, particularly within the social and recreational domains. Specifically, Study 5 showed that social and recreational risk-avoidance reduced following a six-lesson Internet-based (iCBT) treatment for generalised anxiety disorder (GAD) and that change in risk-taking mediated reduction in depression (but not other anxiety symptoms). Study 6 replicated these findings in a clinic-based setting, showing that social and recreational risk-avoidance (but not other domains) significantly reduced over the course of a group treatment (CBGT) for either social phobia (SP) or panic disorder with agoraphobia (PDAg). Together, these findings from these studies suggest that current CBT protocols may indirectly target risk-avoidant decision-making and further highlights the utility of investigating the clinical implications of risk-avoidance.

CHAPTER 7

GENERAL DISCUSSION

	Page
7. GENERAL DISCUSSION	173
Summary of Findings	176
Theoretical Considerations of Risk-Avoidance and Anxiety	176
Risk-Avoidance vs. Disorder-Specific Avoidance	180
Risk-Avoidance and the Development of Anxiety Pathology	182
Risk-Avoidance and the Maintenance of Anxiety Pathology	183
Clinical Considerations of Risk-Avoidance and Anxiety	184
Treatment-Seeking, CBT and Risk-Avoidance	184
Limitations of this Program of Research and Future Directions	187
Concluding Comments	190

Summary of Findings

The aim of this body of research was to contribute to the sparse, albeit expanding, literature on the topic of risk-avoidance and anxiety. In particular, this thesis empirically investigated risk-avoidance in several clinical and non-clinical samples, using self-report and behavioural indices of risk-taking. Furthermore, this thesis contributed to the existing body of research by examining the clinical implications of risk-avoidance.

Study 1 sought to replicate and extend Maner et al.'s (2007) study by examining the hypothesised association between risk-avoidance and social anxiety symptoms in an undergraduate population. In addition, we examined the possibility that risk-avoidance may contribute to social anxiety pathology by investigating whether risk-avoidance mediated the relationship between a dispositional vulnerability to anxiety (behavioural inhibition system sensitivity; BIS; Gray, 1970) and social anxiety symptoms. Consistent with hypotheses, we found that higher levels of social anxiety were associated with less self-reported risky behaviour in the real-world (albeit not consistently across domains) and a more risk-avoidant strategy on a behavioural decision-making task. Furthermore, hierarchical regression analyses suggested that risk-avoidance may be a partial mediator of the relationship between BIS and social anxiety. These findings thereby provided initial evidence for the proposed model of risk-avoidance as a pathway for the development of pathological social anxiety.

Study 2 investigated whether risk-avoidant preferences generalised to an online clinically anxious sample using self-report measures and a novel behavioural risk-taking task, the Columbia Card Task (CCT; Figner et al., 2009). As hypothesised, clinically anxious individuals were significantly more risk-avoidant relative to non-clinical controls on the CCT and a domain-specific self-report measure of risk-avoidance, the DOSPERT. However, anxious individuals were more risk-averse only within the social, recreational and financial risk domains and not the ethical or health and safety domains. Moreover, risk-avoidance was

significantly associated with components of psychological distress, namely anxiety, stress, and depression; however, analyses at the subscale level revealed differential unique associations between risk domains and anxiety or depressive symptoms. These results suggested that, like those with elevated trait anxiety or anxious symptomatology, clinically anxious individuals also show a reduced tendency to take risks across a number of behavioural domains. Moreover, results from the CCT showed that anxious individuals may be more likely to utilise provided information when making risky decisions.

Study 3 sought to replicate previous findings with a larger clinical sample of individuals with SP, GAD and PDAg and to investigate whether risk-avoidance contributes to pathological anxiety symptoms as a transdiagnostic factor. Consistent with previous findings, clinically anxious individuals were found to be generally more risk-avoidant relative to control participants in the social, recreational, financial and health and safety domains of the DOSPERT, even after controlling for differences in age and psychological distress. When examining the contribution of risk-avoidance to specific disorders however, risk-avoidance was not found to be consistently associated with anxiety symptom measures. This inconsistency suggests that further research is needed to verify whether risk-avoidance can be conceptualised as a transdiagnostic factor.

Study 4 extended the previous line of research by examining the potential implications of a risk-avoidant bias on treatment-seeking preferences in an online sample of individuals meeting diagnostic criteria for SP, OCD, or GAD. In line with our hypotheses, individuals with SP and GAD (but not OCD) reported greater risk-avoidance when compared to non-clinical controls. However, when examined at the domain level of the DOSPERT, risk-avoidance was limited to the social and recreational domains for SP and the social, recreational, and financial domains for GAD. Furthermore, willingness to seek treatment was found to be positively associated with social risk-taking and an overall self-rating of risk-

taking behaviour in clinically anxious individuals who had never sought treatment. These results suggest that a risk-avoidant decision-making bias may contribute to the decision to seek treatment.

Finally, Studies 5 and 6 further explored the clinical implications of risk-avoidance by investigating self-reported domain-specific risk-taking on the DOSPERT as a treatment outcome in an Internet-delivered CBT (iCBT) program for GAD and CBT group (CBGT) treatment for SP and PDAg. In both studies, results partially confirmed hypotheses, demonstrating that participants in the treatment groups significantly decreased risk-avoidance in the social and recreational domains, but not in other domains, relative to the control group. In Study 5, mediation analyses revealed risk-taking to be a significant mediator of reduction in depressive symptomatology as a result of CBT; however, this was not the case for measures of GAD symptomatology and overall impairment. These results offer evidence that changes in social and recreational risk-taking likely precede changes in depressive symptomatology as a result of GAD treatment, but suggest that risk-avoidance may not be a mechanism of change for GAD symptomatology or impairment. In Study 6, results suggested that reductions in risk-avoidance in some behavioural domains were significantly associated with improvements in SP, PDAg, and depression symptoms; these results further suggest that risk-avoidance may be an important process measure underlying some aspects of symptom change and highlight the domain-specific complexity of the risk construct.

This final thesis chapter now intends to integrate and review the findings of this program of research in the context of previous literature on risk-taking, decision-making and pathological anxiety. In doing so, this chapter also aims to discuss the limitations of the presented research, the potential clinical implications of these findings, and important directions for future research.

Theoretical Considerations of Risk-Avoidance and Anxiety

Consistent with previous literature, the results of Studies 1, 2, 3, and 4 found that risk-avoidance is associated with pathological anxiety in undergraduate, treatment-seeking and online clinical samples. In particular, clinically anxious individuals reported reduced willingness to engage in risky behaviours across a number of behavioural contexts and demonstrated greater risk-aversion on objective risk-taking tasks. The following section will now discuss how these results relate to the existing theoretical understanding of risk and pathological anxiety.

Risk-Avoidance vs. Disorder-Specific Avoidance

Results from the studies presented in this thesis offer support for the distinction between risk-avoidance and disorder-specific avoidance (i.e., behavioural, experiential, and cognitive avoidance associated with a particular anxiety disorder diagnosis), such that anxious individuals are hypothesised to exhibit a global risk-avoidant decision-making bias across risk domains. We found preliminary evidence to support that this risk-avoidant bias is not limited to avoidance of specific threats that are characteristic of the respective anxiety disorder. Specifically, Study 1 found that social anxiety symptomatology was associated with risk-avoidance in social, recreational, and financial domains. Studies 2 and 3 demonstrated that clinically anxious individuals were more risk-averse than non-clinical controls in social, recreational, and financial domains (and additionally the health and safety domain in Study 3). Finally, Study 4 found individuals with SP and GAD to be more risk-averse than controls in social and recreational domains (with individuals with GAD also reporting greater risk-avoidance in the financial domain), as well as on a general self-report index of risk-taking. Moreover, self-report measures were corroborated by the use of two objective behavioural measures of risk-taking in Studies 1 and 2, supporting the presence of a risk-avoidant cognitive bias at a domain non-specific level. Collectively, these results suggest that risk-

avoidant behaviour is not necessarily limited to the specific domain of pathology. On the other hand, the results also suggested that the initial proposition put forward by Maner & Schmidt (2006) – that "various forms of anxiety pathology (e.g., generalized anxiety disorder, panic disorder, social anxiety disorder) are associated with a global orientation toward making risk avoidant decisions" (p. 185) – is perhaps more complex than originally proposed.

This program of research demonstrated that anxious individuals, irrespective of anxiety disorder diagnosis, consistently reported risk-avoidance in the social and recreational domains, offering preliminary support for the hypothesis that anxious individuals exhibit a global risk-avoidant decision-making bias. Interestingly, reduced risk-taking in social and recreational domains may be conceptualised as a behavioural manifestation of anxiety symptomatology and associated impairment. For example, that social risk-avoidance is prevalent across a number of anxiety disorders is consistent with research reporting social withdrawal associated with anxiety and depressive pathology. One study, for instance, found that most individuals across anxiety disorders report social avoidance, however, those with SP report experiencing more distress and interference across a greater number of social situations (Rapee, Sanderson, & Barlow, 1988). Furthermore, most anxiety disorders tend to have a social component, suggesting that social risk-avoidance may be an expression of comorbid social anxiety. For example, SP is the most common comorbid diagnosis with GAD and content of worries in GAD often include social content (Borkovec, Alcaine, & Behar, 2004); moreover, cognitions associated with experiencing panic attacks can often involve concerns about embarrassment or humiliation (Stein, Shea, & Uhde, 1989).

Furthermore, reduced recreational risk-taking in anxious populations is in line with models of pathological anxiety, implicating the role of anxiety sensitivity and interoceptive avoidance such that anxious individuals (not limited to those experiencing panic symptoms)

are likely to avoid activities that provoke unpleasant physiological reactions (possibly evoked by recreational or physical risk-taking) (Borkovec et al., 2004; Wells & Papageorgiou, 2001; Zvolensky & Forsyth, 2002). Indeed, whether anxious people take less social and recreational risks because of their symptoms, or their risk-avoidance contributes to their anxiety has yet to be empirically established. As argued by Maner and Schmidt (2006), however, it is likely that there is a complex interaction between risk-avoidance and anxiety such that anxiety results in biased risk-appraisals, leading to risk-avoidant decision-making, and the resulting avoidance subsequently maintains biased risk-appraisals and anxiety. Nevertheless, these findings offer preliminary support for the relationship between risk-avoidant tendencies and pathological anxiety in domains not limited to disorder-specific avoidance.

In contrast to social and recreational risk-taking, support for the relationship between risk-avoidance and pathological anxiety in financial, ethical and health and safety domains was less consistent. One possible reason for this finding may be the result of differences in perceptions of risks between the different domains. For example, in line with the 'risk-as-feelings' hypothesis (see Chapter 1), Loewenstein et al. (2001) propose that the vividness with which one can imagine negative consequences and associated anticipatory affect are likely associated with greater perceptions of risk and subsequent risk-avoidant behaviour. Indeed, social and recreational activities are arguably more familiar to people relative to financial, ethical and health and safety risks, and thus negative consequences may be more easily brought to mind. This is especially the case for anxious people who are likely to have previously experienced aversive consequences or anxiety in social and recreational activities and may subsequently experience greater anticipatory affect or vividness associated with self-relevant imagined future negative consequences. On the other hand, for a number of reasons (e.g., less familiarity, less self-relevance), both anxious and non-clinical individuals may be

less able to visualise negative consequences associated with financial, ethical and health and safety risks, resulting similar levels of reported risk-avoidance.

Alternatively (or additionally), these findings may reflect differing perceptions of benefits between domains; that is, the benefits associated with social (e.g., *"Admitting that your tastes are different from those of a friend"*) and recreational (e.g., *"Going down a ski run that is beyond your ability"*) risk-taking may be less tangible than those in the financial (e.g., *"Investing 10% of your annual income in a new business venture"*), ethical (e.g., *"Not returning a wallet you found that contains $200"*) or health and safety (e.g., *"Drinking heavily at a social function"*) domains. This may mean that the Social and Recreational subscales of the DOSPERT are potentially more associated with intolerance of uncertainty (given that the outcomes are unknown), while the Financial, Ethical and Health and Safety subscales are more associated with risk-seeking and impulsivity. Further investigation is needed to shed light on this issue.

Methodologically speaking, inconsistent findings for risk-avoidance on the Financial, Ethical and Health and Safety subscales may reflect a lack of sensitivity in the DOSPERT for measuring maladaptive risk-avoidance in these domains. As outlined previously, it is possible that risk-avoidance is the more adaptive preference within these contexts such that both anxious and non-clinical controls are likely to report risk-avoidant preferences. This is supported by studies showing that non-clinical samples report lower scores on these three domains relative to the Social and Recreational subscales (e.g., Blais & Weber, 2006). Furthermore, financial risk-taking, as measured by the DOSPERT, is heavily focussed on gambling (e.g., *"Betting a day's income at a high-stake poker game."*) or investing (e.g., *"Investing 10% of your annual income in a moderate growth mutual fund"*), and is likely to be associated with a number of external factors (e.g., income, education, etc.), suggesting this subscale may only be relevant to a small subset of our sample. There is also evidence that

anxiety disordered individuals can exhibit high risk health behaviour (e.g., unsafe sex, high alcohol consumption), implying that anxious individuals may also report higher levels of risk-taking within the health and safety domain. As noted in Chapter 1, while the argument has been made for a relationship between risk-avoidance and anxiety, some studies have demonstrated that affective motives (e.g., desire for positive affect, avoidance of negative affect and emotion-focussed coping) underlie many forms of risk-taking behaviours (Cooper, 1992; Cooper, Agocha, & Sheldon, 2000), implying anxious individuals may also exhibit risky behaviour as a means of regulating emotions (e.g., Woodman et al., 2009).

In sum, risk propensity can be considered both a global and domain-specific construct. In other words, people may have a general predisposition to avoid or seek risks, but may also behave differently towards risks in different domains as a result of a number of situational and individual factors. Based on the results presented in this thesis, it is possible that anxious individuals exhibit a general dispositional and cognitive tendency to avoid risks, as evidenced by risk-avoidant performance on behavioural decision-making tasks; however, differences in risk tendencies may also be apparent in specific domains, as evidenced by domain-specific self-report measures. Such domain-specific tendencies are likely dependent on a number of factors (e.g., past experience and self-efficacy); likewise, due to the large number of factors and significant variance between individuals, consistent domain-specific patterns between anxiety disorders may be difficult to see. Nevertheless, although further studies are needed to establish the domain-specific nature of risk-avoidance in pathological anxiety, this thesis offers support that clinically anxious people are risk-averse across a number of behavioural contexts, not limited to disorder-specific avoidance.

Risk-Avoidance and the Development of Anxiety Pathology

The results from Studies 1 and 3 suggest that risk-avoidance contributes to anxiety symptomatology, offering preliminary support for the proposition that risk-avoidance is

implicated in the aetiology of anxiety disorders as a transdiagnostic factor. Of course, given the cross-sectional design of these studies, we are precluded from making any causal inferences. Nonetheless, the potential developmental role of risk-avoidance is supported by longitudinal studies showing that related dispositional constructs – such as behavioural inhibition, punishment sensitivity, and harm avoidance – are robust predictors of the onset of anxiety disorders (e.g., Hirshfeld-Becker et al., 2008; Krueger, Caspi, Moffitt, Silva, & McGee, 1996; Rosenbaum et al., 1993).

As first noted in Chapter 1, behavioural inhibition in children, for example, has been characterised as an endophenotype for anxiety (Degnan & Fox, 2007), given its association with many of the known risk factors that lead to the development of anxiety disorders in later life (i.e., cognitive, behavioural and psychophysiological; Degnan, Calkins, Keane, & Hill Soderlund, 2008; McDermott et al., 2009; Reeb-Sutherland et al., 2009; Wolfe & Bell, 2007). One recent experimental study showed that attentional biases to threat moderated the relationship between behavioural inhibition and social withdrawal in very young children, implying that related cognitive mechanisms – such as risk-avoidance – may also play a similar role (Pérez-Edgar et al., 2011). Interestingly, however, the same study also found children who avoided attending to threatening cues did not demonstrate a significant relationship between behavioural inhibition and social withdrawal, suggesting that threat avoidance may in fact serve a protective role against the development of social anxiety. Indeed, future experimental and longitudinal studies are necessary to clarify the aetiological role of risk-avoidance in anxiety disorders.

Subsequent studies may also wish to investigate the developmental implications of risk-avoidance; for example, does risk-avoidance in childhood predict the presence of anxiety disorders in adulthood? Can interventions targeting risk-avoidance in vulnerable children and parents be preventative? In support of this hypothesis, Rapee and colleagues (2005) found

that preschool children whose parents received six-sessions of an education program targeting withdrawn/inhibited behaviour were significantly less likely to be diagnosed with an anxiety disorder at the 12 month follow-up session relative to those whose parents did not receive the intervention. A later study that concurrently targeted parents of behaviourally inhibited children who had an anxiety disorder also showed similarly promising results (Kennedy, Rapee, & Edwards, 2009). Whether such programs would benefit from inclusion of protocols directly targeting risk-avoidance offers a potentially fruitful line of investigation.

Risk-Avoidance and the Maintenance of Anxiety Pathology

Whether risk-avoidance maintains pathological anxiety was not directly examined in this body of research. However, exploring the association between change in risk-avoidance and change in anxiety symptoms may shed some light on the maintenance role of risk-avoidance. CBT is believed to reduce symptoms of anxiety by targeting common maintaining factors, such as avoidance behaviours and maladaptive cognitions. Study 5 found that change in risk-avoidance approached significance as a full mediator of change in depression, but not any other anxiety symptoms, suggesting that risk-avoidance is a possible maintaining factor for depression, but not anxiety. Study 6 found that reduction in risk-avoidance was associated with reduction in symptoms of anxiety; however, given the cross-sectional and correlational nature of this study, the direction of this relationship is unknown.

While it is possible that reduction in risk-avoidance preceded change in anxiety symptoms (implying that risk-avoidance is a maintaining factor), it is also possible that change in anxiety symptoms preceded change in risk-avoidance, or that change in risk-avoidance and anxiety symptoms was preceded by change in a common maintaining factor (e.g., neuroticism). Further research is needed to clarify the directionality of this relationship. This research also generates questions about the transdiagnostic nature of risk-avoidance. For instance, does risk-avoidance act as maintaining factor for all anxiety disorders? If so, does

risk-avoidance in some domains contribute more to maintaining pathological anxiety than others? Indeed, further studies are needed to address these questions and clarify the role that risk-avoidance plays in the maintenance of pathological anxiety.

