An Integration of Attachment Theory and Reinforcement Sensitivity Theory

by

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Abstract

The purpose of this thesis was to investigate the associations between two dominant behavioural systems theories relating to appetitive and aversive motivation, namely Reinforcement Sensitivity Theory (RST) and attachment theory. Considering the important revisions to RST, it was proposed that attachment avoidance and anxiety are likely to be linked to the functioning of the Fight-Flight-Freezing System (FFFS) in distinct ways, thereby producing characteristic differences in both threat detection and the behavioural responses to threatening stimuli in the environment. Three studies were devised to investigate these propositions. Study 1 of this thesis comprised an experimental examination of the associations between adult attachment, the FFFS, and the detection of threatening and rewarding stimuli in the environment using the dot-probe paradigm. The total sample for Study 1 comprised 70 participants, which included 48 (68.6%) women and 22 (31.4%) men. The age of participants ranged between 19 and 53 \( (M = 27.29, SD = 7.24) \). Multigroup invariance testing was conducted to explore whether the associations between the FFFS and threat and reward response biases differed across levels of attachment avoidance or anxiety. The results demonstrated that associations between the FFFS and threat and reward bias were moderated by levels of attachment anxiety and avoidance, suggesting that the threat detection mechanism of the FFFS operates differently across the attachment orientations. Study 2 and Study 3 consisted of an experimental design in which participants were asked to consider how they would respond to a vignette depicting either a relationship scenario (Study 2) or a substance use scenario (Study 3) in which degree of threat was manipulated. In each of the two studies, four three-way between groups ANOVAs (2 [high and low attachment avoidance] × 2 [high and low...
Attachment anxiety × 2 [high and low threat condition] were conducted to examine main and interaction effects for attachment anxiety and avoidance and threat condition on mean FFFS responses to the respective scenarios. The total sample for Study 2 consisted of 327 participants that included 255 (78%) women and 72 (22%) men. The age of participants ranged between 18 and 68 years ($M = 27.45$, $SD = 9.55$). The results of Study 2 provided partial support for the hypotheses that mean FFFS responses to high and low threat would be moderated by attachment anxiety and avoidance. In Study 3, the total sample consisted of 302 participants including 210 (69.5%) women and 92 (30.5%) men. The age of participants ranged between 18 and 75 ($M = 28.33$, $SD = 11.94$). The results of Study 3 also provided partial support for the hypothesis that mean FFFS responses to high and low substance use threat would be moderated by attachment anxiety and avoidance. The research findings provide preliminary evidence for a link between the differential functioning of the FFFS and attachment system dynamics. Therefore, this thesis makes an important empirical contribution to understandings of the functional interplay between these behavioural systems in the organisation of appetitive and aversive behaviours. The research findings are discussed in terms of the implications for previous research investigating the association between the attachment dimensions and the systems of RST, as well as directions for future research.
CHAPTER 1

Introductory Overview

Over many years, theorists have sought to identify the basic structure of human personality. A dominant theme that has emerged from diverse theoretical disciplines and empirical paradigms is that human behaviour consists of two broad classes of motivational action tendencies: approach toward potential rewards (appetitive motivation) and avoidance of potential punishment (aversive motivation) in the environment (Smillie, 2008; Carver, Sutton, & Scheier, 2000). The terms approach motivation and appetitive motivation, and avoidance motivation and aversive motivation, have been used interchangeably throughout the literature. Despite the interchangeable use of these terms, all theories of approach and avoidance motivation assume that these distinct motivational tendencies are governed by separate underlying behavioural systems (Carver & Harmon-Jones, 2009). A key defining feature of behavioural systems is that they function in a goal-directed manner via a feedback loop to increase an individual’s reproductive fitness and survival, thereby improving the chances that the individual’s genes will be successfully transmitted to future generations (Bowlby, 1969/1982; Cassidy, 2000; Carver et al., 2000). Behavioural systems approaches to the study of appetitive and aversive motivational processes have been applied for the last two decades (e.g., Carver et al., 2000; Elliot, Gable, Mapes, 2003; Gray, 1987).

While there is substantial conceptual convergence between existing approach-avoidance models (Smillie, 2008), research has been undertaken across diverse
theoretical frameworks that have remained largely distinct throughout the literature. Recently, researchers have begun to merge seemingly disparate motivational systems approaches in order to move toward the development of a more unified theory of appetitive and aversive motivation (Carver et al., 2000; Elliot & Thrash, 2002; Gable, Reis, & Elliot, 2003). Proponents (e.g., Elliot & Thrash, 2002; Matthews, 2008) contend that empirical attempts to integrate these motivational systems theories are likely to contribute to a more encompassing understanding of the function, regulation and dynamics of motivational systems (McNaughton & Corr, 2008). The integration of distinct theoretical perspectives has the potential to uncover related processes or hierarchical processes between motivational systems that could contribute to a more comprehensive model of how motivational systems regulate appetitive and aversive behaviour across diverse contexts of threat and reward.

In line with this rationale, the overarching aim of this thesis was to investigate whether the integration of Reinforcement Sensitivity Theory (RST; Gray, 1987) and attachment theory (Bowlby, 1969/1982), two well-established behavioural systems theories that deal with approach and avoidance motivational processes, could contribute to a more comprehensive understanding of the interplay between motivational systems that govern appetitive and aversive motivation. This investigation would help to clarify how the behavioural systems of RST and attachment theory interact to organise behaviour in response to context-specific and more general appetitive and aversive cues in the environment.

Both attachment theory and RST explain personality functioning and behaviour in terms of the operation of innate behavioural systems associated with approach and avoidance motivation (MacDonald & Kingsbury, 2006). RST is a well-established
neuropsychological account of appetitive and aversive motivation that specifies how individual differences in behaviour are regulated by the sensitivity and activation of distinct biobehavioural systems in response to rewarding and threatening environmental cues (Gray, 1981; Gray & McNaughton, 2000). While originally developed to understand the biological basis of individual differences in anxiety (Gray, 1970; 1981), Gray’s theory has also been used as a framework for understanding substance abuse and addiction, with particular focus given to the approach toward positive affective states (e.g., drug use to facilitate euphoria) and avoidance of negative emotional states (e.g., drinking to alleviate distress) (e.g., Franken, 2002; Kambouropoulos & Staiger, 2007). Conversely, attachment theory holds that an innate behavioural attachment system organises approach and avoidance behaviour in close relationships based on expectations learned during early experiences of punishing and rewarding interactions with significant others (Bowlby, 1969/1982). Attachment theory has been used as a framework for the study of close relationships, with specific attention given to tendencies to approach relationships that provide love and support and to avoid rejecting and hurtful relationships that increase emotional distress (see Mikulincer & Shaver, 2007 for a review). Hence, both theories stipulate that individual differences in approach and avoidance motivations are fundamentally tied to underlying behavioural systems. While it seems likely that some functional association should exist between these behavioural systems, research integrating RST with attachment theory is in its infancy.