Risk-Avoidance and Depression

Although not examined directly, several of the studies in this program of research found an association between reduced risk-taking and depression. In particular, our findings in Study 2 demonstrated an association between recreational risk-avoidance and depression; Study 3 showed social risk-avoidance to uniquely predict depression; and Study 5 indicated that change in social and recreational risk-taking mediated iCBT treatment outcome for depression in individuals with GAD. While some studies have found associations between risk-avoidance and depression (Chapman et al., 2007; Smoski et al., 2008), other research has proposed that risk-avoidance is uniquely associated with anxiety (e.g., Maner & Schmidt, 2006; Mitte et al., 2007). There is reason to believe, however, that both anxiety and depression are associated with reduced risk-taking, albeit for different reasons.

For example, there is evidence to suggest that the neurophysiological mechanisms underlying risk-seeking and risk-avoidance are functionally distinct (Schonberg et al., 2011). Moreover, while behavioural inhibition has been generally associated with anxiety disorders and risk-avoidance, reduced behavioural activation has been associated with mood disorders and risk-seeking (e.g., Harmon-Jones & Allen, 1997). Likewise, recreational risk-taking has been associated with behavioural activation and sensation-seeking (e.g., Breivik, 1996; Horvath & Zuckerman, 1993; Nicholson et al., 2002; Nicholson et al., 2005b; Quilty & Oakman, 2004), and may subsequently be related to exposure to sources of external reinforcement, as implicated in depression. Together, this research suggests that reduced risk-seeking, and not increased risk-avoidance, may be implicated in the development and maintenance of co-morbid depression. It is possible, therefore, that even though anxiety and

depression are associated with reduced risk-taking on measures of risk-taking, the underlying reasons may be different. In other words, anxiety may be associated with reduced risk-taking because of an overestimation of the cost of negative outcomes (increased behavioural inhibition), while depression may be associated with reduced risk-taking because of an underestimation of the potential benefits (reduced behavioural activation). Future studies would benefit from the inclusion of measures of risk perception to assess the potential mechanisms for reported risk-avoidance.

Clinical Considerations of Risk-Avoidance and Anxiety

As outlined previously, few studies have examined the potential clinical implications of risk-avoidance in anxiety disorders. Subsequently, Study 4 demonstrated an association between treatment-seeking and risk-avoidance in anxious individuals who had never sought treatment, while Study 5 and 6 examined change in risk-avoidance as a result of CBT treatment for clinical anxiety. Although detailed discussions of these results are available in Chapters 5 and 6, the following section will broadly discuss these results in the context of the treatment of pathological anxiety as well as some future clinical considerations.

Treatment-Seeking, CBT and Risk-Avoidance

Study 4 showed that treatment-seeking was positively associated with social risk-taking and an overall self-rating of risk-taking behaviour in an online sample of clinically anxious individuals who had never sought treatment. These results are supported by research suggesting that certain individual and psychological factors, like risk perceptions, may contribute to the decision to seek treatment (Shaffer et al., 2006; Vogel & Wester, 2003; Vogel et al., 2005). Future studies may benefit from a more detailed investigation of the perceived costs and benefits of treatment-seeking and how this is related to risk-perception and risk-avoidance in anxious populations. By understanding the underlying decision-making processes involved in the decision to get help, we may be better able to develop interventions

to reduce anxiety associated with treatment-seeking. Furthermore, prospective and longitudinal studies are needed to establish the directionality of any relationships between these constructs.

Studies 5 and 6 of this thesis demonstrated that risk-avoidance can be reduced in social and recreational domains and across a number anxiety disorders, as a result of an iCBT and CBGT treatment programs. While the mechanisms of this change are unclear, these results provide initial evidence that CBT indirectly targets risk-avoidance. One way CBT may target risk-avoidance is through graded exposure (a central tenet of current CBT protocols for anxiety disorders; Barlow, 2002; Carey, 2010). Exposure therapy in CBT can be conceptualised as situation-specific risk-taking, or exposure to situation-specific avoidance. Clinically speaking, exposure therapy is believed to function by challenging general (e.g., *"I can't cope"*) and specific (e.g., *"If _____, then _____"*) maladaptive beliefs that maintain anxiety (Carey, 2010; Tryon, 2005). Essentially, exposure to a risky situation provides new information about the probability and the cost of the perceived negative outcomes thereby affecting the likelihood a person will engage in that situation in the future. Interestingly, it has been argued that individuals are remarkably resistant to change in risk perceptions when provided with new information (Rottenstreich & Hsee, 2001; Wildavsky, 1993). However, consistent with clinical research, studies within the risk literature have shown that multiple exposures to risky stimuli or situations results in habituation to negative consequences and subsequent reductions in perceived risk estimates (Breakwell, 2007), supporting the potential mediating role of risk-avoidance in treatment outcome. Future studies are certainly needed to clarify the potential mechanisms of change involved in reducing risk-avoidance.

Another direction warranting further investigation is that of the potential treatment applications associated with risk-avoidance and anxiety. Once an individual makes the choice to engage in treatment, avoidance of risks within the therapeutic context (e.g., taking part in

exposure tasks or applying skills outside the session) may have a serious negative impact on treatment outcome and attrition rates. This is supported by research showing that personality factors and variables related to therapeutic engagement – like severe avoidance (e.g., De Araujo, Ito, & Marks, 1996; Steketee & Shapiro, 1995), harm-avoidance (e.g., Abrams et al., 2004; Joffe, Bagby, Levitt, Regan, & Parker, 1993), avoidant personality disorder (e.g., Feske, Perry, Chambless, Renneberg, & Goldstein, 1996; Finn-Magnus et al., 2010), and even homework compliance (e.g., Kazantzis, Whittington, & Dattilio, 2010; Rees, McEvoy, & Nathan, 2005; Woods, Chambless, & Steketee, 2002) – are negatively associated with treatment outcome. If risk-avoidance is indeed related to treatment outcome, perhaps targeting risk-avoidance pre-treatment may improve retention and outcome. Indirect support for this was demonstrated in a study that implemented a pre-treatment intervention (imagining attending therapy sessions) in individuals with clinical anxiety; results showed reduced attrition and improved treatment outcomes for those in the intervention condition (Buckner et al., 2009). More research is certainly needed, however, to examine the relationship between risk-avoidance, treatment-engagement, attrition, and treatment outcome in anxious populations.

Finally, future studies on this topic should also examine the impact of directly targeting risk-avoidance in CBT treatments for anxiety disorders. While exposure-based techniques as in traditional CBT protocols encourage patients to take risks in domains specific to their particular disorder, it may also be important in addressing the global tendency to avoid perceived risk. Within the social psychology literature, experimental studies have shown that exposure to risk-related material (e.g., pictures, movies, video games), increases accessibility of risk-taking cognitions and subsequent propensity to take risks (e.g., Fischer, Guter, & Frey, 2008), suggesting a potential avenue for future application in a clinical setting. In line with the aforementioned self-efficacy research in Chapter 2, one

might speculate that through exposure to risky situations, risk-related self-efficacy (or the belief that one can cope with a risky situation) may improve, thereby reducing anxiety in future risky situations. Perhaps by directly targeting this bias through psychoeducation, cognitive restructuring of risk-related appraisals and generic exposure to 'risky' situations (not limited to specific behavioural avoidance), we may see an improvement in treatment outcome, attrition rates and relapse rates for anxiety disorder patients.

General Limitations of This Program of Research and Future Directions

In addition to limitations and future directions discussed previously, there are a number of general limitations that warrant consideration. First, state anxiety has been consistently associated with risk-avoidant decision-making (e.g., Lerner & Keltner, 2000; Lerner & Keltner, 2001; Raghunathan & Pham, 1999). Furthermore, some models of emotion and risk-taking have posited that the effect of dispositional anxiety on risk-taking is mediated by state anxiety (e.g., Loewenstein et al., 2001). The measures used in the current program of research were designed to assess clinical anxiety symptomatology and therefore can only suggest a relationship between anxiety symptomatology and risk-avoidance; however, our findings are also consistent with the possibility that state anxiety is associated with risk-avoidance. It is likely that both situational and background levels of anxiety contribute to risk-taking behaviour. Therefore, future research would benefit from investigating the contribution of state anxiety (using both self-report and physiological measures) on the relationship between clinical anxiety and risk-avoidance.

In addition to state anxiety, a significant number of variables can influence decision-making and risk propensity, which this program of research unfortunately did not account for. Given that we did not generally control for psychological distress or impairment, we cannot definitely conclude that risk-avoidance was related to anxiety alone. Ideally, future studies should also control for other factors that may be involved in risk-avoidance, including

mood/affect (e.g., negative affect, etc.), psychological distress, impairment, as well as situational variables (e.g., perceived controllability, motivation, etc.) that may contribute to decision-making performance, in order to rule out these factors as confounding variables. Furthermore, there exists considerable conceptual overlap of risk propensity with other personality correlates and risk-related constructs (e.g., sensation-seeking, impulsivity, intolerance of uncertainty, etc.). The studies presented in this body of research, however, did not control for the influence of all of these variables in statistical analyses. It is likely that risk-avoidance is one of a large number of overlapping factors and therefore, future studies measuring and controlling for these factors would help to establish the unique relationship between risk-avoidance and anxiety pathology. Moreover, while this program of research investigated risk propensity and preferences, we did not include measures that would assess the underlying mechanisms of risk-avoidance (e.g., risk perception).

Another issue that warrants consideration in this program of research is the premise of adaptive risk-taking. Most conceptualisations of risk and many of the measures used to assess risk preferences assume that adaptive risk-taking is characterised by moderate levels of risky behaviour. However, moderate levels of risk-taking are not always optimal. For example, the adaptive strategy on the IGT is to avoid the disadvantageous decks of cards, therefore those exhibiting pronounced risk-aversion may be considered to have the most adaptive level of risk-taking. However, as we have seen, pronounced risk-avoidance is not necessarily adaptive in the real world. As such, there has been some question into the ecological validity of risk-taking tasks (for review, see Sbordone & Long, 1996).

Perhaps adaptive risk-taking is best conceptualised as risk-taking with a *flexible* strategy, such that individuals adapt to their surroundings and take or avoid risks as necessary. For example, studies of self-efficacy and risk-taking have found those higher in self-efficacy are able to take more risks when that outcome is seen as desirable, but avoid

risks if the outcome of taking risks is seen as undesirable (Siero, Van Diem, Voorrips, & Willemsen, 2004). Maladaptive risk-taking may then be conceptualised as a *rigid* risk-taking strategy, whereby individuals consistently choose risky or risk-avoidant strategies, regardless of whether they are adaptive. While some research has investigated adaptive decision-making, future research is needed to investigate flexible and adaptive risk-taking in clinically anxious populations. Future studies may wish to use measures like the "reversal-learning" task developed by Fellows and Farah (2003), which appears to be a combination of the IGT and BART; individuals are asked to pump up a series of balloons, however the contingencies of punishment change after a number of trials, requiring that participants learn and adapt their risk-taking strategy.

Methodological limitations must also be considered. It has been suggested that most current self-report measures of risk-taking were originally developed to measure maladaptive risk and sensation-seeking, and therefore may not be sensitive to the measurement of risk-avoidance. While one measure (i.e., the ERI; Steketee & Frost, 1994) has been designed to overcome this limitation, more work is needed to establish the psychometric properties as well as clinical norms in various anxious populations. Furthermore, the development of domain-specific subscales may also aid in the use of the ERI for treatment outcome assessment. Further work is needed to develop ecologically valid domain-specific behavioural measures that are sensitive to risk-avoidance.

One final limitation worth considering is the relationship between risk attitudes and sample selection. Given that risk preferences and related personality constructs (e.g., sensation-seeking) are likely implicated in the decision to participate in research, samples may inherently show skewed levels of risk-taking (Harrison, Lau, & Rutström, 2009; Roe, Haab, Beversdorf, Gu, & Tilley, 2009). This potential bias may also apply to clinical samples; as shown in Study 4, treatment-seeking was found to be related to self-reported risk

propensity, suggesting that clinical treatment-seeking samples may also show biased risk attitudes. It is possible then, that clinically anxious individuals who are not seeking treatment or participating in research may show even greater risk-aversion.

Concluding Comments

As demonstrated in this thesis, there is mounting evidence to suggest that people with anxiety disorders exhibit a risk-avoidant decision-making bias, the *safety bias*, in which these individuals consistently make choices intended to prevent them from experiencing any perceived harm (e.g., Lorian & Grisham, 2010, 2011; Lorian et al., 2011a; Lorian et al., 2011b; Maner et al., 2007; Maner & Schmidt, 2006; Miu et al., 2008b). It has been argued that individuals experiencing clinical levels of anxiety are less likely and willing to take perceived risks across multiple behavioural domains (e.g., social, recreational, financial, etc.), and this bias is believed to be implicated in the development and maintenance of pathological anxiety through widespread avoidance and subsequent maintenance of maladaptive risk-related appraisals (Maner et al., 2007; Maner & Schmidt, 2006). Indeed, risk-avoidance has been found to be associated with high trait anxiety (e.g., Eisenberg et al., 1998; Maner & Schmidt, 2006) as well as symptoms of social phobia (SP; Kashdan et al., 2006; Lorian & Grisham, 2010; Maner et al., 2007), obsessive-compulsive disorder (OCD; Cavedini et al., 2006a; Cicolini & Rees, 2003; Nielen et al., 2002; Starcke et al., 2010b) and generalised anxiety disorder (GAD; Mueller et al., 2010). Despite growing support, the body of literature examining risk-avoidance and anxiety has been relatively sparse; much of the research investigating this topic has been limited by a lack of systematic investigation across anxiety disorders and behavioural domains. Furthermore, no studies to date have investigated the clinical implications of the relationship between risk-avoidance and anxiety.

The research outlined in this thesis has examined the relationship between pathological risk-avoidance and anxiety in undergraduate, online, and clinic-based samples

using both self-report and behavioural indices of risk-taking. In so doing, this program of research has extended the current understanding of risk-avoidance and anxiety and has offered support for the hypothesis that risk-avoidance is implicated in the development and maintenance of pathological anxiety (Maner & Schmidt, 2006). Given the paucity of research on this topic, this thesis initially provided support for the relationship between risk-avoidance and pathological anxiety by demonstrating that anxious individuals report significantly greater risk-avoidance across a number of behavioural contexts; this was further corroborated by the finding that anxiety was associated with greater risk-aversion on two objective behavioural measures of risky decision-making. We later extended past research by demonstrating that risk-avoidance: (i) mediated the relationship between a dispositional vulnerability to anxiety (behavioural inhibition sensitivity; BIS; Gray. 1970) and social anxiety; and, (ii) uniquely contributed to various forms of clinical anxiety symptomatology above and beyond the influence of neuroticism. Together, these findings provided preliminary support for the proposed model of risk-avoidance as a pathway for the development of pathological anxiety.

This thesis has also contributed more broadly to the literature on risk-avoidance and anxiety by examining some of the clinical implications of this relationship. In addition to establishing that anxious individuals on the Internet were more risk-averse across several domains, findings showed that risk-avoidance was related to the decision to seek help; these results provide support for models suggesting that avoidance of treatment is associated with perceptions of risk and benefit (e.g., Shaffer et al., 2006; Vogel & Wester, 2003). Finally, this thesis offered novel support for the hypothesis that risk-avoidance may be reduced as a result of CBT treatment by showing that social and recreational risk-avoidance decreased following Internet-based CBT (iCBT) for GAD and group CBT treatment (CBGT) for SP or PDAg. Finally, findings in Study 5 also suggested the possibility that risk-avoidance underlies

change in depression as a result of treatment while Study 6 demonstrated associations between change in risk-avoidance and anxiety symptomatology. These results imply that risk-avoidance is sensitive to change and may be a potential target of CBT treatment protocols. The clinical implications of risk-avoidance and anxiety offer an interesting and fruitful avenue of further investigation.

The need for future research in this area is underscored by the complexity of the risk construct and the inconsistency of some of the current findings. For example, the finding that anxiety was consistently associated with self-reported social and recreational risk-avoidance, but not with financial, ethical, health, and safety risk-avoidance, potentially challenges the notion that clinically anxious individuals exhibit a global risk-avoidant decision-making bias. Similarly, the lack of change in financial, ethical and health and safety domains as a result of CBT treatment for SP or PD contrasts with the hypothesis that CBT will reduce risk-avoidance. Furthermore, the finding that risk-avoidance may not be found consistently across anxiety disorders, like OCD, challenges the notion that risk-avoidance is a transdiagnostic factor across all forms of clinical anxiety. These findings are not definitive, however, and do not firmly refute the existence of a pervasive tendency to avoid perceived risks in those who are anxious; they do, nevertheless, highlight that more empirical and systematic research is needed to examine the domain- and disorder-specific nature of risk-avoidance and pathological anxiety.

The aim of this thesis was to contribute to the sparse, albeit expanding body of literature on the topic of risk-avoidance and pathological anxiety. We have argued that pathological anxiety is likely to be associated with a tendency to be risk-averse in domains that are not limited to disorder-specific avoidance and this is likely to have important theoretical and clinical implications. The studies presented in this thesis provide an empirical investigation of risk-avoidance across a number of samples, using both self-report and

behavioural indices of risk-taking. In so doing, this research has provided support for the existence of a risk-avoidant decision-making bias in those with pathological anxiety, and further provides evidence for the implication of such a bias in the development and maintenance of anxiety disorders. In sum, pathological anxiety is associated with a complex, yet pervasive tendency to avoid perceived risks, which is likely to have far-reaching implications for the aetiology, course, and treatment of anxiety pathology.

References

Abramowitz, J. S., Tolin, D. F., & Diefenbach, G. J. (2005). Measuring change in OCD: sensitivity of the Obsessive-Compulsive Inventory-Revised. *Journal of Psychopathology and Behavioral Assessment, 27*, 317-324.

Abrams, K. Y., Yune, S. K., Kim, S. J., Jeon, H. J. I. N., Han, S. J., Hwang, J., . . . Lyoo, I. K. (2004). Trait and state aspects of harm avoidance and its implication for treatment in major depressive disorder, dysthymic disorder, and depressive personality disorder. *Psychiatry and Clinical Neurosciences, 58*(3), 240-248.

Addison, T. L., & Schmidt, L. A. (1999). Are women who are shy reluctant to take risks? Behavioral and psychophysiological correlates. *Journal of Research in Personality, 33*(3), 352-357.

Akiskal, H. (1998). Toward a definition of generalized anxiety disorder as an anxious temperament type. *Acta Psychiatrica Scandinavica, 98*, 66-73.

Aklin, W. M., Tull, M. T., Kahler, C. W., & Lejuez, C. (2009). Risk-taking propensity changes throughout the course of residential substance abuse treatment. *Personality and Individual Differences, 46*(4), 454-459.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders: DSM-IV-TR* (4th ed.). Arlington, VA: American Psychiatric Association.

Anderson, C. B., Joyce, P. R., Carter, F. A., McIntosh, V. V., & Bulik, C. M. (2002). The effect of cognitive-behavioral therapy for bulimia nervosa on temperament and character as measured by the temperament and character inventory. *Comprehensive Psychiatry, 43*(3), 182-188.

Andrews, G. (2003). *The treatment of anxiety disorders: clinician guides and patient manuals*. London, UK: Cambridge University Press.

Andrews, G., Issakidis, C., Sanderson, K., Corry, J., & Lapsley, H. (2004). Utilising survey data to inform public policy: comparison of the cost-effectiveness of treatment of ten mental disorders. *The British Journal of Psychiatry, 184*(6), 526-533.

Andrews, G., & Slade, T. (2001). Interpreting scores on the Kessler psychological distress scale (K10). *Australian and New Zealand Journal of Public Health, 25*(6), 494-497.

Andrews, G., & Titov, N. (2010). Treating people you never see: Internet-based treatment of the internalising mental disorders. *Australian Health Review, 34*(2), 144-147.

Antony, M., Bieling, P., Cox, B., Enns, M., & Swinson, R. (1998). Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychological Assessment, 10*(2), 176-181.

Arkes, H. R., Herren, L. T., & Isen, A. M. (1988). The role of potential loss in the influence of affect on risk-taking behavior. *Organizational Behavior and Human Decision Processes, 42*(2), 181-193.

Arnsten, A. F. T., & Li, B. M. (2005). Neurobiology of executive functions: catecholamine influences on prefrontal cortical functions. *Biological Psychiatry, 57*(11), 1377-1384.

Arroll, B., Goodyear-Smith, F., Crengle, S., Gunn, J., Kerse, N., Fishman, T., . . . Hatcher, S. (2010). Validation of PHQ-2 and PHQ-9 to Screen for Major Depression in the primary care population. *Annals of Family Medicine, 8*(4), 348-353.

Aziz, M. A., & Kenford, S. (2004). Comparability of telephone and face-to-face interviews in assessing patients with posttraumatic stress disorder. *Journal of Psychiatric Practice, 10* (5), 307–313.

Bach, D. R., Seymour, B., & Dolan, R. J. (2009). Neural activity associated with the passive prediction of ambiguity and risk for aversive events. *The Journal of Neuroscience, 29*(6), 1648-1656.

Bar-Haim, Y., Lamy, D., Pergamin, L., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2007). Threat-related attentional bias in anxious and nonanxious individuals: a meta-analytic study. *Psychological Bulletin, 133*(1), 1-24.

Barlow, D. H. (2002). *Anxiety and its disorders: the nature and treatment of anxiety and panic*. New York, NY: The Guilford Press.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173-1182.

Barrett, P., Petrides, K., Eysenck, S. B. G., & Eysenck, H. J. (1998). The Eysenck Personality Questionnaire: an examination of the factorial similarity of P, E, N, and L across 34 countries. *Personality and Individual Differences, 25*(5), 805-819.

Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of general psychology, 5*(4), 323-370.

Baumeister, R. F., DeWall, C. N., & Zhang, L. (2009). Do emotions improve or hinder the decision making process? In K. D. Vohs, R. F. Baumeister & G. Loewenstein (Eds.), *Do emotions help or hurt decision making? A hedgefoxian perspective*. New York, NY: Russell Sage Foundation.

Bechara, A. (2004). The role of emotion in decision-making: evidence from neurological patients with orbitofrontal damage. *Brain and Cognition, 55*, 30-40.

Bechara, A., & Damasio, A. R. (2005). The somatic marker hypothesis: a neural theory of economic decision. *Games and Economic Behavior, 52*(2), 336-372.

Bechara, A., Damasio, A. R., Damasio, H., & Anderson, S. W. (1994). Insensitivity to future consequences following damage to human prefrontal cortex. *Cognition, 50*, 7-15.

Bechara, A., Damasio, H., Damasio, A. R., & Lee, G. P. (1999). Different contributions of the human amygdala and ventromedial prefrontal cortex to decision-making. *The Journal of Neuroscience, 19*(13), 5473-5481.

Bechara, A., Tranel, D., Damasio, H., & Damasio, A. R. (1996). Failure to respond autonomically to anticipated future outcomes following damage to prefrontal cortex. *Cerebral Cortex, 6*(2), 215-225.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Beck Depression Inventory-II (BDI-II)*. San Antonio, TX: Psychological Corporation.

Beck, E., Emery, G., & Greenberg, R. L. (1985). *Anxiety disorders and phobias: a cognitive perspective*. New York, NY: Basic Books.

Beesdo, K., Bittner, A., Pine, D. S., Stein, M. B., Hofler, M., Lieb, R., & Wittchen, H. U. (2007). Incidence of social anxiety disorder and the consistent risk for secondary depression in the first three decades of life. *Archives of General Psychiatry, 64*(8), 903-912.

Berman, N. C., Wheaton, M. G., McGrath, P., & Abramowitz, J. S. (2010). Predicting anxiety: the role of experiential avoidance and anxiety sensitivity. *Journal of Anxiety Disorders, 24*(1), 109-113.

Bernoulli, D. (1738). Exposition of a new theory on the measurement of risk (Sommer, L. Trans. (1954)). *Econometrica, 22*(1), 22–36.

Bienvenu, O. J., Nestadt, G., Samuels, J. F., Costa, P. T., Howard, W. T., & Eaton, W. W. (2001). Phobic, panic, and major depressive disorders and the five-factor model of personality. *The Journal of Nervous and Mental Disease, 189*(3), 154-161.

Bienvenu, O. J., Samuels, J. F., Costa, P. T., Reti, I. M., Eaton, W. W., & Nestadt, G. (2004). Anxiety and depressive disorders and the five factor model of personality: a higher

and lower order personality trait investigation in a community sample. *Depression and Anxiety, 20*(2), 92-97.

Blais, A., & Weber, E. U. (2006). A domain-specific risk-taking (DOSPERT) scale for adult populations. *Judgment and Decision Making, 1*, 33-47.

Blanchette, I., & Richards, A. (2010). The influence of affect on higher level cognition: a review of research on interpretation, judgement, decision making and reasoning. *Cognition & Emotion, 24*(4), 561-595.

Borkovec, T. D., Alcaine, O., & Behar, E. (2004). Avoidance theory of worry and generalized anxiety disorder. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized anxiety disorder: Advances in research and practice* (pp. 77–108). New York, NY: Guilford Press.

Bracha, A., & Brown, D. J. (2008). Affective decision making and the Ellsberg paradox. *Cowles Foundation Discussion Papers*.

Breakwell, G. (2007). *The psychology of risk.* Cambridge: Cambridge University Press.

Brehmer, B. (1992). Dynamic decision making: human control of complex systems. *Acta Psychologica, 81*(3), 211-241.

Breivik, G. (1996). Personality, sensation seeking and risk taking among Everest climbers. *International Journal of Sport Psychology, 27*(3), 308-320.

Brenner, S. L., Beauchaine, T. P., & Sylvers, P. D. (2005). A comparison of psychophysiological and self-report measures of BAS and BIS activation. *Psychophysiology, 42*, 108-115.

Broadbent, D., & Broadbent, M. (1988). Anxiety and attentional bias: state and trait. *Cognition & Emotion, 2*(3), 165-183.

Brosch, T., Pourtois, G., & Sander, D. (2010). The perception and categorisation of emotional stimuli: a review. *Cognition & Emotion, 24*(3), 377-400.

Brown, T. A., Chorpita, B. F., Korotitsch, W., & Barlow, D. H. (1997). Psychometric properties of the Depression Anxiety Stress Scales (DASS) in clinical samples. *Behaviour Research and Therapy, 35*(1), 79-89.

Brown, T. A., Di Nardo, P. A., & Barlow, D. H. (1994). *Anxiety disorders interview schedule for DSM-IV (ADIS-IV)*. New York, NY: Oxford University Press.

Brunborg, G. S., Johnsen, B. H., Mentzoni, R. A., Molde, H., & Pallesen, S. (2011). Individual differences in evaluative conditioning and reinforcement sensitivity affect bet-sizes during gambling. *Personality and Individual Differences, 50*(5), 729-734.

Brunborg, G. S., Johnsen, B. H., Pallesen, S., Molde, H., Mentzoni, R. A., & Myrseth, H. (2010). The relationship between aversive conditioning and risk-avoidance in gambling. *Journal of Gambling Studies*, 1-15.

Buckner, J., Cromer, K., Merrill, K., Mallott, M., Schmidt, N., Lopez, C., . . . Joiner, T. (2009). Pretreatment Intervention Increases Treatment Outcomes for Patients with Anxiety Disorders. *Cognitive Therapy and Research, 33*(1), 126-137. doi: 10.1007/s10608-007-9154-x

Buller, R., Maier, W., Heuser, I., & Frommberger, U. (1990). Panic attacks and avoidance behavior. *Psychiatric Praxis, 17*, 41-46.

Busemeyer, J., Hastie, R., & Medin, D. L. (1995). *Decision making from a cognitive perspective*. San Diego, CA: Academic Press.

Butler, G., & Mathews, A. (1983). Cognitive processes in anxiety. *Advances in behaviour research and therapy, 5*(1), 51-62.

Butler, G., & Mathews, A. (1987). Anticipatory anxiety and risk perception. *Cognitive Therapy and Research, 11*(5), 551-565.

Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Gender differences in risk taking: a meta-analysis. *Psychological Bulletin, 125*(3), 367-383.

Camerer, C., & Weber, M. (1992). Recent developments in modeling preferences: uncertainty and ambiguity. *Journal of Risk and Uncertainty, 5*(4), 325-370.

Carey, T. A. (2010). Exposure and reorganization: the what and how of effective psychotherapy. *Clinical Psychology Review, 31*(2), 236-248.

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activiation, and affective responses to impending reward and punishment: the BIS/BAS scales. *Journal of Personality and Social Psychology, 67*, 319-333.

Cavedini, P., Gorini, A., & Bellodi, L. (2006a). Understanding obsessive–compulsive disorder: focus on decision making. *Neuropsychology Review, 16*(1), 3-15.

Cavedini, P., Zorzi, C., Bassi, T., Gorini, A., Baraldi, C., Ubbiali, A., & Bellodi, L. (2006b). Decision-making functioning as a predictor of treatment outcome in anorexia nervosa. *Psychiatry Research, 145*, 179-187.

Chaiken, S., & Trope, Y. (1999). *Dual-process theories in social psychology*. New York, NY: The Guilford Press.

Chambless, D. L., Beck, A. T., Gracely, E. J., & Grisham, J. R. (2000). Relationship of cognitions to fear of somatic symptoms: a test of the cognitive theory of panic. *Depression and Anxiety, 11*(1), 1-9.

Chambless, D. L., Caputo, G. C., Bright, P., & Gallagher, R. (1984). Assessment of fear of fear in agoraphobics: the body sensations questionnaire and the agoraphobic cognitions questionnaire. *Journal of Consulting and Clinical Psychology, 52*(6), 1090-1097.

Chambless, D. L., & Gracely, E. J. (1989). Fear of fear and the anxiety disorders. *Cognitive Therapy and Research, 13*(1), 9-20.

Chapman, A. L., Lynch, T. R., Rosenthal, M. Z., Cheavens, J. S., Smoski, M. J., & Krishnan, K. R. R. (2007). Risk aversion among depressed older adults with obsessive compulsive personality disorder. *Cognitive Therapy and Research, 31*(2), 161-174.

Chen, E. Y., Brown, M. Z., Lo, T. T. Y., & Linehan, M. M. (2007). Sexually transmitted disease rates and high-risk sexual behaviors in borderline personality disorder versus borderline personality disorder with substance use disorder. *The Journal of Nervous and Mental Disease, 195*(2), 125-129

Chorpita, B. F., & Barlow, D. H. (1998). The development of anxiety: the role of control in the early environment. *Psychological Bulletin, 124*(1), 3-21.

Christensen, H., Leach, L., Barney, L., Mackinnon, A., & Griffiths, K. (2006). The effect of web based depression interventions on self reported help seeking: randomised controlled trial [ISRCTN77824516]. *BMC psychiatry, 6*(1), 13.

Cicolini, T., & Rees, C. S. (2003). Measuring risk-taking in obsessive-compulsive disorder: an extension of the Everyday Risk Inventory with an Australian sample. *Behavioural and Cognitive Psychotherapy, 31*(03), 247-259.

Clark, D. A., & Beck, A. T. (2010). Cognitive theory and therapy of anxiety and depression: convergence with neurobiological findings. *Trends in Cognitive Sciences, 14*(9), 418-424.

Clark, D. M. (1986). A cognitive approach to panic. *Behaviour Research and Therapy, 24*(4), 461-470.

Clark, D. M., & Wells, A. (1995). A cognitive model of social phobia. In R. Heimberg, M. R. Liebowitz, D. A. Hope & F. R. Schneier (Eds.), *Social phobia: diagnosis, assessment and treatment* (pp. 69-93). New York: The Guilford Press.

Cloninger, C. R. (1987). A systematic method for clinical description and classification of personality variants: a proposal. *Archives of General Psychiatry, 44*(6), 573-588.

Clore, G. L. (1992). Cognitive phenomenology: feelings and the construction of judgment. In L. L. Martin & A. Tesser (Eds.), *The construction of social judgments* (pp. 133-163). Hillsdale, NJ: Erlbaum.

Clore, G. L., Gasper, K., & Garvin, E. (2001). Affect as information. In J. Forgas (Ed.), *Handbook of affect and social cognition* (pp. 121–144). Mahwah, NJ: Erlbaum.

Clore, G. L., Schwarz, N., & Conway, M. (1994). Affective causes and consequences of social information processing. In R. S. Wyer & T. K. Srull (Eds.), *Handbook of social cognition: Basic processes* (Vol. 1, pp. 323-417). Hillsdale, NJ: Erlbaum.

Coles, M. E., & Coleman, S. L. (2010). Barriers to treatment seeking for anxiety disorders: initial data on the role of mental health literacy. *Depression and Anxiety, 27*(1), 63-71.

Coles, M. E., Cook, L. M., & Blake, T. R. (2007). Assessing obsessive compulsive symptoms and cognitions on the Internet: evidence for the comparability of paper and Internet administration. *Behaviour Research and Therapy, 45*(9), 2232-2240.

Collins, K. A., Westra, H. A., Dozois, D. J. A., & Burns, D. D. (2004). Gaps in accessing treatment for anxiety and depression: challenges for the delivery of care. *Clinical Psychology Review, 24*(5), 583-616.

Constans, J. I. (2001). Worry propensity and the perception of risk. *Behaviour Research and Therapy, 39*(6), 721-729.

Cooper, M. L. (1992). Alcohol and increased behavioral risk for AIDS. *Alcohol Health & Research World, 16*(1), 64-72.

Cooper, M. L., Agocha, V. B., & Sheldon, M. S. (2000). A motivational perspective on risky behaviors: The role of personality and affect regulatory processes. *Journal of Personality, 68*(6), 1059-1088.

Coplan, R. J., Wilson, J., Frohlick, S. L., & Zelenski, J. (2006). A person-oriented analysis of behavioral inhibition and behavioral activation in children. *Personality and Individual Differences, 41*, 917-927.

Costa, P. T., & McCrae, R. R. (1992). *NEO Personality Inventory - Revised (NEO PI-R)*. Odessa, FL: Psychological Assessment Resources.

Costin, D. L., Mackinnon, A. J., Griffiths, K. M., Batterham, P. J., Bennett, A. J., Bennett, K., & Christensen, H. (2009). Health e-cards as a means of encouraging help seeking for depression among young adults: randomized controlled trial. *Journal of Medical Internet Research, 11*(4), e42.

Couper, M. P. (2007). Issues of representation in eHealth research (with a focus on web surveys). *American journal of preventive medicine, 32*(5), S83-S89.

Cox, B. J., Ross, L., Swinson, R. P., & Direnfeld, D. M. (1998). A comparison of social phobia outcome measures in cognitive-behavioral group therapy. *Behavior Modification, 22*(3), 285-297.

Cox, B. J., Swinson, R. P., Shulman, I. D., & Bourdeau, D. (1995). Alexithymia in panic disorder and social phobia. *Comprehensive Psychiatry, 36*(3), 195-198.

Craske, M. G., Sanderson, W. C., & Barlow, D. H. (1987). The relationships among panic, fear, and avoidance. *Journal of Anxiety Disorders, 1*(2), 153-160.

Crippa, J. A., de Lima Osorio, F., Del-Ben, C. M., Filho, A. S., da Silva Freitas, M. C., & Loureiro, S. R. (2008). Comparability between telephone and face-to-face structured clinical interview for DSM-IV in assessing social anxiety disorder. *Perspectives on Psychiatric Care, 44(4)*, 241-247.

Crowley, T. J., Raymond, K. M., Mikulich-Gilbertson, S. K., Thompson, L. L., & Lejuez, C. W. (2006). A risk-taking “set” in a novel task among adolescents with serious conduct

and substance problems. *Journal of American Academy of Child & Adolescent Psychiatry, 45*(2), 175-183

Cuming, S., Rapee, R. M., Kemp, N., Abbott, M. J., Peters, L., & Gaston, J. E. (2009). A self-report measure of subtle avoidance and safety behaviors relevant to social anxiety: development and psychometric properties. *Journal of Anxiety Disorders, 23*(7), 879-883.