An important point of divergence however, between RST and attachment theory, is that the attachment system is a context-specific system that is activated by attachment-related cues and responds with systematic approach or avoidance tendencies in attachment contexts. By contrast, RST represents a broad theory of the
systems responsible for organising general approach-avoidance behaviours across diverse contexts. It may be that the systems are hierarchical in nature, whereby the attachment system operates as a nested system of the higher-order appetitive and aversive motivational systems that is specifically calibrated for promoting the survival of one’s genes via mechanisms associated with care-receiving and caregiving. This is in line with work by Carver and others (Carver & Scheier, 1982; Carver et al., 2000) who proposed that behavioural control systems are hierarchically organised such that lower order systems control context-specific goals that contribute to overall processes or functions being controlled at the higher level. In support of this idea, it has been speculated that there is a possibility that, rather than only having overarching, broad systems (i.e., RST), appetitive and aversive motivation may be governed by numerous sets of systems that have distributed control over approach and avoidance behaviours (Gray & McNaughton, 2000).

In the introductory chapters of this thesis, key theoretical literature and empirical evidence pertaining to the possible associations between the systems of RST and attachment theory is reviewed. In order to explore the propositions made above, the introductory chapters of this thesis had two key aims. The first aim was to examine how a threat detection system, as described by RST, is relevant to understanding the mechanism that underlie individual variation in sensitivity to threat across the attachment orientations. The second aim was to develop an argument for the ways in which the systems of RST, especially the Fight-Flight-Freezing System, are expected to be associated with approach-avoidance dynamics across the attachment styles.
1.1 Thesis Overview

This thesis is divided into eight chapters. In Chapter 2, the RST conceptualisation of appetitive and aversive motivation and associated evidence is reviewed. Specific attention is given to important revisions made to the theory (Gray & McNaughton, 2000) and the implications for understanding the interactions between appetitive and aversive processes.

In Chapter 3, evidence linking appetitive and aversive motivation to attachment system dynamics is discussed with particular focus on the fundamental assumptions of attachment theory regarding the origins of attachment behaviour in early interpersonal experiences of punishment and reward.

Chapter 4 consists of discussion of preliminary research that has attempted to integrate RST and attachment theory in studying motivational processes. This includes consideration of the limitations and inconsistencies of these past studies. Considering the revisions made to RST and existing evidence from the attachment and RST literature, a revised account of how the dimensions of attachment and the systems of RST were expected to be related is also set out in this chapter. This chapter concludes with the research aims and hypotheses.

Chapter 5, 6 and 7 consist of the methodology, results, and discussion of Study 1, 2, and 3. In Chapter 8, the findings of the three studies are discussed in terms of the implications for the theoretical integration of RST and attachment theory and the contribution of the research findings to understandings of the motivational systems involved in appetitive and aversive motivational processes. The limitations of the thesis are also discussed and potential directions for future research outlined.
CHAPTER 2

Reinforcement Sensitivity Theory

2.0 Chapter Overview

This chapter includes a detailed description of the central tenets of RST and the important revisions that were made to the theory by Gray and McNaughton (2000). A number of the complexities and measurement issues inherent in the theory are discussed. This is followed by a review of the current state of the RST literature. Of relevance to this thesis, this section notes the empirical contributions of RST to understandings of addictive behaviours and substance use, and highlights the need for further research applying the systems of RST to the context of close personal relationships. The chapter concludes with the proposition that attachment theory can provide a useful framework for understanding how RST motivational processes are organised for behaviour in close personal relationships.

2.1 Reinforcement Sensitivity Theory

Based upon extensive animal research, Gray (1970, 1981) originally developed RST as an alternative to Eysenck’s (1967) arousal model of personality. According to Eysenck’s (1967; Eysenck & Eysenck, 1985) theory, three core traits (i.e., extraversion, neuroticism, psychoticism) can be mapped as a three-dimensional space
to represent the fundamental elements of personality. The dimension that is thought to
be directly associated with neurobiological processes is the introversion-extroversion
dimension. Eysenck (1967) proposed that individual variation in introversion-
extroversion could be explained in terms of the maintenance of optimal levels of
cortical arousal. Specifically, due to chronically low levels of cortical arousal,
extraverts are motivated to seek greater stimulation, whereas introverts are motivated
to avoid stimulation due to chronically high levels of arousal.

In contrast, Gray (1970, 1981) argued that individual differences in personality
and behaviour reflect differences in responses to reinforcing stimuli rather than arousal
levels. Specifically, he proposed that introverts were more sensitive to reinforcing
stimuli that signalled threat or punishment (i.e., aversive stimuli) while extroverts were
more sensitive to reinforcing stimuli signalling reward (i.e., appetitive stimuli). He
suggested that these differing reinforcement sensitivities, and subsequent individual
differences in behaviour, are controlled by two distinct biological motivational systems
relating to behavioural activation and inhibition (Gray, 1970, 1981). These systems are
respectively labelled the Behavioural Activation System (BAS) and the Behavioural
Inhibition System (BIS).

Gray (1970, 1981) also proposed that two new personality dimensions be used;
impulsivity (IMP) and anxiety (ANX), to reflect the stable individual differences in the
activity of these systems. Impulsivity is related to activity in the approach system and
is characterised by increased sensitivity and reactivity to incentives and more efficient
learning under a rewarding reinforcement schedule. Conversely, anxiety is related to
activity in the inhibition system as it is characterised by increased sensitivity and
reactivity to cues of punishment and more efficient learning under a punitive
reinforcement schedule. As a consequence of this change in conceptualisation, Gray subjected Eysenck’s three-dimensional model to a slight rotation in order to reflect more accurately the different emphasis. IMP is located between Extraversion and Neuroticism but is aligned most closely with Extroversion, while ANX is located between Neuroticism and Introversion but is aligned most closely with Neuroticism (Matthews & Gilliland, 1999). The rotation of the Eysenck’s model resulted in the label IMP capturing traits associated with extraversion and sensation-seeking whilst ANX captured traits associated with neuroticism and harm avoidance (Pickering & Gray, 1999). Gray’s model was less focused on Eysenck’s psychoticism trait (Smillie, Pickering, & Jackson, 2006).