Dale, W., Hemmerich, J., Ghini, E. A., & Schwarze, M. L. (2006). Can induced anxiety from a negative earlier experience influence vascular surgeons' statistical decision-making? A randomized field experiment with an abdominal aortic aneurysm analog. *Journal of the American College of Surgeons, 203*(5), 642-652.

Damasio, A. R. (1994). *Descartes' error: emotion, reason, and the human brain*. New York, NY: Grosset/Putnam.

Damasio, A. R., Everitt, B., & Bishop, D. (1996). The somatic marker hypothesis and the possible functions of the prefrontal cortex [and discussion]. *Philosophical transactions: Biological sciences, 351*(1346), 1413-1420.

De Araujo, L., Ito, L., & Marks, I. (1996). Early compliance and other factors predicting outcome of exposure for obsessive-compulsive disorder. *The British Journal of Psychiatry, 169*(6), 747-752. doi: 10.1192/bjp.169.6.747

De Fruyt, F., Van Leeuwen, K., Bagby, R. M., Rolland, J. P., & Rouillon, F. (2006). Assessing and interpreting personality change and continuity in patients treated for major depression. *Psychological Assessment, 18*(1), 71-80.

Deane, F. P., & Chamberlain, K. (1994). Treatment fearfulness and distress as predictors of professional psychological help-seeking. *British Journal of Guidance & Counselling, 22*(2), 207-217.

Degnan, K. A., Calkins, S. D., Keane, S. P., & Hill Soderlund, A. L. (2008). Profiles of disruptive behavior across early childhood: contributions of frustration reactivity, physiological regulation, and maternal behavior. *Child Development, 79*(5), 1357-1376.

Degnan, K. A., & Fox, N. A. (2007). Behavioral inhibition and anxiety disorders: Multiple levels of a resilience process. *Development and Psychopathology, 19*(03), 729-746.

Demaree, H. A., DeDonno, M. A., Burns, K. J., & Erik Everhart, D. (2008). You bet: how personality differences affect risk-taking preferences. *Personality and Individual Differences, 44*(7), 1484-1494.

Denissen, J. J. A., Neumann, L., & van Zalk, M. (2010). How the Internet is changing the implementation of traditional research methods, people's daily lives, and the way in which developmental scientists conduct research. *International Journal of Behavioral Development, 34*(6), 564-575.

DeSteno, D., Petty, R. E., Wegener, D. T., & Rucker, D. D. (2000). Beyond valence in the perception of likelihood: the role of emotion specificity. *Journal of Personality and Social Psychology, 78*(3), 397-416.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., & Wagner, G. G. (2011). Individual risk attitudes: measurement, determinants, and behavioral consequences. *Journal of the European Economic Association, 9*(3), 1-39.

Dohmen, T. J., Falk, A., Huffman, D., Schupp, J., Sunde, U., & Wagner, G. G. (2006). Individual risk attitudes: new evidence from a large, representative, experimentally-validated survey. *Discussion Paper Series - Centre for Economic Policy Research 5517*.

Dozois, D. J. A., Dobson, K. S., & Ahnberg, J. L. (1998). A psychometric evaluation of the Beck Depression Inventory-II. *Psychological Assessment, 10*(2), 83-89.

Dugas, M. J., Freeston, M. H., & Ladouceur, R. (1997). Intolerance of uncertainty and problem orientation in worry. *Cognitive Therapy and Research, 21*(6), 593-606.

Dugas, M. J., Letarte, H., Rhéaume, J., Freeston, M. H., & Ladouceur, R. (1995). Worry and problem solving: evidence of a specific relationship. *Cognitive Therapy and Research, 19*(1), 109-120.

Dunn, B. D., Dalgleish, T., & Lawrence, A. D. (2006). The somatic marker hypothesis: a critical evaluation. *Neuroscience & Biobehavioral Reviews, 30*(2), 239-271.

Edwards, W. (1954). The theory of decision making. *Psychological Bulletin, 51*(4), 380-417.

Einav, L., Finkelstein, A., Pascu, I., & Cullen, M. R. (2010). *How general are risk preferences? Choices under uncertainty in different domains*. National Bureau of Economic Research Cambridge, Mass., USA.

Eisenberg, A. E., Baron, J., & Seligman, M. E. P. (1998). Individual differences in risk aversion and anxiety. *Psychological Bulletin, 87*, 245-251.

Epstein, S. (1994). Integration of the cognitive and the psychodynamic unconscious. *American Psychologist, 49*(8), 709-724.

Ernst, M., & Paulus, M. P. (2005). Neurobiology of decision making: a selective review from a neurocognitive and clinical perpsective. *Biological Psychiatry, 58*, 597-604.

Erwin, B. A., Turk, C. L., Heimberg, R. G., Fresco, D. M., & Hantula, D. A. (2004). The Internet: home to a severe population of individuals with social anxiety disorder? *Journal of Anxiety Disorders, 18*, 629-646.

Etkin, A., Pittenger, C., Polan, H. J., & Kandel, E. R. (2005). Toward a neurobiology of psychotherapy: basic science and clinical applications. *Journal of Neuropsychiatry and Clinical Neuroscience, 17*(2), 145-158.

Ettelt, S., Grabe, H. J., Ruhrmann, S., Buhtz, F., Hochrein, A., Kraft, S., . . . Wagner, M. (2008). Harm avoidance in subjects with obsessive-compulsive disorder and their families. *Journal of Affective Disorders, 107*(1-3), 265-269.

Eysenck, H. J., & Eysenck, S. B. G. (1975). *Manual of the Eysenck Personality Questionnaire*. London: Hodder & Stoughton.

Eysenck, M. W., & Derakshan, N. (2011). New perspectives in attentional control theory. *Personality and Individual Differences, 50*(7), 955-960.

Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: attentional control theory. *Emotion, 7*(2), 336-353.

Farvolden, P., McBride, C., Bagby, R. M., & Ravitz, P. (2003). A web-based screening instrument for depression and anxiety disorders in primary care. *Journal of Medical Internet Research, 5*, 44-49.

Faytout, M., Tignol, J., Swendsen, J., Grabot, D., Aouizerate, B., & Lépine, J. P. (2007). Social phobia, fear of negative evaluation and harm avoidance. *European Psychiatry, 22*(2), 75-79.

Fellows, L. K., & Farah, M. J. (2003). Ventromedial frontal cortex mediates affective shifting in humans: evidence from a reversal learning paradigm. *Brain, 126*(8), 1830-1837.

Feske, U., Perry, K. J., Chambless, D. L., Renneberg, B., & Goldstein, A. J. (1996). Avoidant personality disorder as a predictor for treatment outcome among generalized social phobics. *Journal of Personality Disorders, 10*(2), 174-184.

Figner, B., Mackinlay, R. J., Wilkening, F., & Weber, E. U. (2009). Affective and deliberative processes in risky choice: age differences in risk taking in the Columbia Card Task. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 35*(3), 709–730.

Finn-Magnus, B., Asle, H., Harold, S., Egil, M., Tore, G., Liv Margaret, H., & Gun, A. (2010). Pre-treatment predictors and in-treatment factors associated with change in avoidant and dependent personality disorder traits among patients with social phobia. *Clinical Psychology & Psychotherapy, 17*(2), 87-99.

First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (1996). *Structured clinical interview for DSM-IV Axis I disorders- patient edition (SCID-I/P, Version 2.0)*. New York, NY: Biometrics Research Department, New York State Psychiatric Institute.

Fischer, P., Guter, S., & Frey, D. (2008). The effects of risk-promoting media on inclinations toward risk taking. *Basic and Applied Social Psychology, 30*(3), 230-240.

Foa, E. B., Huppert, J. D., Leiberg, S., Langner, R., Kichic, R., Hajcak, G., & Farrell, M. (2002). The Obsessive-Compulsive Inventory: development and validation of a short version. *Psychological Assessment, 14*, 485-496.

Fontaine, J. R. J., Scherer, K. R., Roesch, E. B., & Ellsworth, P. C. (2007). The world of emotions is not two-dimensional. *Psychological Science, 18*(12), 1050-1057.

Franken, I. H. A., & Muris, P. (2005). Individual differences in decision-making. *Personality and Individual Differences, 39*, 991-998.

Freeman, N., & Muraven, M. (2010). Self-control depletion leads to increased risk taking. *Social Psychological and Personality Science, 1*(2), 175-181.

Freeston, M. H., Rhéaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences, 17*(6), 791-802.

Frost, R. O., Steketee, G., Cohn, L., & Griess, K. (1994). Personality traits in subclinical and non-obsessive-compulsive volunteers and their parents. *Behaviour Research and Therapy, 32*(1), 47-56.

Fukunishi, I., Kikuchi, M., Wogan, J., & Takubo, M. (1997). Secondary alexithymia as a state reaction in panic disorder and social phobia. *Comprehensive Psychiatry, 38*(3), 166-170.

Garon, N., Moore, C., & Waschbusch, D. A. (2006). Decision making in children with ADHD only, ADHD-anxious/depressed, and control children using a child version of the Iowa Gambling Task. *Journal of Attention Disorders, 9*(4), 607-619.

Gasper, K., & Clore, G. L. (1998). The persistent use of negative affect by anxious individuals to estimate risk. *Journal of Personality and Social Psychology, 74*(5), 1350-1363.

Gasper, K., & Clore, G. L. (2000). Do you have to pay attention to your feelings to be influenced by them? *Personality and Social Psychology Bulletin, 26*(6), 698-711.

George, L. K., Blazer, D. G., Hughes, D. C., & Fowler, N. (1989). Social support and the outcome of major depression. *The British Journal of Psychiatry, 154*(4), 478-485.

Gigerenzer, G. (2007). *Gut feelings: the intelligence of the unconscious*. New York, NY: Penguin Books.

Gilboa-Schechtman, E., Franklin, M. E., & Foa, E. B. (2000). Anticipated reactions to social events: differences among individuals with generalized social phobia, obsessive compulsive disorder, and nonanxious controls. *Cognitive Therapy and Research, 24*(6), 731-746.

Gloster, A., Wittchen, H., Einsle, F., Lang, T., Helbig-Lang, S., Fydrich, T., . . . Alpers, G. (2011). Psychological treatment for panic disorder with agoraphobia: a randomized controlled trial to examine the role of therapist-guided exposure in situ in CBT. *Journal of Consulting and Clinical Psychology, 79*(3), 406-420.

Gloster, A. T., Rhoades, H. M., Novy, D., Klotsche, J., Senior, A., Kunik, M., . . . Stanley, M. A. (2008). Psychometric properties of the Depression Anxiety and Stress Scale-21 in older primary care patients. *Journal of Affective Disorders, 110*(3), 248-259.

Goudriaan, A., Oosterlaan, J., de Beurs, E., & van den Brink, W. (2005). Decision making in pathological gambling: a comparison between pathological gamblers, alcohol dependents, persons with Tourette syndrome, and normal controls. *Cognitive Brain Research, 23*(1), 137-151.

Goudriaan, A. E., Oosterlaan, J., de Beurs, E., & Van Den Brink, W. (2006). Neurocognitive functions in pathological gambling: a comparison with alcohol dependence, Tourette syndrome and normal controls. *Addiction, 101*(4), 534-547.

Gray, J. A. (1970). The psychophysiological basis of introversion-extraversion. *Behaviour Research and Therapy, 8,* 249-266.

Gray, J. A., & McNaughton, N. (2000). *The neuropsychology of anxiety: an enquiry into the functions of the septo-hippocampal system* (2 ed.). New York, NY: Oxford University Press.

Haaland, V., & Landrø, N. (2007). Decision making as measured with the Iowa Gambling Task in patients with borderline personality disorder. *Journal of the International Neuropsychological Society, 13*(04), 699-703.

Hanoch, Y., Johnson, J., & Wilke, A. (2006). Domain specificity in experimental measures and participant recruitment. *Psychological Science, 17*(4), 300-304.

Harmon-Jones, E., & Allen, J. J. B. (1997). Behavioral activation sensitivity and resting frontal EEG asymmetry: Covariation of putative indicators related to risk for mood disorders. *Journal of Abnormal Psychology, 106*(1), 159.

Harrison, G. W., Lau, M. I., & Rutström, E. (2009). Risk attitudes, randomization to treatment, and self-selection into experiments. *Journal of Economic Behavior & Organization, 70*(3), 498-507.

Harvey, A. G. (2004). *Cognitive behavioural processes across psychological disorders: a transdiagnostic approach to research and treatment*. New York, NY: Oxford University Press.

Hashimoto, H., & Fukuhara, S. (2004). The influence of locus of control on preferences for information and decision making. *Patient education and counseling, 55*(2), 236-240.

Hedman, E., Ljótsson, B., Rück, C., Furmark, T., Carlbring, P., Lindefors, N., & Andersson, G. (2010). Internet administration of self-report measures commonly used in research on social anxiety disorder: a psychometric evaluation. *Computers in Human Behavior, 26*(4), 736-740.

Heilman, R. M., Crisan, L. G., Houser, D., Miclea, M., & Miu, A. C. (2010). Emotion regulation and decision making under risk and uncertainty. *Emotion, 10*(2), 257-265.

Heimberg, R. G., Mueller, G. P., Holt, C. S., Hope, D. A., & Liebowitz, M. R. (1992). Assessment of anxiety in social interaction and being observed by others: the Social Interaction Anxiety Scale and the Social Phobia Scale. *Behavior Therapy, 23*(1), 53-73.

Heubeck, B. G., Wilkinson, R. B., & Cologon, J. (1998). A second look at Carver and White (1994) BIS/BAS scales. *Personality and Individual Differences, 25*, 785-800.

Hinson, J. A., & Swanson, J. L. (1993). Willingness to seek help as a function of self-disclosure and problem severity. *Journal of Counseling and Development, 71*, 465-465.

Hirshfeld-Becker, D. R., Micco, J., Henin, A., Bloomfield, A., Biederman, J., & Rosenbaum, J. (2008). Behavioral inhibition. *Depression and Anxiety, 25*(4), 357-367.

Hockey, G. R. J., Maule, A. J., Clough, P., & Bdzola, L. (2000). The effects of negative affect on personal risk-taking behaviour. *Cognition & Emotion, 14*, 823-855.

Hofmann, S. G., & Smits, J. A. J. (2008). Cognitive-behavioral therapy for adult anxiety disorders: a meta-analysis of randomized placebo-controlled trials. *The Journal of clinical psychiatry, 69*(4), 621-632.

Holahan, C. J., & Moos, R. H. (1981). Social support and psychological distress: a longitudinal analysis. *Journal of Abnormal Psychology, 90*(4), 365-370.

Holmes, K. M., Bearden, C. E., Barguil, M., Fonseca, M., Serap Monkul, E., Nery, F. G., . . . Glahn, D. C. (2009). Conceptualizing impulsivity and risk taking in bipolar disorder: importance of history of alcohol abuse. *Bipolar Disorders, 11*, 33-40.

Horswill, M. S., & McKenna, F. P. (1999). The effect of perceived control on risk taking. *Journal of Applied Social Psychology, 29*(2), 377-391.

Horvath, P., & Zuckerman, M. (1993). Sensation seeking, risk appraisal, and risky behavior. *Personality and Individual Differences, 14*(1), 41-52.

Hoyer, J., Becker, E. S., & Roth, W. T. (2001). Characteristics of worry in GAD patients, social phobics, and controls. *Depression and Anxiety, 13*(2), 89-96.

Huettel, S. A., Stowe, C. J., Gordon, E. M., Warner, B. T., & Platt, M. L. (2006). Neural signatures of economic preferences for risk and ambiguity. *Neuron, 49*(5), 765-775.

Hutton, S. B., Murphy, F. C., Joyce, E. M., Rogers, R. D., Cuthbert, I., Barnes, T. R. E., . . . Robbins, T. W. (2002). Decision making deficits in patients with first-episode and chronic schizophrenia. *Schizophrenia Research, 55*(3), 249-257.

Jelinek, L., Hottenrott, B., & Moritz, S. (2009). When cancer is associated with illness but no longer with animal or zodiac sign: investigation of biased semantic networks in obsessive-compulsive disorder (OCD). *Journal of Anxiety Disorders, 23*(8), 1031-1036.

Joffe, R. T., Bagby, R. M., Levitt, A. J., Regan, J. J., & Parker, J. D. A. (1993). The tridimensional personality questionnaire in major depression. *The American journal of psychiatry, 150*(6), 959-960.

Johnson, E. J., & Tversky, A. (1983). Affect, generalization, and the perception of risk. *Journal of Personality and Social Psychology, 45*(1), 20-31.

Johnson, J. A. (2005). Ascertaining the validity of individual protocols from web-based personality inventories. *Journal of Research in Personality, 39*(1), 103-129.

Jorm, A., Griffiths, K., Christensen, H., Korten, A., Parslow, R., & Rodgers, B. (2003). Providing information about the effectiveness of treatment options to depressed people in the community: a randomized controlled trial of effects on mental health literacy, help-seeking and symptoms. *Psychological Medicine, 33*(06), 1071-1079.

Jorm, A. F., Christensen, H., Henderson, A. S., Jacomb, P. A., Korten, A. E., & Rodgers, B. (1999). Using the BIS/ BAS scales to measure behavioural inhibition and behavioural activation: factor structure, validity and norms in a large community sample. . *Personality and Individual Differences, 26*, 49-58.

Kagan, J., Reznick, J. S., & Snidman, N. (1987). The physiology and psychology of behavioral inhibition in children. *Child Development, 58*(6), 1459-1473.

Kahneman, D. (2003). Perspectives on judgment and choice: mapping bounded rationality. *American Psychologist, 58*, 697-720.

Kahneman, D., & Frederick, S. (2002). Representativeness revisited: attribute substitution in intuitive judgment. In T. Gilovich, D. Griffin & D. Kahneman (Eds.), *Heuristics and biases* (pp. 49-81). New York, NY: Cambridge University Press.

Kahneman, D., & Tversky, A. (1979). Prospect theory: an analysis of decision under risk. *Econometrica: Journal of the Econometric Society, 47*(2), 263-291.

Kahneman, D., & Tversky, A. (1982). Judgment under uncertainty: heuristics and biases. In D. Kahneman, P. Slovic & A. Tversky (Eds.), *Judgment under uncertainty: heuristics and biases* (pp. 3-22). Cambridge, UK: Cambridge University Press.

Kallmen, H. (2000). Manifest anxiety, general self-efficacy and locus of control as determinants of personal and general risk perception. *Journal of Risk Research, 3*(2), 111-120.