Thus, according to RST, individual differences in personality are the result of differing sensitivities of the BAS and the BIS to reward and punishment, respectively (Gray, 1987; Gray & McNaughton, 2000). The BAS is responsible for appetitive motivation and mediates responses to positive reinforcement and conditioned signals of reward and non-punishment (Gray, 1987). As a result, the BAS responds to reward cues by initiating approach behaviour with the aim of increasing the spatiotemporal proximity to the reward. Attainment of the reward results in the experience of positive affect (Gray, 1970; Pickering, Corr, & Gray, 1999). Specifically, BAS functioning is proposed to mediate the personality dimension of impulsivity, which is characterised by heightened sensitivity to reward and increased reward-seeking behaviour (Corr, 2002a; Gray, 1970). According to RST, the heightened appetitive motivation displayed by highly impulsive individuals is reflective of a highly sensitive or hyperactive BAS (Gray, 1987).
In contrast, the BIS is responsible for regulating aversive motivation. This system responds to conditioned signals of punishment, non-reward, innate fear stimuli, and extreme novelty with inhibition of behaviour and the affective state of anxiety (Corr, 2002a; Gray, 1970; Pickering et al., 1999). When activated, the BIS responds by inhibiting further movement toward the stimulus and increasing arousal, attention and negative affect. Hence, the BIS is considered to be the causal basis of anxiety as an individual’s experience of anxiety is regulated by the degree to which the system is activated in response to signals of impending punishment (Corr, 2002a; Gray 1970).

According to RST, individuals who harbour an overactive BIS are likely to be acutely sensitive to conditioned cues that signal potential threat, non-reward, and novelty and experience heightened behavioural inhibition and anxiety when confronted with these cues (Gray 1987).

In the original RST, a third system, the Flight-Fight System (FFS), was defined as a threat-response system that facilitated unconditioned responses to impending danger (Gray, 1987; Gray & McNaughton, 2000). The FFS was proposed to be sensitive to unlearned aversive stimuli and responsible for activating either defensive aggression toward (fight), or rapid escape (flight) from, the stimulus (Smillie et al., 2006). The activation of this system was thought to mediate the emotions of rage and panic (Corr, 2002a). While the FFS shared similarities with the role of the BIS, its behavioural outputs could be discerned from BIS-mediated outcomes as they were unlearned responses. Nevertheless, the boundaries between these two systems and their affective outputs (i.e., fear and anxiety) were difficult to distinguish as they both involved punishment and aversive responses to the threat (Corr, 2002a; Jackson, 2003; Smillie et al., 2006). Furthermore, the operation of the FFS was not clearly linked to personality (Jackson, 2003; Smillie et al., 2006).
As a means of addressing the conceptual and functional overlap of the BIS and FFS, the model of RST was updated by Gray and McNaughton (2000). As part of an evaluation of all available empirical evidence, including pharmacological, psychological and ethological data, several important theoretical revisions were made. The theory was modified to account for the emerging inconsistencies across studies at the time, and to more accurately conceptualise BIS functioning (Gray & McNaughton, 2000). In broad terms, their review of the research indicated a need to expand the concept of the BIS and address the fundamental distinctions between fear and anxiety, and active avoidance and behavioural inhibition. This work has led to both minor and major changes to the ways in which the systems of RST and the interrelationships between them are understood. The specific modifications to RST are discussed in more detail in the following section.

2.2 The Revised Model of RST

As a result of Gray and McNaughton’s (2000) seminal work, it is now posited that the BAS facilitates the expression of approach motivation in response to all appetitive stimuli (i.e., conditioned and unconditioned rewarding stimuli). The FFS was renamed the Fight-Flight-Freezing System (FFFS) and was re-conceptualised as responsible for threat detection and aversive motivation. Therefore, the FFFS has been given a more central role in the revised RST as it is considered to be the BAS and the FFFS that regulate levels of appetitive and aversive motivation, respectively (McNaughton & Corr, 2004). The BIS is now conceptualised as a system of conflict resolution that is activated under conditions of conflict between appetitive and aversive stimuli (McNaughton & Corr, 2004).
The adaptation of the FFFS was drawn from animal research by Blanchard and Blanchard (1990a, 1990b) who consistently reported three distinct behavioural responses to threat (Smillie et al., 2006). Fight was observed when an animal was confronted with proximal threat stimuli (e.g., physical contact with a predator), whereas flight and freezing were observed when an animal was confronted with more distal threat stimuli. Freezing appeared to occur when escape from the distal threat (i.e., flight) was not possible. The FFFS was therefore argued to be central to the regulation of avoidance behaviour in any situation where the removal of the animal from the source of threat was necessary (Gray & McNaughton, 2000). Based on this evidence, the FFFS was re-conceptualised as being responsible for threat detection and aversive motivation, as this system activates avoidance behaviour and negative affect (i.e., fear) in response to all incoming threat-related cues of punishment and non-reward (Gray & McNaughton, 2000).

The BIS is now conceptualised as a system of conflict resolution that activates behavioural inhibition, increased attention and heightened arousal under conditions of conflict between appetitive and aversive stimuli (McNaughton & Corr, 2004). As described by Smillie et al. (2006), in the presence of aversive stimuli that need not be approached, the FFFS will produce escape or defence behaviour (i.e., fleeing, fighting, or freezing). However, if a threatening stimulus must be approached, then the BIS will be activated resulting in the inhibition of behaviour and the affective state of anxiety until the conflict is resolved. Hence, in more simple terms, the BIS is activated by the need to approach potential danger (Gray & McNaughton, 2000). This modification was drawn from evidence that the BIS appears to be activated not only by signals of potential punishment or innately fearful stimuli, but also by cues of novelty or failure to attain expected rewards (e.g., Harmon-Jones & Allan, 1998; Carver, 2004; Corr,
2002b). Gray and McNaughton (2000) concluded that it is not solely the presence of aversive stimuli that activate the BIS, but rather their combination with appetitive stimuli or conditions where an animal must choose between conflicting goals to approach or avoid a stimulus.

Therefore, any input which initiates an approach-avoidance conflict (i.e., concurrent BAS and FFFS input) engages the BIS. When faced with a conflict between an appetitive and an aversive cue, neither approach or avoidance behaviour is appropriate. Therefore, the BIS is activated to provide the necessary conditions to resolve the conflict. Firstly, the inhibition of both the BAS and the FFFS provides a preliminary solution to the conflict by preventing either system to take immediate control over behaviour. Then, increased arousal and attention follow in order to prepare the animal and facilitate the most adaptive decision to either continue approaching the stimulus or escape danger. Finally, the BIS then further activates either the BAS, in order to continue approaching the stimulus, or the FFFS in order to escape it (Smillie et al., 2006). The BIS is primarily related to “hesitation and doubt” (Gray & McNaughton, 2000, p. 87) and resolves the conflict with greater weight placed on incoming aversive information (Zinbarg & Yoon, 2008). Therefore, the stronger the BIS output, the more likely an individual is to interpret ambiguous or unfamiliar stimuli as threatening.

The revised RST explicates a specific pathway that leads to activation of the BIS and anxiety. While the theoretical revisions have not yet been extensively validated, preliminary findings appear to support the distinctions made in Gray and McNaughton’s (2000) model and its major predictions. Firstly, inherent in the revisions to RST is the distinction between fear (FFFS regulated) and anxiety (BIS
regulated). Gray and McNaughton based this conceptual distinction on the research conducted by Blanchard and Blanchard (1990a, 1990b). Specifically, the Blanchards identified key biological and behavioural differences between fear- and anxiety-related processes in animals. This distinction has also been supported by recent human studies (e.g., Cooper, Perkins & Corr, 2007; Perkins, Kemp & Corr, 2007). For example, Perkins et al. (2007) explored the relationships between various measures of fear and anxiety in relation to task performance in a military training setting. The results revealed that the constructs of fear and anxiety appear to be relatively distinct. Compared to anxiety, fear accounted for unique variance in the prediction of task performance. Likewise, Cooper et al. (2007) also found that self-report measures of fear and anxiety seem to measure different processes. Specifically, these authors found only weak associations between measures of fear and anxiety, which lead them to conclude that two constructs are likely to reflect separate underlying processes. These findings support the notion that fear (FFFS) and anxiety (BIS) are conceptually distinct constructs which may be regulated by different motivational systems.

Secondly, behavioural studies have provided support for the key predictions of the revised model, specifically in relation to the conflict-resolution role of the BIS (e.g., Amodio, Yee, Masters, & Shelley, 2008; Berkman, Lieberman, & Gable, 2009; Kambouropoulos & Staiger, 2004). For example, Berkman et al. (2009) tested the key predictions of the revised RST by examining the links between appetitive and aversive motivation, using the BIS/BAS scales (Carver & White, 1994), and responses to a novel incentive task containing a mixture of conditioned and unconditioned appetitive and aversive stimuli. Carver and White (1994) designed the BIS/BAS scales to measure levels of appetitive and aversive motivation as conceptualised by the original RST. Accounting for the revised RST, Berkman et al. hypothesised that those
individuals with higher trait BAS would respond faster to both conditioned *and* unconditioned incentives. Secondly, they hypothesised that individuals with higher BIS scores would respond faster to conflicting incentives but not to aversive stimuli when no conflict was present. This hypothesis was based on the premise that individuals with greater BIS activity are likely to show faster responses to conflict as they are more efficient in detecting a conflict and allocating resources to resolve it. Finally, they hypothesised that during approach-avoidance conflicts the effect of BIS on response times to conflicting incentives would be moderated by BAS, such that higher BAS would enhance the relationship between BIS and faster responding to conditioned signals of reward (i.e., faster conflict resolution). The results of the study were consistent with all three hypotheses, thereby providing preliminary empirical support for the revised RST.

In another behavioural study, Kambouropoulos and Staiger (2004) found that the presence of an approach-avoidance conflict led to greater behavioural inhibition. In this study, participants completed two self-report measures of BIS/BAS activity and two behavioural measures of reward responsiveness. The authors found that high levels of approach motivation were significantly associated with greater behavioural inhibition on the Q-TASK; a behavioural task measuring punishment-induced behavioural inhibition, only in participants with high self-reported avoidance motivation. It was concluded that the behavioural inhibition displayed by these high approach/high avoidance individuals may have been elicited by a state of anxiety resulting from the experience of an approach-avoidance conflict between gaining a reward and avoiding loss. This is consistent with the present conceptualisation of the BIS as a conflict resolution device.
Of interest, neurocognitive research has also found support for the conflict-resolution role of this system. Amodio and colleagues (Amodio et al., 2008) demonstrated that BIS activity, also measured by the BIS/BAS scales, was uniquely associated with increased conflict-related cortical activity in the Anterior Cingulate Cortex (ACC) during a Go/No-Go behavioural task. Based on these findings, the authors concluded that the BIS is best conceptualised as an attentional conflict-monitoring system responsible for halting ongoing behaviour rather than motivating behavioural avoidance.

These findings provide preliminary support for the conflict-resolution role of the BIS. In addition, these studies have helped to unpack the associations amongst the revised RST systems and to elucidate some of the inter-relationships that exist between appetitive and aversive motivational processes. In particular, they provide support for proposition that the BIS is activated by simultaneous and conflicting motivational system cues (i.e., concurrent activation of the BAS and FFFS). However, methodological issues surrounding the measurement of the systems of RST continue to challenge researchers attempting to further delineate the complexities inherent in the theory. These issues are discussed in more detail in the following section.

2.3 RST: Measurement Issues

In reviewing the RST literature, a number of measurement issues must be considered. Firstly, a large proportion of RST research has continued to utilise self-report measures that were specifically designed to measure the constructs of the original theory. In doing so, this research has to a large extent, neglected to incorporate the revisions to RST or acknowledge that existing psychometric tools may not be valid
measures of the revised RST systems (Smillie et al., 2006). Furthermore, relatively little has been done to either psychometrically examine the functioning of the revised FFFS as the threat detection system, or to design research paradigms in which to investigate the operation of FFFS and its interplay with the BAS and BIS. This gap in the research is likely to have contributed significantly to the current limitations in testing the revised RST model. Finally, the use of correlational research designs in which self-report tools are often solely relied upon to measure underlying neurobiological processes and systems, has been questioned by some RST proponents (e.g., Pickering, 2004; Smillie, 2008). The incorporation of experimental approaches that facilitate empirical testing of the functional associations amongst the RST systems into RST research is likely to contribute to the development of a more comprehensive evidence-base for the role of the RST processes in appetitive and aversive motivation.

Reinforcement sensitivity has almost exclusively been operationalised using self-report questionnaires (Smillie, 2008). Despite the important modifications to the theory, most approach-avoidance researchers continue to use psychometric tools that were designed to measure the BIS and BAS according to the original RST (Berkman et al., 2009; Heym, Ferguson, & Lawrence, 2008; Smillie et al., 2006). This may be due, at least in part, to the fact that well-validated measures that incorporate the modifications to the RST model are yet to be established (Heym et al., 2008). In particular, relatively little research has been conducted to examine the operation of the FFFS as the aversive motivational system or to develop measures of this construct. Demarcating the operational parameters of this key system should be essential to any examination of the modified theory (Smillie et al., 2006).
Amongst the established RST measures (e.g., BIS/BAS Scales, Carver & White, 1994; Sensitivity to Punishment – Sensitivity to Reward Questionnaire [SPSRQ], Torrubia, Ávila, Mólto, & Caseras, 2001), one particular questionnaire has been the most popular. The BIS/BAS scales, developed by Carver and White (1994), were specifically designed to tap the reinforcement sensitivity of the BIS and BAS according to the original version of RST. In the initial development of the scale, Carver and White revealed a four factor structure that they argued captured the underlying activity of the BIS and BAS. Specifically, a single factor was thought to tap activity of the BIS while an additional three factors reflected distinct elements of the BAS. Of these three factors, the factor termed Reward Responsiveness was argued to measure positive responses to reward, Drive was considered a measure of one’s willingness to approach positive stimuli, and Fun Seeking was a measure of openness to pursue new experiences (Carver & White, 1994).