Kashdan, T. B., Collins, R. L., & Elhai, J. D. (2006). Social anxiety and positive outcome expectancies on risk-taking behaviors. *Cognitive Therapy and Research, 30*(6), 749-761.

Kashdan, T. B., Elhai, J. D., & Breen, W. E. (2008). Social anxiety and disinhibition: an analysis of curiosity and social rank appraisals, approach-avoidance conflicts, and disruptive risk-taking behavior. *Journal of Anxiety Disorders, 22*(6), 925-939.

Kashdan, T. B., & McKnight, P. E. (2010). The darker side of social anxiety. *Current Directions in Psychological Science, 19*(1), 47-50.

Kashdan, T. B., McKnight, P. E., Richey, J. A., & Hofmann, S. G. (2009). When social anxiety disorder co-exists with risk-prone, approach behavior: investigating a neglected, meaningful subset of people in the National Comorbidity Survey-Replication. *Behaviour Research and Therapy, 47*(7), 559-568.

Kashdan, T. B., & Roberts, J. E. (2006). Affective outcomes in superficial and intimate interactions: roles of social anxiety and curiosity. *Journal of Research in Personality, 40*, 140-167.

Kazantzis, N., Whittington, C., & Dattilio, F. (2010). Meta-analysis of homework effects in cognitive and behavioral therapy: A replication and extension. *Clinical Psychology: Science and Practice, 17*(2), 144-156.

Kennedy, S. J., Rapee, R. M., & Edwards, S. L. (2009). A selective intervention program for inhibited preschool-aged children of parents with an anxiety disorder: effects on current anxiety disorders and temperament. *Journal of the American Academy of Child & Adolescent Psychiatry, 48*(6), 602-609.

Kessler, R., Barker, P., Colpe, L., Epstein, J., Gfroerer, J., Hiripi, E., . . . Walters, E. (2003). Screening for serious mental illness in the general population. *Archives of General Psychiatry, 60*(2), 184-189.

Kim, D.-Y., & Lee, J.-H. (2011). Effects of the BAS and BIS on decision-making in a gambling task. *Personality and Individual Differences, 50*(7), 1131-1135.

Kim, M. J., & Whalen, P. J. (2009). The structural integrity of an amygdala-prefrontal pathway predicts trait anxiety. *The Journal of Neuroscience, 29*(37), 11614-11618.

Kimbrel, N. A. (2008). A model of the development and maintenance of generalized social phobia. *Clinical Psychology Review, 28*(4), 592-612.

Kirsch, M., & Windmann, S. (2009). The role of anxiety in decision-making. *Review of Psychology, 16*(1), 19-28.

Knutson, B., & Greer, S. M. (2008). Anticipatory affect: neural correlates and consequences for choice. *Philosophical Transactions of the Royal Society B: Biological Sciences, 363*(1511), 3771-3786.

Knyazev, G. G., Slobodskaya, H. R., & Wilson, G. D. (2002). Psychophysiological correlates of behavioural inhibition and activation. *Personality and Individual Differences, 33*(4), 647-660.

Kollman, D. M., Brown, T. A., Liverant, G. I., & Hofmann, S. G. (2006). A taxometric investigation of the latent structure of social anxiety disorder in outpatients with anxiety and mood disorders. *Depression and Anxiety, 23*, 190-199.

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. . *Journal of General Internal Medicine, 16*(9), 606-613.

Krueger, N., & Dickson, P. R. (1994). How believing in ourselves increases risk taking: perceived self-efficacy and opportunity recognition. *Decision Sciences, 25*(3), 385-400.

Krueger, R. F., Caspi, A., Moffitt, T. E., Silva, P. A., & McGee, R. (1996). Personality traits are differentially linked to mental disorders: A multitrait-multidiagnosis study of an adolescent birth cohort. *Journal of Abnormal Psychology, 105*(3), 299.

Kühberger, A. (1998). The influence of framing on risky decisions: a meta-analysis. *Organizational Behavior and Human Decision Processes, 75*(1), 23-55.

Kuhnen, C. M., & Knutson, B. (2005). The neural basis of financial risk taking. *Neuron, 47*(5), 763-770.

Kushner, M. G., & Sher, K. J. (1989). Fear of psychological treatment and its relation to mental health service avoidance. *Professional Psychology: Research and Practice, 20*(4), 251-257.

Kushner, M. G., & Sher, K. J. (1991). The relation of treatment fearfulness and psychological service utilization: an overview. *Professional Psychology: Research and Practice, 22*(3), 196-203.

Ladouceur, R., Talbot, F., & Dugas, M. J. (1997). Behavioral expressions of intolerance of uncertainty in worry. *Behavior Modification, 21*(3), 355-371.

Lane, S. D., Cherek, D. R., & Nouvion, S. O. (2008). Modulation of human risky decision making by flunitrazepam. *Psychopharmacology, 196*(2), 177-188.

Lane, S. D., Tcheremissine, O. V., Lieving, L. M., Nouvion, S., & Cherek, D. R. (2005). Acute effects of alprazolam on risky decision making in humans. *Psychopharmacology, 181*(2), 364-373.

Lauriola, M., & Levin, I. P. (2001). Personality traits and risky decision-making in a controlled experimental task: an exploratory study. *Personality and Individual Differences, 31*(2), 215-226.

Lauriola, M., Russo, P. M., Lucidi, F., Violani, C., & Levin, I. P. (2005). The role of personality in positively and negatively framed risky health decisions. *Personality and Individual Differences, 38*(1), 45-59.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York, NY: Springer

Leigh, B. C. (1999). Peril, chance, adventure: concepts of risk, alcohol use and risky behavior in young adults. *Addiction, 94*(3), 371-383.

Lejuez, C. W., Aklin, W. M., Jones, H. A., Strong, D. R., Richards, J. B., Kahler, C. W., & Read, J. P. (2003a). The Balloon Analogue Risk Task (BART) differentiates smokers and nonsmokers. *Experimental and Clinical Psychopharmacology, 11*(1), 26-33.

Lejuez, C. W., Aklin, W. M., Zvolensky, M. J., & Pedulla, C. M. (2003b). Evaluation of the Balloon Analogue Risk Task (BART) as a predictor of adolescent real-world risk-taking behaviours. *Journal of Adolescence, 26*(4), 475-479.

Lejuez, C. W., Richards, J. B., Read, J. P., Kahler, C. W., Ramsey, S. E., Stuart, G. L., . . . Brown, R. A. (2002). Evaluation of a behavioral measure of risk taking: the balloon analogue risk task (BART). *Journal of Experimental Psychology: Applied, 8*(2), 75-84.

Leon, A., Olfson, M., Portera, L., Farber, L., & Sheehan, D. (1997). Assessing psychiatric impairment in primary care with the Sheehan Disability Scale. *The International Journal of Psychiatry in Medicine, 27*(2), 93-105.

Leon, A., Shear, M., Portera, L., & Klerman, G. (1992). Assessing impairment in patients with panic disorder: the Sheehan Disability Scale. *Social psychiatry and psychiatric epidemiology, 27*(2), 78-82.

Lerner, J. S., & Keltner, D. (2000). Beyond valence: toward a model of emotion-specific influences on judgement and choice. *Cognition & Emotion, 14*(4), 473-493.

Lerner, J. S., & Keltner, D. (2001). Fear, anger, and risk. *Journal of Personality and Social Psychology, 81*, 146-159.

Li, C. R., Chao, H. H. A., & Lee, T. W. (2009). Neural correlates of speeded as compared with delayed responses in a Stop Signal Task: an indirect analog of risk taking and association with an anxiety trait. *Cerebral Cortex, 19*(4), 839-848.

Liberzon, I., Britton, J. C., & Phan, K. L. (2003). Neural correlates of traumatic recall in posttraumatic stress disorder. *Stress, 6*(3), 151-156.

Linnman, C., Carlbring, P., Åhman, Å., Andersson, H., & Andersson, G. (2006). The Stroop effect on the Internet. *Computers in Human Behavior, 22*(3), 448-455.

Loewenstein, G., Rick, S., & Cohen, J. D. (2008). Neuroeconomics. *Annual Review of Psychology, 59*, 647-672.

Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin, 127*(2), 267-286.

Longmore, R. J., & Worrell, M. (2007). Do we need to challenge thoughts in cognitive behavior therapy? *Clinical Psychology Review, 27*(2), 173-187.

Loomes, G., & Sugden, R. (1982). Regret theory: an alternative theory of rational choice under uncertainty. *The Economic Journal, 92*(368), 805-824.

Loomes, G., & Sugden, R. (1986). Disappointment and dynamic consistency in choice under uncertainty. *The Review of Economic Studies, 53*(2), 271-282.

Lorian, C. N., & Grisham, J. R. (2010). The safety bias: risk-avoidance and social anxiety pathology. *Behaviour Change, 27*(1), 1-13.

Lorian, C. N., & Grisham, J. R. (2011). Clinical implications of risk aversion: an online study of risk-avoidance and treatment utilization in pathological anxiety. *Journal of Anxiety Disorders, 25*, 840-848.

Lorian, C. N., Mahoney, A. E. J., & Grisham, J. R. (2011a). *Playing it safe: an examination of risk-avoidance in an anxious treatment-seeking sample*. Manuscript submitted for publication.

Lorian, C. N., Titov, N., & Grisham, J. R. (2011b). Changes in risk-taking over the course of an Internet-delivered cognitive behavioral therapy treatment for generalized anxiety disorder. *Journal of Anxiety Disorders, In Press*.

Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd ed.). Sydney: Psychology Foundation.

Lucki, I. (1996). Serotonin receptor specificity in anxiety disorders. *The Journal of clinical psychiatry, 57*, 5-10.

Lyneham, H. J., & Rapee, R. M. (2005). Agreement between telephone and in-person delivery of a structured interview for anxiety disorders in children. *Journal of the American Academy of Child and Adolescent Psychiatry, 44*(3), 274–282.

Machina, M. J. (2006). *Nonexpected Utility Theory*: John Wiley & Sons, Ltd.

MacLeod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional disorders. *Journal of Abnormal Psychology, 95*(1), 15-20.

Maddux, J. E. (1991). Self-efficacy. In C. R. Snyder & D. R. Forsyth (Eds.), *Handbook of Social and Clinical Psychology* (pp. 57-78). New York: Pergamon Press.

Maestas, C., & Pollock, W. M. (2010). Measuring generalized risk orientation with a single survey item. *SSRN eLibrary*. Retrieved from SSRN: http://ssrn.com/paper=1599867

Maner, J. K. (2009). Anxiety: proximate processes and ultimate functions. *Social and Personality Psychology Compass, 3*(5), 798-811.

Maner, J. K., Richey, J. A., Cromer, K., Mallott, M., Lejuez, C. W., Joiner, T. E., & Schmidt, N. B. (2007). Dispositional anxiety and risk-avoidant decision-making. *Personality and Individual Differences, 42*(4), 665-675.

Maner, J. K., & Schmidt, N. B. (2006). The role of risk avoidance in anxiety. *Behavior Therapy, 37*(2), 181-189.

Mansell, W., Harvey, A., Watkins, E. R., & Shafran, R. (2008). Cognitive behavioral processes across psychological disorders: a review of the utility and validity of the transdiagnostic approach. *International Journal of Cognitive Therapy, 1*(3), 181-191.

Marques, L., LeBlanc, N. J., Weingarden, H. M., Timpano, K. R., Jenike, M., & Wilhelm, S. (2010). Barriers to treatment and service utilization in an Internet sample of individuals with obsessive-compulsive symptoms. *Depression and Anxiety, 27*(5), 470-475.

Martin, E. I., Ressler, K. J., Binder, E., & Nemeroff, C. B. (2010). The neurobiology of anxiety disorders: brain imaging, genetics, and psychoneuroendocrinology. *Clinics in Laboratory Medicine, 30*(4), 865-891.

Mathews, A., Mackintosh, B., & Fulcher, E. P. (1997). Cognitive biases in anxiety and attention to threat. *Trends in Cognitive Sciences, 1*(9), 340-345.

Mathews, A., Mogg, K., May, J., & Eysenck, M. (1989). Implicit and explicit memory bias in anxiety. *Journal of Abnormal Psychology, 98*(3), 236-240.

Matthews, G., Panganiban, A. R., & Hudlicka, E. (2011). Anxiety and selective attention to threat in tactical decision-making. *Personality and Individual Differences, 50*(7), 949-954.

Mattick, R. P., & Clarke, J. C. (1998). Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. *Behaviour Research and Therapy, 36*(4), 455-470.

Maxwell, D. E., & Cole, D. A. (2007). Bias in cross-sectional analyses of longituinal mediation. *Psychological Methods, 12(1)*, 23-44.

Mazzucchelli, T., Kane, R., & Rees, C. (2009). Behavioral activation treatments for depression in adults: a meta analysis and review. *Clinical Psychology: Science and Practice, 16*(4), 383-411.

McDermott, J. M., Perez-Edgar, K., Henderson, H. A., Chronis-Tuscano, A., Pine, D. S., & Fox, N. A. (2009). A history of childhood behavioral inhibition and enhanced response monitoring in adolescence are linked to clinical anxiety. *Biological Psychiatry, 65*(5), 445-448.

McEvoy, P. M. (2007). Effectiveness of cognitive behavioural group therapy for social phobia in a community clinic: A benchmarking study. *Behaviour Research and Therapy, 45*(12), 3030-3040.

McEvoy, P. M., Mahoney, A., Perini, S. J., & Kingsep, P. (2009). Changes in post-event processing and metacognitions during cognitive behavioral group therapy for social phobia. *Journal of Anxiety Disorders, 23*(5), 617-623.

McEvoy, P. M., & Mahoney, A. E. J. (2011). Achieving certainty about the structure of intolerance of uncertainty in a treatment-seeking sample with anxiety and depression. *Journal of Anxiety Disorders, 25*, 112-122.

McGinn, L. K. (2010). The impacts of cognitive processes in anxiety: a test of cognitive models of anxiety. *International Journal of Cognitive Therapy, 3*(3), 213-214.

McGuire, J. F., Storch, E. A., Lewin, A. B., Price, L. H., Rasmussen, S. A., & Goodman, W. K. (2011). The role of avoidance in the phenomenology of obsessive-compulsive

disorder. *Comprehensive Psychiatry, In Press, Corrected Proof*. doi: 10.1016/j.comppsych.2011.03.002

McNally, R. J. (2001). On the scientific status of cognitive appraisal models of anxiety disorder. *Behaviour Research and Therapy, 39*(5), 513-521.

McNaughton, N., & Corr, P. J. (2004). A two-dimensional neuropsychology of defense: fear/anxiety and defensive distance. *Neuroscience & Biobehavioral Reviews, 28*(3), 285-305.

Mellers, B., Schwartz, A., & Ritov, I. (1999). Emotion-based choice. *Journal of Experimental Psychology: General, 128*(3), 332-345.

Mellers, B. A., Schwartz, A., Ho, K., & Ritov, I. (1997). Decision affect theory. *Psychological Science, 8*(6), 423-429.

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28*, 487-495.

Mischel, W., Shoda, Y., & Rodriguez, M. (1989). Delay of gratification in children. *Science, 244*(4907), 933-938.

Mishra, S., & Lalumière, M. L. (2011). Individual differences in risk-propensity: associations between personality and behavioral measures of risk. *Personality and Individual Differences, 50*(6), 869-873.

Mitte, K. (2007). Anxiety and risky decision-making: the role of subjective probability and subjective costs of negative events. *Personality and Individual Differences, 43*(2), 243-253.

Miu, A. C., Heilman, R. M., & Houser, D. (2008a). Anxiety impairs decision-making: psychophysiological evidence from an Iowa Gambling Task. *Biological Psychology, 77*(3), 353-358.

Miu, A. C., Miclea, M., & Houser, D. (2008b). Anxiety and decision-making: toward a neuroeconomics perspective. *Advances in Health Economics and Health Services Research, 20,* 55–84.

Mogg, K., Mathews, A., & Eysenck, M. (1992). Attentional bias to threat in clinical anxiety states. *Cognition & Emotion, 6*(2), 149-159.

Mohr, D., Hart, S., Howard, I., Julian, L., Vella, L., Catledge, C., & Feldman, M. (2006). Barriers to psychotherapy among depressed and nondepressed primary care patients. *Annals of Behavioral Medicine, 32*(3), 254-258.

Mohr, D., Ho, J., Duffecy, J., Baron, K. G., Lehman, K. A., Jin, L., & Reifler, D. (2010a). Perceived barriers to psychological treatments and their relationship to depression. *Journal of Clinical Psychology, 66*(4), 394-409.

Mohr, P. N. C., Biele, G., & Heekeren, H. R. (2010b). Neural processing of risk. *Journal of Neuroscience, 30*(19), 6613-6619.

Molina, S., & Borkovec, T. D. (1994). The Penn State Worry Questionnaire: psychometric properties and associated characteristics. In G. C. L. Davey & F. Tallis (Eds.), *Worrying: perspective on theory assessment and treatment* (pp. 265-283). Oxford, UK: John Wiley & Sons.

Moye, J., Karel, M. J., Gurrera, R. J., & Azar, A. R. (2006). Neuropsychological predictors of decision making capacity over 9 months in mild to moderate dementia. *Journal of General Internal Medicine, 21*(1), 78-83.

Mueller, E. M., Nguyen, J., Ray, W. J., & Borkovec, T. D. (2010). Future-oriented decision-making in Generalized Anxiety Disorder is evident across different versions of the Iowa Gambling Task. *Journal of behavior therapy and experimental psychiatry, 41*(2), 165-171.

Mukherjee, K. (2010). A dual system model of preferences under risk. *Psychological Review, 117*(1), 243-255.

Muris, P. (2002). Relationships between self-efficacy and symptoms of anxiety disorders and depression in a normal adolescent sample. *Personality and Individual Differences, 32*(2), 337-348.

Muris, P., Rassin, E., Franken, I., & Leemreis, W. (2007). Psychometric properties of the behavioral inhibition scale in young adults. *Journal of Individual Differences, 28*(4), 219-226.

Muris, P., & van der Heiden, S. (2006). Anxiety, depression, and judgments about the probability of future negative and positive events in children. *Journal of Anxiety Disorders, 20*(2), 252-261.