Most researchers continue to use the BIS/BAS scales to measure RST constructs. This is problematic because the scales were designed to measure behavioural inhibition according to the original theory (i.e., the BIS Scale) and contain items that tap both FFFS-mediated aversive responses and BIS-mediated anxiety responses — a measurement distinction that should be made according to the revised RST (Heym et al., 2008). Hence, the single-factor BIS scale is likely to measure elements of two systems that control manifestly different motivational processes (Corr & McNaughton, 2008). Moreover, the extent to which the items in the BIS/BAS scales align with the revised systems of RST, especially the FFFS, is unclear (Berkman et al., 2009).
Some attempts have been made to empirically delineate the items that tap FFFS-mediated aversive responses versus BIS-mediated anxiety responses in the BIS/BAS scales (see Heym et al., 2008). Specifically, Heym et al. (2008) conducted a confirmatory factor analysis on the BIS scale and demonstrated that a two-factor model of FFFS-Fear and BIS-Anxiety was the best fit to the data. However, more than half of the items loaded onto the BIS-Anxiety factor and the two factors were highly correlated \((r > .50)\). Thus, the validity of using this two-factor structure to reliably measure the FFFS has been questioned (Berkman et al., 2009). Furthermore, as Berkman et al. (2009) argue, the BIS scale may still be a reliable measure of the revised BIS. These findings and speculations require further investigation and underscore the need for future research to develop psychometric tools that measure all constructs of the revised RST, especially the functional components of the FFFS.

To date, only one published study has attempted to develop a self-report measure of the revised RST that contains items specifically designed to tap FFFS functioning. Jackson (2009) used exploratory and confirmatory factor analysis to establish the Jackson-5 scales, which include three FFFS subscales that measure flight, fight, and freezing responses. The questionnaire also includes a revised BIS scale that is designed to capture BIS-mediated responses relating to uncertainty and anxiety, as well as a BAS scale. The measure reportedly demonstrated adequate reliability, theoretically consistent inter-relationships between the subscales and acceptable construct validity (Jackson, 2009). However, no subsequent research has investigated the psychometric properties of the measure and questions exist regarding the appropriateness of some of the items that constitute the various factors, especially the items pertaining to the FFFS factors. For example, while items may empirically hang together, on a substantive basis, some may question the face validity of various items,
such as “If there is a choice of products in a shop, I find it hard to decide what to buy”. Also, some items in Jackson’s measure demonstrate significant cross-loadings with other factors. For example, the items “If something very bad was just about to happen to me, I would just stop” and “If I got scared in my bed at night, I would remain motionless” are freeze items, yet show the highest cross-loadings on the flight factor. Therefore, the scale requires further empirical examination and validation in future research.

Hence, the failure of many researchers to appropriately account for the revisions to RST, and the relative lack of research on the FFFS may be attributable to the challenges in operationalising FFFS functioning in psychometric instruments. Adding to these challenges of measuring the FFFS, are the difficulties in developing experimental paradigms that allow the functioning of the FFFS or its interactions with the BAS and BIS to be empirically tested. A significant number of RST studies utilise correlational research designs to investigate RST processes rather than experimental designs (e.g., Carver & White, 1994; Frankin & Muris, 2006; Jorm et al., 1999; Kimbrel, Nelson-Gray, & Mitchell, 2007; Loxton & Dawe, 2001). However, correlational designs, coupled with the inherent problems of some psychometric measures, raises concerns about the validity of findings from studies that have solely used correlational research methods. Specifically, there exists contention about whether psychometric instruments alone can be used as valid indices of the underlying motivational systems of RST (Pickering, 2004; Smillie, 2008; Smillie et al., 2006). This issue is compounded when studies utilise purely correlational designs to draw conclusions about the associations between the FFFS, BAS, and BIS functioning and various psychological or behavioural outcomes. In contrast, the use of experimental designs enable researchers to empirically test the functioning of the FFFS; including its
distinct components, the BAS, and their concurrent activation to produce BIS, under different experimental conditions of threatening and rewarding stimuli. These kinds of research designs allow researchers to draw more firm conclusions about the role of FFFS in appetitive and aversive motivation, thereby providing more compelling evidence about the differential functioning of the RST systems and the interplay between them. To this end, a number of experimental research designs have been suggested as potentially useful for investigating the FFFS.

In particular, paradigms that utilise imaginary scenarios to examine FFFS-related variables have shown promise in being used to investigate human defensive behaviour (i.e., FFFS-mediated outcomes). For example, Blanchard, Hynd, Minke, Minemoto, and Blanchard (2001) developed a set of threat scenarios depicting situations involving present or potential threat to examine whether human defensive behaviour followed the same three FFFS-mediated behavioural patterns (i.e., fight, flight, freezing) observed in rodents. The scenarios consisted of short descriptions, such as “You are alone in an elevator late at night. As it stops and the doors open, a menacing stranger rushes in to attack you, blocking the door” (Blanchard et al., 2001; p. 764). Participants were asked to choose their first response out of a list of ten possibilities, which included items such as “Hide” and “Attack or struggle”. The results revealed that the patterning of participants’ self-reported behavioural responses to the scenarios was consistent with the fight, flight and freezing behaviours observed in rodents in response to analogous sources of threat. Taking the lead of Blanchard et al., Perkins and colleagues (e.g., Perkins, Cooper, Abdellal, Smillie, & Corr, 2010; Perkins & Corr, 2006) have sought to replicate these author’s findings and explicitly test the key predictions of the revised RST. Consistent with Blanchard et al.’s results, these researchers have found that individual differences in self-reported responses to
the threatening scenarios varied in ways that were consistent with the responses of rodents to real threats. These results provide preliminary validation for the use of the threat scenario approach to operationalise and investigate individual differences in aversive, FFFS-mediated responses to threat (Perkins & Corr, 2006).

Measures of implicit attention may also serve as useful assessments of the operation of the FFFS. In the context of appetitive and aversive motivation, it has been proposed that individual differences in the sensitivity of the threat and reward systems should be reflected in attentional biases toward or away from rewarding and punishing stimuli in the environment (Gable & Berkman, 2008; Zinbarg & Yoon, 2008). Implicit attention tasks are thought to capture the motivations and attitudes that underlie behaviour while circumventing common issues associating with self-report tools in personality research, such as biased responding due to social desirability (Dewitte, Koster, DeHouwer, & Buysse, 2007). Given the concerns about using self-report tools to operationalise RST constructs, an important strength of implicit measures of attention is the capacity to assess underlying reinforcement sensitivity more directly, without the need for introspection (Smillie, 2008).

One particular measure that has been used to examine attentional responses to threat is the dot-probe paradigm (MacLeod, Mathews, & Tata, 1986). In the dot-probe task, the participant is presented with trials that consist of the presentation of pairs of words on a computer screen. Each trial can contain one threat word and one neutral word, one reward word and one neutral word, or paired neutral words that are typically matched in length and frequency. On each trial, a word pair is presented followed immediately by the presentation of a dot-probe in the position just occupied by one of the words. The participant is asked to respond as quickly as possible to the location of
the dot-probe. Individuals will respond faster when the location of the dot-probe appears in the space of an attended word rather than an unattended word. This paradigm has predominantly been used to study the associations between anxiety and vigilance to threat. In this context, the research has generally found that anxious individuals respond faster when dot-probes replace threat stimuli rather than neutral stimuli, thereby suggesting that anxiety is associated with vigilance to threat (e.g., Bradley, Mogg, & Miller, 2000; MacLeod et al., 1986; Mogg & Bradley, 2002; Mogg, Bradley, & Williams, 1995).

The dot-probe paradigm has also been applied to the study of temperament-related attentional biases to conditioned appetitive and aversive stimuli (Derryberry & Reed, 1994). Derryberry and Reed (1994) implemented a variation of the dot-probe task in which participants had to respond to cues signalling reward (gain points) or punishment (lose points). They found that individuals with greater approach motivation, which they defined as the combination of high self-reported Extroversion and low Neuroticism, were biased toward appetitive stimuli such that they responded more quickly when the dot-probe appeared in the positive location and were slower to shift their attention away from the positive location when the dot-probe was positioned elsewhere. Conversely, individuals with greater aversive motivation (i.e., low Extroversion and high Neuroticism) displayed attention biases toward aversive stimuli, such that they were slower to shift their attention away from the negative location. Thus, the dot-probe task is likely to be a useful paradigm in which to examine the revised RST systems, especially the operation of the FFFS as the threat detection system. Examining how response latencies to threatening and rewarding stimuli converge with new and existing RST measures is likely to help clarify the role of the FFFS in approach-avoidance outcomes.
2.4 RST Research Evidence

Despite the measurement issues inherent in Gray’s theory, RST is a comprehensive and empirically testable model of the mechanisms that underlie human behaviour and personality, which can be applied to a broad range of areas in psychology. In addition to the research programs created to specifically investigate the central tenets of RST and clarify its theoretical complexities (e.g., Berkman et al., 2009; Corr, 2002a), a plethora of research has used RST as a framework for understanding many psychological phenomena. Since its inception, RST has been adopted to examine, for example, procedural learning (e.g., Corr, Pickering, & Gray, 1997), cognitive processes such as attentional biases (e.g., Avila & Parcet, 1997; Gomez & Gomez, 2002), affect (Watson, Wiese, Vaidya, & Tellegen, 1999; Zelenski & Larsen, 1999); breast cancer distress (Carver, Meyer, & Antoni, 2000), depression and anxiety (e.g., Gray, 1982; Johnson, Turner, & Iwata, 2003; Kimbrel et al., 2007), conduct problems and antisocial behaviour (e.g., Quay, 1988, 1993; Pickering, 2004), disordered eating (e.g., Loxton & Dawe, 2001) and variation in substance use (e.g., Franken, Muris, & Georgieva, 2006; Kambouropoulos & Staiger, 2004; Knyazev, Slobodskaya, Kharchenko, & Wilson, 2004).

Studies have demonstrated that individuals with greater self-reported approach motivation experience greater daily positive affect, greater subjective well-being and more optimism about life (e.g., Gable, Reis, & Elliot, 2000; Impett, Paplau, & Gable, 2005; Watson et al., 1999). In contrast, high aversive motivation has been associated with the experience of greater daily negative affect and a greater propensity to experience negative emotions in response to aversive cues (Carver & White, 1994;
This research indicates that heightened reward sensitivity is associated with a heightened propensity to experience positive affective states while heightened punishment sensitivity is associated with a heightened vulnerability to negative affective states. This is consistent with RST research examining appetitive and aversive motivational processes and psychopathology.

The research shows that hyperactivity or underactivity in one or both of the motivational systems also predisposes an individual to greater risk of developing psychopathology (see Bijttebier, Beck, Claes, & Vanderycken, 2009 for a review). Consistent with Gray’s (1982) early hypothesis, both community-based and clinical studies have shown that anxiety symptoms are positively associated with BIS sensitivity (i.e., aversive motivation) but show either a very weak or no association with BAS sensitivity (i.e., appetitive motivation) (e.g., Beevers & Meyer, 2002; Johnston et al., 2003; Jorm et al., 1999; Kimbrel et al., 2007). By contrast, depression tends to be more frequently linked to lowered approach motivation. For example, in their community study, Kimbrel et al. (2007) found a negative association between depressive symptoms and self-reported BAS. Another study demonstrated that low BAS is associated with the persistence of depressive symptoms over a six month period (e.g., McFarland, Shankman, Tenke, Bruder, & Klein, 2006). Interestingly however, some studies have found significant positive associations between depressive symptoms and BIS sensitivity (e.g., Johnston et al., 2003; Jorm et al., 1999). Based on these findings, it has been suggested that while low BAS activity may be specific to depression, a highly active BIS may be a common factor across seemingly distinct internalising problems (see Bijttebier et al., 2009 for a review; Zinbarg & Yoon, 2008).
In contrast, hyperactivity of the BAS has been linked to psychological disorders characterised by pathological engagement in appetitive behaviours (Bjornebekk, 2007; Loxton & Dawe, 2001; Johnson et al., 2003). In broad terms, the research indicates higher appetitive motivation is associated with an increased vulnerability to conduct problems and anti-social and addictive behaviours (Quay, 1998; Knyazev, Wilson, Slobodskaya, 2008). More specifically, empirical evidence shows an important link between the BAS and maladaptive appetitive behaviours characterised by the misuse of naturally occurring sources of reward (e.g., food and psychoactive substances). For example, Loxton and Dawe (2001) found that adolescent girls who misuse alcohol and/or engage in disordered eating display a heightened sensitivity to reward. They concluded that these distinct clinical groups may be predisposed to the overuse of naturally occurring substances that induce pleasure due to an overly sensitive BAS and subsequent heightened appetitive motivation.

Of particular relevance to the current thesis, research has investigated individual differences in substance use and addiction within the RST framework. Given that the neurobiological systems involved in regulating appetitive motivation have also been implicated in drug use (e.g. Koob & Nestler, 1997; Wise, 1998), substance use researchers have drawn on RST to identify how individual differences in appetitive and aversive motivation might be associated with vulnerabilities to substance abuse (e.g., Franken, 2002; Franken & Muris, 2006; Glautier, Bankart, & Williams, 2000; Kambouropoulos & Staiger, 2001). It has been proposed that elevated BAS levels should be associated with greater substance use as high BAS individuals will respond more strongly to the rewarding properties of substances, resulting in
heightened appetitive motivation and continued approach behaviour (Franken et al., 2006).