Nelson, E. A., Lickel, J. J., Sy, J. T., Dixon, L. J., & Deacon, B. J. (2010). Probability and cost biases in social phobia: nature, specificity, and relationship to treatment outcome. *Journal of Cognitive Psychotherapy, 24*(3), 213-228.

Newman, M. G., Zuellig, A. R., Kachin, K. E., Constantino, M. J., Przeworski, A., Erickson, T., & Cashman-McGrath, L. (2002). Preliminary reliability and validity of the Generalized Anxiety Disorder Questionnaire-IV: A revised self-report diagnostic measure of generalized anxiety disorder. *Behavior Therapy, 33,* 215-233.

Nich, C., & Carroll, K. M. (2002). Intention-to-treat meets missing data: implications of alternate strategies for analyzing clinical trials data. *Drug and alcohol dependence, 68*(2), 121-130.

Nicholson, N., Fenton-O'Creevy, M., Soane, E., & Willman, P. (2002). Risk propensity and personality. Retrieved from http://facultyresearch.london.edu/docs/risk.pdf

Nicholson, N., Soane, E., Fenton-O'Creevy, M., & Willman, P. (2005a). Personality and domain-specific risk taking. *Journal of Risk Research.*

Nicholson, N., Soane, E., Fenton-O'Creevy, M., & Willman, P. (2005b). Personality and domain-specific risk taking. *Journal of Risk Research, 8*(2), 157-176.

Nielen, M. M., Veltman, D. J., Jong, R., Mulder, G., & Den Boer, J. A. (2002). Decision making performance in obsessive compulsive disorder. *Journal of Affective Disorders, 69*(1-3), 257-260.

O'Carroll, R. E., & Papps, B. P. (2003). Decision making in humans: the effect of manipulating the central noradrenergic system. *Journal of Neurology, Neurosurgery & Psychiatry, 74*(3), 376-378.

Olatunji, B. O., Moretz, M. W., & Zlomke, K. R. (2010). Linking cognitive avoidance and GAD symptoms: the mediating role of fear of emotion. *Behaviour Research and Therapy, 48*(5), 435-441.

Ouimet, A. J., Gawronski, B., & Dozois, D. J. A. (2009). Cognitive vulnerability to anxiety: a review and an integrative model. *Clinical Psychology Review, 29*(6), 459-470.

Parker, A. M., & Fischhoff, B. (2005). Decision making competence: external validation through an individual differences approach. *Journal of Behavioral Decision Making, 18*(1), 1-27.

Pattison, E. M., Lleamas, R., & Hurd, G. (1979). Social network mediation of anxiety. *Psychiatric Annals, 9*, 56-67.

Paulus, M. P., Rogalsky, C., Simmons, A., Feinstein, J. S., & Stein, M. B. (2003). Increased activation in the right insula during risk-taking decision making is related to harm avoidance and neuroticism. *NeuroImage, 19*(4), 1439-1448.

Pérez-Edgar, K., Reeb-Sutherland, B. C., McDermott, J. M., White, L. K., Henderson, H. A., Degnan, K. A., . . . Fox, N. A. (2011). Attention biases to threat link behavioral inhibition to social withdrawal over time in very young children. *Journal of abnormal child psychology, 39*(6), 885-895.

Peters, L. (2000). Discriminant validity of the Social Phobia and Anxiety Inventory (SPAI), the Social Phobia Scale (SPS) and the Social Interaction Anxiety Scale (SIAS). *Behaviour Research and Therapy, 38*, 943-950.

Peters, E., & Slovic, P. (2000). The springs of action: affective and analytical information processing in choice. *Personality and Social Psychology Bulletin, 26*(12), 1465-1475.

Peters, E., Västfjäll, D., Gärling, T., & Slovic, P. (2006a). Affect and decision making: a "hot" topic. *Journal of Behavioral Decision Making, 19*(2), 79-85.

Peters, E., Västfjäll, D., Slovic, P., Mertz, C., Mazzocco, K., & Dickert, S. (2006b). Numeracy and decision making. *Psychological Science, 17*(5), 407-413.

Pfohl, B., Black, D., Noyes, R., Kelley, M., & Blum, N. (1990). A test of the tridimensional personality theory: association with diagnosis and platelet imipramine binding in obsessive-compulsive disorder. *Biological Psychiatry, 28*(1), 41-46.

Platt, M. L., & Huettel, S. A. (2008). Risky business: the neuroeconomics of decision making under uncertainty. *Nature Neuroscience, 11*(4), 398-403.

Polezzi, D., Sartori, G., Rumiati, R., Vidotto, G., & Daum, I. (2010). Brain correlates of risky decision-making. *NeuroImage, 49*(2), 1886-1894.

Polman, A., Bouman, T. K., van Hout, W. J. P. J., de Jong, P. J., & den Boer, J. A. (2010). Processes of change in cognitive–behavioural treatment of obsessive–compulsive disorder: current status and some future directions. *Clinical Psychology & Psychotherapy, 17*(1), 1-12.

Porto, P. R., Oliveira, L., Mari, J., Volchan, E., Figueira, I., & Ventura, P. (2009). Does cognitive behavioral therapy change the brain? A systematic review of neuroimaging in anxiety disorders. *Journal of Neuropsychiatry and Clinical Neuroscience, 21*(2), 114-125.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers, 15*, 203-215.

Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypotheses: theory, methods, and prescriptions. *Multivariate Behavioral Research, 42*(1), 185-227.

Preston, S., Buchanan, T., Stansfield, R., & Bechara, A. (2007). Effects of anticipatory stress on decision making in a gambling task. *Behavioral neuroscience, 121*(2), 257-263.

Price, J., Sloman, L., Gardner Jr, R., Gilbert, P., & Rohde, P. (1994). The social competition hypothesis of depression. *The British journal of psychiatry: the journal of mental science, 164*(3), 309-315.

Purdon, C., Antony, M., Monteiro, S., & Swinson, R. P. (2001). Social anxiety in college students. *Journal of Anxiety Disorders, 15*, 203-215.

Quilty, L. C., Godfrey, K. M., Kennedy, S. H., & Bagby, R. M. (2010). Harm avoidance as a mediator of treatment response to antidepressant treatment of patients with major depression. *Psychotherapy and Psychosomatics, 79*(2), 116-122.

Quilty, L. C., Meusel, L. A. C., & Bagby, R. M. (2008). Neuroticism as a mediator of treatment response to SSRIs in major depressive disorder. *Journal of Affective Disorders, 111*(1), 67-73.

Quilty, L. C., & Oakman, J. M. (2004). The assessment of behavioural activation - the relationship between impulsivity and behavioural activation. *Personality and Individual Differences, 37*(2), 429-442.

Raghunathan, R., & Pham, M. T. (1999). All negative moods are not equal: motivational influences of anxiety and sadness on decision making. *Organizational Behavior and Human Decision Processes, 79*(1), 56-77.

Ramsøy, T. Z., & Skov, M. (2010). How genes make up your mind: individual biological differences and value-based decisions. *Journal of Economic Psychology, 31*(5), 818-831.

Rapee, R. M., & Heimberg, R. G. (1997). A cognitive-behavioral model of anxiety in social phobia. *Behaviour Research and Therapy, 35*(8), 741-756.

Rapee, R. M., Kennedy, S., Ingram, M., Edwards, S., & Sweeney, L. (2005). Prevention and early intervention of anxiety disorders in inhibited preschool children. *Journal of Consulting and Clinical Psychology, 73*(3), 488.

Rapee, R. M., Sanderson, W. C., & Barlow, D. H. (1988). Social phobia features across the DSM-III-R anxiety disorders. *Journal of Psychopathology and Behavioral Assessment, 10*(3), 287-299.

Reeb-Sutherland, B. C., Vanderwert, R. E., Degnan, K. A., Marshall, P. J., Pérez Edgar, K., Chronis Tuscano, A., . . . Fox, N. A. (2009). Attention to novelty in behaviorally inhibited adolescents moderates risk for anxiety. *Journal of Child Psychology and Psychiatry, 50*(11), 1365-1372.

Rees, C. S., Anderson, R. A., & Egan, S. J. (2006). Applying the five-factor model of personality to the exploration of the construct of risk-taking in obsessive-compulsive disorder. *Behavioural and Cognitive Psychotherapy, 34*(1), 31-42.

Rees, C. S., McEvoy, P., & Nathan, P. R. (2005). Relationship between homework completion and outcome in cognitive behaviour therapy. *Cognitive Behaviour Therapy, 34*(4), 242-247.

Reimann, M., & Bechara, A. (2010). The somatic marker framework as a neurological theory of decision-making: review, conceptual comparisons, and future neuroeconomics research. *Journal of Economic Psychology, 31*(5), 767-776.

Reyna, V. F. (2004). How people make decisions that involve risk. *Current Directions in Psychological Science, 13*(2), 60-66.

Richter, M. A., Summerfeldt, L. J., Joffe, R. T., & Swinson, R. P. (1996). The Tridimensional Personality Questionnaire in obsessive-compulsive disorder. *Psychiatry Research, 65*(3), 185-188.

Rickwood, D., Deane, F. P., Wilson, C. J., & Ciarrochi, J. (2005). Young people's help-seeking for mental health problems. *Advances in Mental Health, 4*(3), 218-251.

Righi, S., Mecacci, L., & Viggiano, M. P. (2009). Anxiety, cognitive self-evaluation and performance: ERP correlates. *Journal of Anxiety Disorders, 23*(8), 1132-1138.

Risk. (2010). Retrieved May 7, 2011, from Oxford University Press http://dictionary.oed.com/

Robinson, E., Titov, N., Andrews, G., McIntyre, K., Schwencke, G., & Solley, K. (2010). Internet treatment for generalized anxiety disorder: a randomized controlled trial comparing clinician vs. technician assistance. *PLoS ONE, 5*(6), e10942.

Roe, B. E., Haab, T. C., Beversdorf, D. Q., Gu, H. H., & Tilley, M. R. (2009). Risk-attitude selection bias in subject pools for experiments involving neuroimaging and blood samples. *Journal of Economic Psychology, 30*(2), 181-189.

Roemer, L., Molina, S., & Borkovec, T. (1997). An investigation of worry content among generally anxious individuals. *The Journal of Nervous and Mental Disease, 185*(5), 314-319.

Roemer, L., Salters, K., Raffa, S. D., & Orsillo, S. M. (2005). Fear and avoidance of internal experiences in GAD: preliminary tests of a conceptual model. *Cognitive Therapy and Research, 29*(1), 71-88.

Rogers, R. D. (2011). The Roles of Dopamine and Serotonin in decision making: evidence from pharmacological experiments in humans. *Neuropsychopharmacology, 36*(1), 114-132.

Rosenbaum, J., Biederman, J., Bolduc-Murphy, E., Faraone, S., Chaloff, J., Hirschfeld, D., & Hirschfeld, D. (1993). Behavioral inhibition in childhood: A risk factor for anxiety disorders. . *Harvard Review of Psychiatry, 1*, 2-16.

Rottenstreich, Y., & Hsee, C. K. (2001). Money, kisses, and electric shocks: on the affective psychology of risk. *Psychological Science, 12*(3), 185-190.

Roy, A. K., Gotimer, K., Kelly, A. M. C., Castellanos, F. X., Milham, M. P., & Ernst, M. (2011). Uncovering putative neural markers of risk avoidance. *Neuropsychologia, 49*(5), 937-944.

Rubin, K. H., Coplan, R. J., & Bowker, J. C. (2009). Social withdrawal in childhood. *Annual Review of Psychology, 60*, 141-171.

Rubin, K. H., Hymel, S., & Mills, R. S. L. (1989). Sociability and social withdrawal in childhood: stability and outcomes. *Journal of Personality, 57*(2), 237-255.

Ruiz, M., Zamorano, E., García-Campayo, J., Pardo, A., Freire, O., & Rejas, J. (2010). Validity of the GAD-7 scale as an outcome measure of disability in patients with generalized anxiety disorders in primary care. *Journal of Affective Disorders, 128*(3), 277-286.

Rundmo, T. Ø. (2002). Associations between affect and risk perception. *Journal of Risk Research, 5*(2), 119-135.

Sakagami, M., Pan, X., & Uttl, B. (2006). Behavioral inhibition and prefrontal cortex in decision-making. *Neural networks, 19*(8), 1255-1265.

Salkovskis, P. M. (1991). The importance of behaviour in the maintenance of anxiety and panic: a cognitive account. *Behavioural Psychotherapy, 19*(1), 6-19.

Savage, L. J. (1954). *The foundations of statistics*. New York, NY: John Wiley & Sons.

Sbordone, R. J., & Long, C. J. (1996). *Ecological validity of neuropsychological testing*. Delray Beach, FL: Gr Press.

Schmitt, W. A., Brinkley, C. A., & Newman, J. P. (1999). Testing Damasio's somatic marker hypothesis with psychopathic individuals: risk takers or risk averse? . *Journal of Abnormal Psychology, 108*(3), 538-543.

Schonberg, T., Fox, C. R., & Poldrack, R. A. (2011). Mind the gap: bridging economic and naturalistic risk-taking with cognitive neuroscience. *Trends in Cognitive Sciences, 15*(1), 11-19.

Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: information and directive functions of affective states. *Journal of Personality and Social Psychology, 45*, 513-523.

Shackman, A. J., McMenamin, B. W., Maxwell, J. S., Greischar, L. L., & Davidson, R. J. (2009). Right dorsolateral prefrontal cortical activity and behavioral inhibition. *Psychological Science, 20*(12), 1500-1506.

Shaffer, P. A., Vogel, D. L., & Wei, M. (2006). The mediating roles of anticipated risks, anticipated benefits, and attitudes on the decision to seek professional help: an attachment perspective. *Journal of counseling psychology, 53*(4), 442-452.

Shear, M.K., Brown, T.A., Barlow, D. H., Money, R., Sholomskas, D. E., Woods, S. W., Gorman, J. M., & Papp, L. A. (1997). Multicenter collaborative Panic Disorder Severity Scale. *American Journal of Psychiatry, 154,* 1571–1575.

Sheehan, D., Harnett-Sheehan, K., & Raj, B. (1996). The measurement of disability. *International clinical psychopharmacology, 11*(3), 89-95.

Sheehan, D. V. (1983). *The anxiety disease*. New York, NY: Scribner's.

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., . . . Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (MINI): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry, 59*, 22-33.

Siero, F., Van Diem, M., Voorrips, R., & Willemsen, M. (2004). Periconceptional smoking: an exploratory study of determinants of change in smoking behavior among women in the fertile age range. *Health Education Research, 19*(4), 418.

Simon, H. A. (1957). *Administrative behaviour*. New York, NY: Macmillan.

Sitkin, S. B., & Pablo, A. L. (1992). Reconceptualizing the determinants of risk behavior. *The Academy of Management Review, 17*(1), 9-38.

Sitkin, S. B., & Weingart, L. R. (1995). Determinants of risky decision-making behavior: a test of the mediating role of risk perceptions and propensity. *The Academy of Management Journal, 38*(6), 1573-1592.

Skitka, L. J., & Sargis, E. G. (2006). The Internet as psychological laboratory. *Annual Review of Psychology, 57*(1), 529-555.

Sloman, S. A. (1996). The empirical case for two systems of reasoning. *Psychological Bulletin, 119*(1), 3-22.

Slovic, P. (1987). Perception of risk. *Science, 236*(4799), 280-285.

Slovic, P. (2000). *The perception of risk*. London, UK: Earthscan Publications London.

Slovic, P., Finucane, M., Peters, E., & MacGregor, D. (2007). The affect heuristic. *European Journal of Operational Research, 177*(3), 1333-1352.

Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2004). Risk as analysis and risk as feelings: some thoughts about affect, reason, risk, and rationality. *Risk Analysis, 24*(2), 311-322.

Slovic, P., Peters, E., Finucane, M. L., & MacGregor, D. G. (2005). Negative affect, risk, and decision making. *Health Psychology, 24*, 35-40.

Smoski, M. J., Lynch, T. R., Rosenthal, M. Z., Cheavens, J. S., Chapman, A. L., & Krishnan, R. R. (2008). Decision-making and risk aversion among depressive adults. *Journal of behavior therapy and experimental psychiatry*, *39*(4), 567-576.

Soane, E., Dewberry, C., & Narendran, S. (2010). The role of perceived costs and perceived benefits in the relationship between personality and risk-related choices. *Journal of Risk Research, 13*(3), 303-318.

Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. In S. Leinhardt (Ed.), *Sociological Methodology* (pp. 290-312). Washington, DC: American Sociological Association.

Spira, A. P., Zvolensky, M. J., Eifert, G. H., & Feldner, M. T. (2004). Avoidance-oriented coping as a predictor of panic-related distress: a test using biological challenge. *Journal of Anxiety Disorders, 18*(3), 309-323.

Spitzer, R., Kroenke, K., Williams, J., & Lowe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of Internal Medicine, 166*(10), 1092-1097.

Stapinski, L. A., Abbott, M. J., & Rapee, R. M. (2010). Evaluating the cognitive avoidance model of generalised anxiety disorder: impact of worry on threat appraisal, perceived control and anxious arousal. *Behaviour Research and Therapy, 48*(10), 1032-1040.

Starcevic, V., Uhlenhuth, E. H., Fallon, S., & Pathak, D. (1996). Personality dimensions in panic disorder and generalized anxiety disorder. *Journal of Affective Disorders, 37*(2-3), 75-79.

Starcke, K., Tuschen-Caffier, B., Markowitsch, H., & Brand, M. (2010a). Dissociation of decisions in ambiguous and risky situations in obsessive-compulsive disorder. *Psychiatry Research, 175*(1-2), 114-120.

Starcke, K., Tuschen-Caffier, B., Markowitsch, H. J., & Brand, M. (2010b). Dissociation of decisions in ambiguous and risky situations in obsessive-compulsive disorder. *Psychiatry Research, 175*(1-2), 114-120.

Starmer, C. (2000). Developments in non-expected utility theory: the hunt for a descriptive theory of choice under risk. *Journal of Economic Literature, 38*(2), 332-382.

Stein, M. B., Shea, C. A., & Uhde, T. W. (1989). Social phobic symptoms in patients with panic disorder: practical and theoretical implications. *American Journal of Psychiatry, 146*(2), 235-238.