Consistent with this notion, studies have demonstrated that BAS predicts alcohol craving (Franken, 2002) and drug use (e.g., Knyazev et al., 2004). Positive associations have also been observed between self-reported BAS characteristics and self-reported alcohol and drug use (Franken & Muris, 2006), as well as hazardous drinking (Kambouropoulos & Stagier, 2007). In a clinical study, Franken et al. (2006) compared BIS/BAS scale scores across a group of 71 clinically referred drug addicts, 39 alcoholics, and 96 healthy controls. While no significant differences in BIS/BAS scale scores were found between alcoholics and the two other groups, drug addicts had significantly higher self-reported BAS scores than the group of healthy controls, particularly with respect to BAS Fun Seeking and BAS Drive (a measure of one’s persistence to obtain goals). Johnson et al. (2003) also found an association between elevated BAS sensitivity and the presence of life time alcohol abuse disorder in a large community-based sample. In contrast, weak and inconsistent associations have been observed between substance use and BIS (Franken & Muris, 2006; Kambouropoulos & Staiger, 2007; Kimbrel et al., 2007; Kynazev, 2004). This data provide support for the strong association between heightened appetitive motivation and substance abuse.

While research has generally found a positive association between BAS sensitivity and positive affective states, associations between the appetitive motivational system, fight responses and negative emotions, such as anger and frustration, have also been observed. Thus, it has been argued that fight-type behaviours and anger have an appetitive component (e.g., Carver, 2004; Carver & Harmon-Jones, 2009; Harmon-Jones & Allan, 1998). This is based on the notion that
anger, aggression and fight behaviours appear to be inherently linked to appetitive motivational processes. Firstly, the affective states of anger and frustration result from the disruption of movement toward an expected, desired end state (i.e., goal blockage) and are therefore expected to be associated with appetitive motivation in some way (Carver & Harmon-Jones, 2009). Secondly, empirical evidence from a number of research programs provides support for the association between anger and approach motivation (see Carver & Harmon-Jones, 2009 for a review). For example, Harmon-Jones (2003) investigated the links between the BAS and aggression and found that behavioural and self-report measures of aggression were strongly, positively correlated with measures of the BAS and negatively correlated with measures of the BIS. In response to scenarios depicting events that could plausibly elicit either aggressive or anxious responses, Carver (2004) also demonstrated that anger responses were positively associated with the Reward Responsiveness subscale of the BIS/BAS scales. Interestingly, links have also been found between the experience of anger and increased activity in left anterior cerebral cortex; the brain region related to approach motivation and positive feelings (Carver & Harmon-Jones, 2009).

The empirical evidence supports the central propositions of RST with regard to a number of behavioural and psychological outcomes; however, an important area of human functioning that has received less research attention is that of close personal relationships. Relatively few studies have examined how RST can contribute to understandings of the core social aspects of human behaviour. Everyday social interactions are likely to be one of the most dominant sources of threat and reward in an individual’s environment. Therefore, the systems of RST should play an integral role in the regulating social interaction behaviour (Gable, 2007; Knyazev et al., 2008). Yet the processes that operate during the establishment, maintenance and dissolution
of social bonds have rarely been investigated explicitly from a systems theory perspective, such as RST (Gable & Berkman, 2008).

Individual differences in approach and avoidance motivation have been identified as central to understanding interpersonal processes and have been investigated within some interpersonal contexts. Much like general appetitive and aversive motives, social approach motives are focused on achieving a desired, rewarding end-state while social avoidance motives are focused on an undesired, aversive end-state (Gable & Berkman, 2008). Within the social interaction domain, appetitive motives have been broadly conceptualised as hope for affiliation and aversive motives have been commonly conceptualised as fear of rejection (Elliot et al., 2006). This research has, however, investigated motives in terms of broad appetitive-aversive motivational differences rather than applying a motivational systems theory, such as RST, to understanding these processes. By applying RST to the study of interpersonal processes, there is potential to more clearly delineate how the underlying regulatory systems of threat and reward detection operate to produce these broad individual differences in approach and avoidance.

In the friendship domain, Elliot et al. (2006) developed their own self-report measure of approach and avoidance motivation. The authors found that friendship-approach motives predicted greater relationship satisfaction and the experience of positive relational events and less loneliness and negative relational events. Conversely, friendship-avoidance motives predicted greater loneliness, greater experience of negative relational events, and greater impact of these events. Others have examined the role of motivational processes in the context of specific intimate relationship behaviours, such as the influence of approach versus avoidance motives in
the engagement of sexual relations with a romantic partner on relationship quality and personal well-being. Impett et al. (2005) demonstrated that sexual approach motives were associated with greater interpersonal well-being, whereas sexual avoidance motives were associated with lower interpersonal well-being and poorer relationship outcomes over time. While these findings provide evidence for the associations between approach-avoidance motives and relationship outcomes, the ways in which social motives relate to underlying behavioural system functioning is unclear. It is important to clarify the associations between the operation of the underlying appetitive and aversive behavioural systems and these approach-avoidance outcomes so that the mechanisms by which individuals detect and respond to interpersonal cues can be more fully understood.

Recognising the potential for motivational systems theories to contribute to understandings of relationship processes, some relationship researchers have recently drawn on Carver and White’s (1994) conceptualisation of the BIS and BAS to investigate how appetitive and aversive processes operate within this context (Gable, 2007). In one of the only known studies to explicitly relate a measure of BIS and BAS activity (i.e., BIS/BAS scales, Carver & White, 1994) to interpersonal interaction, Gable (2006) assessed dispositional social motives, social goals and social outcomes across three studies; two of which were longitudinal. Across these studies, Gable found reliable associations between dispositional approach motives and greater satisfaction with social relationships and less reported loneliness. In contrast, dispositional avoidance motives were associated with insecurity in relationships, increased anxiety, loneliness, and negative social attitudes over time. Furthermore, higher self-reported BAS predicted greater social approach motives whereas higher self-reported BIS predicted greater social avoidance motives.
These studies provide preliminary support for the operation of appetitive and aversive motivational processes in interpersonal contexts. However, as researchers such as Gable (2007) concede, the role of interpersonal approach and avoidance motivation on behaviour, cognition, and emotion is yet to be fully understood. In particular, two key areas appear to require further empirical investigation. First, few studies have investigated how the interaction between the approach and avoidance motivational processes and the concurrent activation of opposing motivational systems influence behaviour when conflicting signals of reward and punishment arise in one’s interpersonal environment (Gable, 2007; Impett et al., 2005). Second, relatively little has been done to investigate how these processes operate within close personal relationships (e.g., adult romantic relationships), which are amongst the most salient sources of threat and reward in an individual’s environment. It is especially important to understand how behavioural motivational systems, such as those of RST, operate within close personal relationships because these relationships serve important adaptive functions that are fundamental to an individual’s survival (Bowlby, 1969/1982).