Steinberg, L. (2008). A social neuroscience perspective on adolescent risk-taking. *Developmental Review, 28*(1), 78-106.

Steketee, G., & Frost, R. O. (1994). Measurement of risk-taking in Obsessive-Compulsive Disorder. *Behavioural and Cognitive Psychotherapy, 22*(04), 287-298.

Steketee, G., & Shapiro, L. J. (1995). Predicting behavioral treatment outcome for agoraphobia and obsessive compulsive disorder. *Clinical Psychology Review, 15*(4), 317-346.

Stemberger, R. T., Turner, S. M., Beidel, D. C., & Calhoun, K. S. (1995). Social phobia: an analysis of possible developmental factors. *Journal of Abnormal Psychology, 104*, 526-531.

Stöber, J. (1997). Trait anxiety and pessimistic appraisal of risk and chance. *Personality and Individual Differences, 22*(4), 465-476.

Strickland, L. H., Lewicki, R. J., & Katz, A. M. (1966). Temporal orientation and perceived control as determinants of risk-taking. *Journal of Experimental Social Psychology, 2*(2), 143-151.

Suhr, J. A., & Tsanadis, J. (2007). Affect and personality correlates of the Iowa Gambling Task. *Personality and Individual Differences, 43*(1), 27-36.

Swinson, R. P. (2006). The GAD-7 scale was accurate for diagnosing generalised anxiety disorder. *Evidence-Based Medicine, 11*(6), 184.

Taylor, S., & Wald, J. (2003). Expectations and attributions in social anxiety disorder: diagnostic distinctions and relationship to general anxiety and depression. *Cognitive Behaviour Therapy, 32*(4), 166-178.

Ten Have, M., De Graaf, R., Ormel, J., Vilagut, G., Kovess, V., & Alonso, J. (2010). Are attitudes towards mental health help-seeking associated with service use? Results from the European Study of Epidemiology of Mental Disorders. *Social psychiatry and psychiatric epidemiology, 45*(2), 153-163.

Titov, N., Andrews, G., Johnston, L., & Robinson, E. (2010a). Transdiagnostic Internet treatment for anxiety disorders: a randomized controlled trial. *Behaviour Research and Therapy, 48*(9), 890-899.

Titov, N., Andrews, G., Kemp, A., & Robinson, E. (2010b). Characteristics of adults with anxiety or depression treated at an Internet clinic: comparison with a National Survey and an outpatient clinic. *PLoS ONE, 5*(5), e10885.

Titov, N., Andrews, G., Robinson, E., Schwencke, G., Johnston, L., Solley, K., & Choi, I. (2009). Clinician-assisted Internet-based treatment is effective for generalized anxiety disorder: randomized controlled trial. *Australian and New Zealand Journal of Psychiatry, 43*(10), 905-912.

Tran, V. (2007). The use, overuse, and misuse of affect, mood, and emotion in organizational research. In C. E. J. Hartel, N. M. Ashkanasy & W. J. Zerbe (Eds.), *Research on emotions in organizations: functionality, intentionality and morality* (pp. 31-54). Oxford, UK: JAI Press.

Tryon, W. W. (2005). Possible mechanisms for why desensitization and exposure therapy work. *Clinical Psychology Review, 25*(1), 67-95. doi: DOI: 10.1016/j.cpr.2004.08.005

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: heuristics and biases. *Science, 185*(4157), 1124-1131.

van Ameringen, M., Mancini, C., & Oakman, J. M. (1998). The relationship of behavioural inhibition and shyness to anxiety disorder. *Journal of Nervous and Mental Disease, 186*(7), 425-431.

van Gelder, J. L., de Vries, R. E., & van der Pligt, J. (2009). Evaluating a dual process model of risk: affect and cognition as determinants of risky choice. *Journal of Behavioral Decision Making, 22*(1), 45-61.

van Honk, J., Hermans, E. J., Putman, P., Montagne, B., & Schutter, D. J. L. G. (2002). Defective somatic markers in sub-clinical psychopathy. *NeuroReport, 13*(8), 1025-1027.

Vlek, C., & Stallen, P. J. (1980). Rational and personal aspects of risk. *Acta Psychologica, 45*(1-3), 273-300.

Vogel, D. L., Gentile, D. A., & Kaplan, S. A. (2008). The influence of television on willingness to seek therapy. *Journal of Clinical Psychology, 64*(3), 276-295.

Vogel, D. L., Wade, N. G., & Hackler, A. H. (2008). Emotional expression and the decision to seek therapy: the mediating roles of the anticipated benefits and risks. *Journal of Social and Clinical Psychology, 27*(3), 254-278.

Vogel, D. L., & Wester, S. R. (2003). To seek help or not to seek help: the risks of self-disclosure. *Journal of counseling psychology, 50*(3), 351-361.

Vogel, D. L., Wester, S. R., & Larson, L. M. (2007). Avoidance of counseling: psychological factors that inhibit seeking help. *Journal of Counseling & Development, 85*(4), 410-422.

Vogel, D. L., Wester, S. R., Larson, L. M., & Wade, N. G. (2006). An information-processing model of the decision to seek professional help. *Professional Psychology: Research and Practice, 37*(4), 398-406.

Vogel, D. L., Wester, S. R., Wei, M., & Boysen, G. A. (2005). The role of outcome expectations and attitudes on decisions to seek professional help. *Journal of counseling psychology, 52*(4), 459-470.

Wang, P., Angermeyer, M., Borges, G., Bruffaerts, R., CHIU, W., DE GIROLAMO, G., . . . Huang, Y. (2007a). Delay and failure in treatment seeking after first onset of mental disorders in the World Health Organization's World Mental Health Survey Initiative. *World Psychiatry, 6*(3), 177-185.

Wang, P. S., Angermeyer, M., Borges, G., Bruffaerts, R., Chiu, W., De Girolamo, G., . . . Huang, Y. (2007b). Delay and failure in treatment seeking after first onset of mental disorders in the World Health Organization's World Mental Health Survey Initiative. *World Psychiatry, 6*(3), 177.

Wang, X. T., Kruger, D. J., & Wilke, A. (2009). Life history variables and risk-taking propensity. *Evolution and Human Behavior, 30*(2), 77-84.

Warmerdam, L., van Straten, A., Jongsma, J., Twisk, J., & Cuijpers, P. (2010). Online cognitive behavioral therapy and problem-solving therapy for depressive symptoms: exploring mechanisms of change. *Journal of behavior therapy and experimental psychiatry, 41*(1), 64-70.

Weber, E. U. (2010). Risk attitude and preference. *Wiley Interdisciplinary Reviews: Cognitive Science, 1*(1), 79-88.

Weber, E. U., Blais, A. R., & Betz, N. E. (2002). A domain-specific risk-attitude scale: measuring risk perceptions and risk behaviors. *Journal of Behavioral Decision Making, 15*(4), 263-290.

Weber, E. U., & Johnson, E. J. (2009). Decisions under uncertainty: psychological, economic, and neuroeconomic explanations of risk preference. In P. W. Glimcher (Ed.), *Neuroeconomics: decision making and the brain* (pp. 127-142). London, UK: Academic Press.

Weber, E. U., & Milliman, R. A. (1997). Perceived risk attitudes: relating risk perception to risky choice. *Management Science, 43*(2), 123-144.

Weller, J. A., & Tikir, A. (2011). Predicting domain specific risk taking with the HEXACO personality structure. *Journal of Behavioral Decision Making, 24*(2), 180-201.

Wells, A., & Papageorgiou, C. (2001). Social phobic interoception: effects of bodily information on anxiety, beliefs and self-processing. *Behaviour Research and Therapy, 39*(1), 1-11.

West, J. D., Fretz, B. R., & Macdonald, M. J. (1970). Modifying risk-taking behavior. *Child Development, 41*, 1083-1088.

White, T. L., Lejuez, C. W., & de Wit, H. (2008). Test-retest characteristics of the Balloon Analogue Risk Task (BART). *Experimental and Clinical Psychopharmacology, 16*, 565-570.

Wiborg, I. M., Falkum, E., Dahl, A. A., & Gullberg, C. (2005). Is harm avoidance an essential feature of patients with panic disorder? *Comprehensive Psychiatry, 46*(4), 311-314.

Wildavsky, A. (1993). The comparative study of risk perception: a beginning. In B. Rnck (Ed.), *Risk is a Construct* (pp. 89-94). Munich: Knesebeck.

Williams, L. M., Gatt, J. M., Schofield, P. R., Olivieri, G., Peduto, A., & Gordon, E. (2009). 'Negativity bias' in risk for depression and anxiety: Brain-body fear circuitry correlates, 5-HTT-LPR and early life stress. *NeuroImage, 47*(3), 804-814. doi: DOI: 10.1016/j.neuroimage.2009.05.009

Wilson, J. K., & Rapee, R. M. (2005). The interpretation of negative social events in social phobia with versus without comorbid mood disorder. *Journal of Anxiety Disorders, 19*(3), 245-274.

Winkielman, P., & Trujillo, J. (2007). Emotional influence on decision and behavior: stimuli, states, and subjectivity. In K. D. Vohs, R. F. Baumeister & G. Loewenstein (Eds.), *Do emotions help or hurt decision making? A hedgefoxian perspective* (pp. 69-91). New York, NY: Russell Sage Foundation.

Wolfe, C. D., & Bell, M. A. (2007). The integration of cognition and emotion during infancy and early childhood: regulatory processes associated with the development of working memory. *Brain and Cognition, 65*(1), 3-13.

Woodman, T., Huggins, M., Le Scanff, C., & Cazenave, N. (2009). Alexithymia determines the anxiety experienced in skydiving. *Journal of Affective Disorders, 116*(1-2), 134-138.

Woods, C. M., Chambless, D. L., & Steketee, G. (2002). Homework compliance and behavior therapy outcome for panic with agoraphobia and obsessive compulsive disorder. *Cognitive Behaviour Therapy, 31*(2), 88-95.

Wright, W. F., & Bower, G. H. (1992). Mood effects on subjective probability assessment. *Organizational Behavior and Human Decision Processes, 52*(2), 276-291.

Wu, J. C., Buchsbaum, M. S., Hershey, T. G., Hazlett, E., Sicotte, N., & Chad Johnson, J. (1991). PET in generalized anxiety disorder. *Biological Psychiatry, 29*(12), 1181-1199.

Xue, G., Lu, Z., Levin, I. P., Weller, J. A., Li, X., & Bechara, A. (2009). Functional dissociations of risk and reward processing in the medial prefrontal cortex. *Cerebral Cortex, 19*(5), 1019-1027.

Zajonc, R. B. (1980). Feeling and thinking: preferences need no inferences. *American Psychologist, 35*(2), 151-175.

Zlomke, K. R. (2009). Psychometric properties of Internet administered versions of Penn State Worry Questionnaire (PSWQ) and Depression, Anxiety, and Stress Scale (DASS). *Computers in Human Behavior, 25*(4), 841-843.

Zvolensky, M. J., & Forsyth, J. P. (2002). Anxiety sensitivity dimensions in the prediction of body vigilance and emotional avoidance. *Cognitive Therapy and Research, 26*(4), 449-460.

APPENDICES

Appendix 1: Appendix to Chapter 2 (Study 1) 242

Appendix 2: Appendix to Chapter 3 (Study 2) 246

Appendix 3: Appendix to Chapter 4 (Study 3) 249

Appendix 4: Appendix to Chapter 5 (Study 4) 253

Appendix 5: Appendix to Chapter 6 (Studies 5 & 6) 255

Appendix 1

RISK-AVOIDANCE AND SOCIAL ANXIETY PATHOLOGY

STUDY 1

Page

Study 1

Consent Form 243

Domain-Specific Risk-Taking Scale (DOSPERT) 245

UNSW

THE UNIVERSITY OF NEW SOUTH WALES

Approval No 985

PARTICIPANT INFORMATION STATEMENT

Anxiety and Risk-Taking

Participant Selection and Purpose of Study

You are invited to participate in a study of anxiety and risk-taking. We hope to learn how different levels of anxiety relate to people's desire to take risks. You were selected as a possible participant in this study because you are a Psychology 1 student.

Description of Study and Risks

If you decide to participate, you will be asked to complete a set of questionnaires and carry out a computer task. The questionnaires will ask about (i) the likelihood that you would engage in a given activity/behaviour if you were to find yourself in that situation and, (ii) the extent to which certain statements apply to your personality and mood. You will also be asked to fill out a basic demographic questionnaire. The computer task will involve using the mouse to blow up a series of 15 balloons that will burst at variable sizes. Your intention will be to win as much computer money as possible. You will be *free to discontinue any section of the experiment at any time you choose*. Together, the questionnaires and tasks will take approximately 30 minutes.

In addition to the research credit, you will also receive the exact amount of real money earned in the computer task. You may also gain personal satisfaction from knowing that your participation in this study will help lead to a better understanding of the relationship between anxiety and risk-taking. However, we cannot and do not guarantee that you will receive any benefits from this study.

Confidentiality and Disclosure of Information

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or except as required by law. If you give us your permission by signing this document, we plan to publish the results in the peer-reviewed scientific literature. In any publication or presentation, information will be provided in such a way that you cannot be identified. In any publication, information will be provided in such a way that you cannot be identified.

Recompense to participants

Participation in this study will allow you to receive 0.5 hours worth of participation credit for your Psychology 1 course and you will also receive the exact amount of real money earned in the computer task.

Your consent

Your decision whether or not to participate will not prejudice your future relations with The University of New South Wales. If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without prejudice.

Inquiries

If you have any questions or concerns following your participation, Carolyn Lorian (0405 815 800) and Dr. Jessica Grisham (9385 3031) will be happy to address them.

Complaints may be directed to the Ethics Secretariat, The University of New South Wales, SYDNEY 2052 AUSTRALIA (phone 9385 4234, fax 9385 6648, email ethics.sec@unsw.edu.au).

Please keep this information sheet and one copy of the Participant Consent Form. The investigator will keep the other signed copy. Both copies should be signed by you and the investigator

Approval No 985

PARTICIPANT CONSENT FORM

Anxiety and Risk-Taking

You are making a decision whether or not to participate. Your signature indicates that, having read the information provided on the participant information sheet, you have decided to participate.

.....	.....
Signature of Research Participant	Signature of Parent or Guardian (when relevant)
.....	.....
(Please PRINT name)	(Please PRINT name)

.....
Date

.....
Signature(s) of Investigator(s)

.....
Please PRINT Name

REVOCATION OF CONSENT

Anxiety and Risk-Taking

I hereby **WITHDRAW** my consent to participate in the research proposal described above and direct that any data collected from me be destroyed.

I understand that such withdrawal **WILL NOT** jeopardise any treatment or my relationship with The University of New South Wales

.....	.....
Signature	Date

.....
Please PRINT Name

The section for Revocation of Consent should be forwarded to Dr. Jessica Grisham, School of Psychology, Mathews Building, UNSW, Sydney, 2052.

Domain-Specific Risk-Taking Scale (DOSPERT)

Instructions: For each of the following statements, please indicate the likelihood that you would engage in the described activity or behaviour if you were to find yourself in that situation. Provide a rating from *Extremely Unlikely* to *Extremely Likely*, using the following scale:

1	2	3	4	5	6	7
Extremely Unlikely	Moderately Unlikely	Somewhat Unlikely	Not Sure	Somewhat Likely	Moderately Likely	Extremely Likely

1. Admitting that your tastes are different from those of a friend. (S)
2. Going camping in the wilderness. (R)
3. Betting a day's income at the horse races. (F)
4. Investing 10% of your annual income in a moderate growth mutual fund. (F)
5. Drinking heavily at a social function. (H/S)
6. Taking some questionable deductions on your income tax return. (E)
7. Disagreeing with an authority figure on a major issue. (S)
8. Betting a day's income at a high-stake poker game. (F)
9. Having an affair with a married man/woman. (E)
10. Passing off somebody else's work as your own. (E)
11. Going down a ski run that is beyond your ability. (R)
12. Investing 5% of your annual income in a very speculative stock. (F)
13. Going whitewater rafting at high water in the spring. (R)
14. Betting a day's income on the outcome of a sporting event. (F)
15. Engaging in unprotected sex. (H/S)
16. Revealing a friend's secret to someone else. (E)
17. Driving a car without wearing a seat belt. (H/S)
18. Investing 10% of your annual income in a new business venture. (F)
19. Taking a skydiving class. (R)
20. Riding a motorcycle without a helmet. (H/S)
21. Choosing a career that you truly enjoy over a more prestigious one. (S)
22. Speaking your mind about an unpopular issue in a meeting at work. (S)
23. Sunbathing without sunscreen. (H/S)
24. Bungee jumping off a tall bridge. (R)
25. Piloting a small plane. (R)
26. Walking home alone at night in an unsafe area of town. (H/S)
27. Moving to a city far away from your extended family. (S)
28. Starting a new career in your mid-thirties. (S)
29. Leaving your young children alone at home while running an errand. (E)
30. Not returning a wallet you found that contains $200. (E)

Note. E = Ethical, F = Financial, H/S = Health/Safety, R = Recreational, and S = Social.

Appendix 2

AN ONLINE STUDY OF RISK-AVOIDANCE AND CLINICAL ANXIETY

STUDY 2

Page

Study 2

Consent Form 247

Everyday Risk Inventory: Australian Revision (ERI-AUS) 248

THE UNIVERSITY OF NEW SOUTH WALES

Approval No 1436

PARTICIPANT INFORMATION STATEMENT

Anxiety and Risk-Taking

Information Statement and Consent Form

Thank you for your interest in taking part in our study. My name is Carolyn Lorian, an Intern Clinical Psychologist working with Dr Jessica Grisham, at the University of New South Wales, Sydney, Australia. This study involves two parts. Part 1 involves completing a variety of questionnaires about yourself in relation to your levels of anxiety, risk-taking affinity and personality. Part 2 involves completing an online computer task . You have been directed to this website following a telephone screening interview.

The study typically takes around 30-40 minutes to complete. We ask that you choose a quiet solitary location in which to complete the study and that you answer as honestly as possible. You will be free to discontinue any section of the experiment at any time by closing the browser.

As compensation for your time you will be paid AU$15-20 via PayPal, contingent on your performance on the computer task. Please ensure that you have a PayPal account established prior to commencing the study. You can create one here. You may also gain personal satisfaction from knowing that your participation in this study will help lead to a better understanding of the relationship between anxiety and risk-taking. However, we cannot and do not guarantee that you will receive any benefits from this study.

This study has been approved by the Human Ethics Research Advisory Panel (Behavioural Sciences), University of New South Wales (Approval #1436). Any information that is obtained in connection with this study will be kept completely confidential and in no cases will responses from individual participants be identified. As with any piece of research it is important to consider whether there are any risks to participants. The study involves minimal risk to participants (i.e., the level of risk encountered in daily life)

Completion of the questionnaires will be taken as evidence that you understand that the results of this study will be kept confidential and also that you give consent to be included as a participant, and for your data to be used for the purposes of research.

If you have any questions or concerns following your participation, Carolyn Lorian (carolyn.lorian@unsw.edu.au) and Dr. Jessica Grisham (jgrisham@psy.unsw.edu.au) will be happy to address them. Complaints may be directed to the Ethics Secretariat, The University of New South Wales, SYDNEY 2052 AUSTRALIA (phone +61 2 9385 4234, fax +61 2 9385 6648, email ethics.sec@unsw.edu.au).

☐ I have read the consent form and wish to take part in the study

Everyday Risk Inventory: Australian Revision (ERI-AUS)

Instructions: Listed below are various activities that people sometimes do that involve some degree of risk. Please rate the extent to which you would be likely to do each of these things. Although some of the items may not apply directly to your current situation, please reply as if they did.

1	**2**	**3**	**4**	**5**
"I would never do this"		"I might do this"		"I would definitely do this"

1. Leave your car unlocked for several hours while picnicking in the bush.
2. See a movie without knowing much about it.
3. Drive 20 kilometres over the speed limit on a major highway.
4. Go on a holiday without a specific itinerary.
5. Go to an AIDS clinic with a friend diagnosed HIV-positive.
6. Drink from a water fountain in a public park.
7. Make a recipe for the first time for guests.
8. Sit directly on a public toilet seat in a department store.
9. Camp in a national park by a creek where there are crocodiles.
10. Let a 2-year-old play on the kitchen floor after broken glass had been swept up with a broom.
11. Drink from a cup used by a friend.
12. Leave your car unlocked for several hours while at a shopping centre.
13. Pet an unfamiliar dog in the park when the owner is not in sight.
14. Use a toilet stall whose latch is broken.
15. Drive in very heavy rain to do an errand you could postpone.
16. Go out without a coat in cool weather.
17. Not put the parking brake on when the car is on a slight hill, with the car in gear.
18. Swim less than 30 minutes after eating.
19. Allow a stranger to come into your home to use your phone.
20. Drive in a snowstorm to do an errand you could postpone.
21. Drive 10 kilometres over the speed limit on a major highway.
22. Borrow something from a friend without asking because he/she was unavailable.
23. Drink from a flowing bush creek.
24. Walk under a ladder.
25. Leave your house unlocked when you're home during the day.
26. Order a dish in a foreign restaurant when you don't know the ingredients.
27. Spray your kitchen with fly spray to get rid of bugs.
28. Pick up a hitchhiker.
29. Leave the iron plugged in with the dial in the ''off'' position.
30. Drive somewhere without directions.
31. Drive in a thunderstorm to do an errand you could postpone.
32. Open a can of soup without wiping the top first.

Appendix 3
RISK-AVOIDANCE IN AN ANXIOUS TREATMENT-SEEKING SAMPLE

STUDY 3

Page

Study 3

Consent Form (Anxiety Disorder Group) 250

Consent Form (Control Group) 252

Anxiety Disorders Unit, St Vincent's Hospital

Information Sheet and Consent Form

The Anxiety Disorders Clinic at St Vincent's Hospital conducts specialised, time-limited treatment programmes for people with specific anxiety and depressive disorders. It does not provide a crisis service or long term support.

The clinic cannot provide treatments for everyone with anxiety and depression. At your first assessment, you will be asked to complete some questionnaires and a specialist psychiatrist will conduct a directed diagnostic interview. The purpose of this interview is not to obtain a comprehensive history of all your problems. Instead, the psychiatrist will ask a series of specific questions to determine (a) whether you have a disorder treated at this clinic, and (b) whether we think you will benefit from our programmes. If treatment here is advised**,** your treating clinician will go into greater depth about your condition and the treatment programmes at a subsequent interview. As this is a University Clinic there will normally be a medical student or other health professional at your initial consultation.

If treatment here is recommended, you will be offered a place on our waiting list. If we do not think our programmes will be of benefit to you, we will write an explanatory letter to your referring doctor and do our best to identify management strategies that may be helpful. We will not prepare reports for other purposes, such as legal or insurance.

If you have concerns about the details above, you should discuss them with the clinic manager before your first consultation.

Tick here if this is <u>not</u> acceptable [ ]

If you are offered treatment we will ask you to complete weekly questionnaires that will allow us to assess your progress. After treatment has ended we will want you to complete follow-up questionnaires (e.g. at one month, three months, and/or six months after treatment), so we can know if the benefit you have received is lasting.

Periodically the clinic staff review the progress of all our patients to ensure that our treatments are working as they should, or to explore ways that we might improve what we do. This is called clinical audit or quality assurance and sometimes leads to publications in professional journals. You will not be identified in any such publication. We sometimes collaborate with researchers from outside our clinic to answer important questions. The clinical details that we provide them with are always de-identified so that your privacy is protected. If you do not want your clinical records used in these ways you should tell the clinic manager and your record will be marked accordingly.

Tick here if this is <u>not</u> acceptable [ ]

If you are offered treatment, your treating clinician may need to discuss treatment issues with your other health care providers (e.g. your GP, Psychiatrist, Counsellor, Case Manager etc). Your clinicians will ask for your consent prior to contacting specific health professionals.

Tick here if this is <u>not</u> acceptable [ ]

Please sign that you have read this. It will be placed in your notes and be one of the circumstances governing our relationship with you.

Name.....

Signature.....…..... Date……

Anxiety Disorders Unit, St Vincent's Hospital

Consent to Release Information Form

I …….. give my consent for the Anxiety Disorders Clinic, St Vincent's Hospital to contact the following people in relation to my care.

……

……

……

…….. ……
Signature Date

UNSW

THE UNIVERSITY OF NEW SOUTH WALES

Approval No 1182

PARTICIPANT INFORMATION STATEMENT

Anxiety and Risk-Taking

Information Statement and Consent Form

Thank you for your interest in taking part in our study. My name is Carolyn Lorian, an Intern Clinical Psychologist working with Dr Jessica Grisham, at the University of New South Wales, Sydney, Australia. This study involves completing a variety of questionnaires about yourself in relation to your levels of anxiety, risk-taking affinity and personality.

The study typically takes around 10-15 minutes to complete. We ask that you choose a quiet solitary location in which to complete the study and that you answer as honestly as possible. You will be free to discontinue any section of the experiment at any time by closing the browser.

As compensation for your time you will go into a drawn to win AU$50. You may also gain personal satisfaction from knowing that your participation in this study will help lead to a better understanding of the relationship between anxiety and risk-taking. However, we cannot and do not guarantee that you will receive any benefits from this study.

This study has been approved by the Human Ethics Research Advisory Panel (Behavioural Sciences), University of New South Wales (Approval #1182). Any information that is obtained in connection with this study will be kept completely confidential and in no cases will responses from individual participants be identified. As with any piece of research it is important to consider whether there are any risks to participants. The study involves minimal risk to participants (i.e., the level of risk encountered in daily life).

Completion of the questionnaires will be taken as evidence that you understand that the results of this study will be kept confidential and also that you give consent to be included as a participant, and for your data to be used for the purposes of research.

If you have any questions or concerns following your participation, Carolyn Lorian (carolyn.lorian@unsw.edu.au) and Dr. Jessica Grisham (jgrisham@psy.unsw.edu.au) will be happy to address them. Complaints may be directed to the Ethics Secretariat, The University of New South Wales, SYDNEY 2052 AUSTRALIA (phone +61 2 9385 4234, fax +61 2 9385 6648, email ethics.sec@unsw.edu.au).

☐ I have read the consent form and wish to take part in the study

Appendix 4

CLINICAL IMPLICATIONS OF RISK-AVOIDANCE AND ANXIETY: TREATMENT-SEEKING

STUDY 4

Page

Study 4

Consent Form 254

UNSW

THE UNIVERSITY OF NEW SOUTH WALES

Approval No 1114

PARTICIPANT INFORMATION STATEMENT

Anxiety and Risk-Taking

Information Statement and Consent Form

Thank you for your interest in taking part in our study. My name is Carolyn Lorian, an Intern Clinical Psychologist working with Dr Jessica Grisham, at the University of New South Wales, Sydney, Australia. This study involves completing a variety of questionnaires about yourself in relation to your levels of anxiety, risk-taking affinity and personality.

The study typically takes around 20 minutes to complete. We ask that you choose a quiet solitary location in which to complete the study and that you answer as honestly as possible. You will be free to discontinue any section of the experiment at any time.

As compensation for your time you will be given the opportunity to be entered into a draw to win US$150. You may also gain personal satisfaction from knowing that your participation in this study will help lead to a better understanding of the relationship between anxiety and risk-taking. However, we cannot and do not guarantee that you will receive any benefits from this study.

This study has been approved by the Ethics Committee at the School of Psychology, University of New South Wales (Approval #1114). Any information that is obtained in connection with this study will be kept completely confidential and in no cases will responses from individual participants be identified. As with any piece of research it is important to consider whether there are any risks to participants. The study involves minimal risk to participants (i.e., the level of risk encountered in daily life). Participants should be aware that the experiment is not being run from a 'secure' https server of the kind typically used to handle credit card transactions, so there is a small possibility that anonymised data could be viewed by third parties.

Completion of the questionnaires will be taken as evidence that you understand that the results of this study will be kept confidential and also that you give consent to be included as a participant, and for your data to be used for the purposes of research.

If you have any questions or concerns following your participation, Carolyn Lorian (clorian@psy.unsw.edu.au) and Dr. Jessica Grisham (jgrisham@psy.unsw.edu.au) will be happy to address them. Complaints may be directed to the Ethics Secretariat, The University of New South Wales, SYDNEY 2052 AUSTRALIA (phone +61 2 9385 4234, fax +61 2 9385 6648, email ethics.sec@unsw.edu.au).

☐ I have read the consent form and wish to take part in the study

Appendix 5

TREATMENT IMPLICATIONS OF RISK-AVOIDANCE: CHANGES IN RISK-TAKING

STUDY 5 & 6

	Page
Study 5	
Consent Form	256
Study 6	
Consent Form	259

UNSW

HREC Approval No: 08232

THE UNIVERSITY OF NEW SOUTH WALES

PARTICIPANT INFORMATION STATEMENT AND CONSENT FORM

Internet Based Education for GAD

Purpose of study

You are invited to participate in this study of education for generalized anxiety disorder (GAD). This project is being conducted by Dr Nickolai Titov and Professor Gavin Andrews from the School of Psychiatry, University of New South Wales, and Dr Alison Mahoney, from the Anxiety Disorders Clinic at St Vincent's Hospital, Sydney. By conducting this project we hope to learn whether completing 6 educational lessons about GAD over the Internet can help people to reduce their symptoms of GAD and improve mood. You are invited to participate because you meet criteria for GAD and have volunteered to participate.

Description of study

If you decide to participate, please complete the last page of this form, and return it to us as soon as possible. Once we have received it, the following will happen.

One of the researchers will telephone you to complete your application. If you meet all the criteria (as described on the website at www.climateclinic.tv) you will be randomly allocated to either of the following groups:

1. The Education group, which will start the education program immediately, or

2. The Wait-List Control group, which will start the education program as soon as the Education group have finished (about 10 weeks from now). We require a Wait-List Control group because we need to compare the participants in the Education group with individuals who have not yet formally received such education.

The education program consists of 6 lessons about GAD. You will be asked to complete one lesson each 2 weeks and to complete some simple homework assignments that will help you to remember the material you have learned. Each lesson tells part of the story, in cartoon format, about a person with GAD who seeks treatment, and who learns to manage his or her symptoms. Each lesson takes about 30 minutes to complete, and the homework will take a further 2 – 4 hours over the next two weeks. We will email you each week to answer any questions you may have and to monitor your progress.

If you are in the Education group we will ask you to fill in online questionnaires about your symptoms at the start of the first lesson and one week after completing the last lesson. We will then contact you again 6 months after the program has concluded to ask you to complete these same questionnaires. These questionnaires will help determine whether the education program has been helpful, and whether any improvements continued after treatment. These questionnaires take about 15 minutes to complete.

If you are in the Wait-List Control group we will ask you to fill in the same online questionnaires about your symptoms within the next week, and then at the start of the first lesson and one week after completing the last lesson.

We estimate that, including homework and emails, participating in this project will take about 24 hours of your time in total over the total of 8 weeks. Although unlikely, it is possible that some individuals may become anxious when completing questionnaires and reading the educational information about GAD. Should you become distressed you can contact Dr Nickolai Titov, a Clinical Psychologist (ph 02 8382 1732; email: nickt@unsw.edu.au) to discuss this. There are no known discomforts or risks associated with participating in this educational program. We expect that you will find this educational course interesting and helpful, and we expect that it will help reduce your symptoms of GAD and improve mood. However, we cannot and do not guarantee or promise that you will receive any benefits from this study.

You are able to withdraw from this study at any stage, without any penalty; your participation is voluntary. If after beginning this study you do not wish to participate you can contact Dr Titov (ph (02) 8382 1732, email: nickt@unsw.edu.au) who will arrange this. Should you withdraw we would recommend that you consider formal treatment for GAD, preferably from a mental health professional with experience in treating GAD. Your GP will be able to advise you about this.

Confidentiality

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission, except as required by law. If you give us your permission by signing this document, we plan to publish the results and discuss these at national and international conferences. In any publication, information will be provided in such a way that you cannot be identified.

If you have any concerns about this project at any stage you are welcome to contact Dr Titov (ph (02) 8382 1732, email: nickt@unsw.edu.au). However, complaints may be directed to the Ethics Secretariat, The University of New South Wales, SYDNEY 2052 AUSTRALIA (ph 9385 4234, fax 9385 6648, email ethics.sec@unsw.edu.au). Any complaint you make will be investigated promptly and you will be informed about the outcome.

Results

We will send all participants a summary of the main findings of this project in July 2009, once the follow-up results are available. You are welcome to request a copy of research articles that are published about this project.

Your consent

Your decision whether or not to participate will not prejudice your future relations with the University of New South Wales. If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without prejudice.

If you have any questions, please feel free to ask us. If you have any additional questions later, Dr Titov (ph (02) 8382 1732) will be happy to answer them.

Please keep a copy of this form, but complete and return the following page.

THE UNIVERSITY OF NEW SOUTH WALES

PARTICIPANT INFORMATION STATEMENT AND CONSENT FORM (continued)

Internet Based Education for GAD

You are making a decision whether or not to participate. Your signature indicates that, having read the information provided above, you have decided to participate.

……	**……..**
Signature of Research Participant	Signature of Witness
……	**……**
(Please PRINT name)	(Please PRINT name)
……..	**……**
Date	Nature of Witness

REVOCATION OF CONSENT

Internet Based Education for GAD

I hereby wish to **WITHDRAW** my consent to participate in the research proposal described above and understand that such withdrawal **WILL NOT** jeopardise any treatment or my relationship with The University of New South Wales.

……..	**……**
Signature	Date

Date

……
Please PRINT Name

The section for Revocation of Consent should be forwarded to Dr Nickolai Titov, CRUFAD, 299 Forbes Street, Darlinghurst, NSW 2010, Australia, as soon as possible.

Anxiety Disorders Unit, St Vincent's Hospital

Information Sheet and Consent Form

The Anxiety Disorders Clinic at St Vincent's Hospital conducts specialised, time-limited treatment programmes for people with specific anxiety and depressive disorders. It does not provide a crisis service or long term support.

The clinic cannot provide treatments for everyone with anxiety and depression. At your first assessment, you will be asked to complete some questionnaires and a specialist psychiatrist will conduct a directed diagnostic interview. The purpose of this interview is not to obtain a comprehensive history of all your problems. Instead, the psychiatrist will ask a series of specific questions to determine (a) whether you have a disorder treated at this clinic, and (b) whether we think you will benefit from our programmes. If treatment here is advised**,** your treating clinician will go into greater depth about your condition and the treatment programmes at a subsequent interview. As this is a University Clinic there will normally be a medical student or other health professional at your initial consultation.

If treatment here is recommended, you will be offered a place on our waiting list. If we do not think our programmes will be of benefit to you, we will write an explanatory letter to your referring doctor and do our best to identify management strategies that may be helpful. We will not prepare reports for other purposes, such as legal or insurance.

If you have concerns about the details above, you should discuss them with the clinic manager before your first consultation.

Tick here if this is <u>not</u> acceptable [ ]

If you are offered treatment we will ask you to complete weekly questionnaires that will allow us to assess your progress. After treatment has ended we will want you to complete follow-up questionnaires (e.g. at one month, three months, and/or six months after treatment), so we can know if the benefit you have received is lasting.

Periodically the clinic staff review the progress of all our patients to ensure that our treatments are working as they should, or to explore ways that we might improve what we do. This is called clinical audit or quality assurance and sometimes leads to publications in professional journals. You will not be identified in any such publication. We sometimes collaborate with researchers from outside our clinic to answer important questions. The clinical details that we provide them with are always de-identified so that your privacy is protected. If you do not want your clinical records used in these ways you should tell the clinic manager and your record will be marked accordingly.

Tick here if this is <u>not</u> acceptable [ ]

If you are offered treatment, your treating clinician may need to discuss treatment issues with your other health care providers (e.g. your GP, Psychiatrist, Counsellor, Case Manager etc). Your clinicians will ask for your consent prior to contacting specific health professionals.

Tick here if this is <u>not</u> acceptable [ ]

Please sign that you have read this. It will be placed in your notes and be one of the circumstances governing our relationship with you.

Name.....

Signature.....…..... Date……

Anxiety Disorders Unit, St Vincent's Hospital

Consent to Release Information Form

I …….. give my consent for the Anxiety Disorders Clinic, St Vincent's Hospital to contact the following people in relation to my care.

……

……

……

…….. ……
Signature Date