While research applying RST to close personal relationships is fairly scant, a dominant behavioural systems theory about individual differences in tendencies to approach reward and avoid threat in close relationships is attachment theory (Bowlby, 1969/1982). In reviewing the attachment literature, it becomes clear that approach and avoidance motivations are fundamental to the operation of the attachment behavioural system. Consistent with this, research on attachment theory has identified parallels between the RST conceptualisation of appetitive and aversive motivational systems and attachment-related responses to threat and reward within the context of
It is important that the links between RST and attachment theory are investigated further as this line of research may provide a deeper understanding of how appetitive and aversive motivational processes operate within the relationship context. Specifically, it is suggested in this thesis that the attachment system may operate as a sub-system of RST that is calibrated specifically to regulate appetitive and aversive processes in close relationships. In which case, the systems of RST may exert top-down effects on the calibration and operation of the attachment system. In contrast, the social experiences that shape attachment system functioning may, in turn, feed back into the broad systems of RST, shaping the operation of these systems at a general level (i.e., bottom-up effects). By examining how the systems proposed in RST relate to, or interact with, the system responsible for regulating behaviour in close relationship contexts, a more comprehensive account of how motivational behavioural systems interact to organise human appetitive and aversive behaviour can be developed.

2.5 Summary

In summary, RST is a well-established neuropsychological account of appetitive and aversive motivation. Its central tenets specify how personality and behaviour are regulated by the activation of distinct neurological systems in response to rewarding and threatening environmental cues. However, complexities remain in terms of measuring the central RST constructs, especially the FFFS. Given that
attempts to measure the FFFS are still relatively scant, more empirical investigation and validation of measures of this system are necessary.

Nevertheless, a major strength of RST is that it is the only behavioural systems theory to provide a biologically-based framework for understanding the operation of motivational processes across diverse contexts (MacDonald & Kingsbury, 2006). While RST has been applied to many areas of psychological study, including addiction, some important facets of human behaviour are yet to be extensively investigated from the RST perspective. Researchers have begun to apply RST to the study of personal relationships; however, further research is needed to investigate the functioning of the appetitive and aversive motivational systems in the context of close relationships. Attachment theory is a well-established behavioural systems approach to understanding close relationships that clearly demarcates the role of approach and avoidance processes in close relationships. Exploring how attachment system dynamics relate to RST system functioning will help to clarify whether the attachment behavioural system may represent a sub-system of RST calibrated to determine behaviour in close personal relationships. That is, it may be that the broad systems of RST result in top-down effects that shape attachment system functioning. However, it may also be that the functioning of the attachment system may, over the course of time, influence the functioning of the broad systems of RST. Thus, the attachment behavioural system may impose a bottom-up effect on the systems of RST.
CHAPTER 3

Attachment Theory

3.0 Chapter Overview

In this chapter, a detailed description of the fundamental assumptions and theoretical propositions of attachment theory are provided. This includes a detailed discussion of how individual differences in attachment system functioning develop and the ways in which these individual differences are expressed as systematic cognitive, affective and behavioural tendencies throughout the lifespan. This is followed by a review of research evidence pertaining to the role of approach and avoidance tendencies in attachment-related contexts. To conclude, the inherent role of approach and avoidance processes in attachment system functioning is highlighted to validate the importance of investigating the associations between the attachment system and the systems of RST.

3.1 Attachment Theory

Attachment theory was first developed by Bowlby (1969/1982) as a theory of emotional bonding that accounted for individual differences in personality development and emotion regulation rooted in unhealthy parent-child relationships. Since then, the theory has been applied to a broad range of relationships including romantic and peer relationships (Bartholomew & Horowitz, 1991; Fraley & Davis,
1997; Hazan & Shaver, 1987), adult familial relationships (e.g., Karantzas, Evans, & Foddy, 2009), leader-follower relationships (Davoditz, Mikulincer, Izsak, & Popper, 2007), as well as inter-group relations (Mikulincer & Shaver, 2001). The theory has also been used as a framework for understanding individual differences in a variety of psychological processes including emotional regulation (e.g., Mikulincer, Shaver, & Pereg, 2003; see Shaver & Mikulincer, 2007), ways of coping (e.g., Mikulincer, Florian, & Weller, 1993; Ognibene & Collins, 1998; Wei, Heppner, & Mallinckrodt, 2003), conflict behaviour (e.g., Creasey, 2002), and vulnerability to psychopathology (see Dozier, Stovall-McClough, & Albus, 2008 for a detailed review; Riggs et al., 2007).

Bowlby (1969/1982) argued that human evolution has resulted in the formation of various behavioural systems. He proposed that each system comprises a unique set of functions, goals, triggers, and responses that serve the adaptive function of ensuring the reproduction and survival of one’s genes. Specifically, the attachment system is associated with the maintenance of proximity toward protective and supportive others during times of threat and distress, which serves to increase the likelihood that an individual will survive through to reproductive age (Cassidy, 2000). According to Bowlby, the attachment system is a biologically-based behavioural system comprising a neural program that organises behaviour to ensure the detection and avoidance of environmental threats and dangers and the seeking of comfort from a stronger wiser other (i.e., an attachment figure) to ameliorate the distress.

The set goal of the attachment system is the achievement of felt security; a psychological state in which an individual experiences a sense of safety and wellbeing in his/her environment (Mikulincer & Shaver, 2007). The attachment system functions
as a goal-correcting system in which activation and deactivation of this system is
guided by the degree to which this set goal is met. That is, behaviour is evaluated in
terms of progress toward the attainment of felt security such that, should a discrepancy
between the set goal and one’s behaviour occur, one’s behaviour can be adjusted
accordingly (Dewitte, DeHouwer, Buysse, & Koster, 2009).

The primary strategy engaged to achieve felt security is proximity seeking. Proximity seeking encompasses a broad set of behaviours designed to maintain and enhance physical and emotional closeness to the attachment figure by either; (a) alerting the attention of an attachment figure, or (b) mobilizing the needy individual to be in the presence of the attachment figure. In times of psychological or physical threat, the attachment system is activated and this primary strategy is enacted (Mikulincer et al., 2003). In seeking proximity to the attachment figure, the attachment figure also functions as a safe haven of comfort and protection for the needy individual and a secure base from which to explore and master the environment (Hazan & Shaver, 1987). The ability of the attachment figure to meet these additional attachment functions enhances feelings of security in the individual (Doherty & Feeney, 2004).

It has been proposed that, based on the extent to which an attachment figure is responsive to a child’s physical and emotional needs, children develop systematic behavioural tendencies for interacting with the attachment figure and the environment (Ainsworth, 1991; Bowlby, 1973). In turn, the pattern of caregiving provided by the attachment figure influences the child’s ability to regulate his/her affective and cognitive states, which results in behaviours to either continue to seek out (i.e., approach) or disengage (i.e., avoid) the attachment figure. Across repeated encounters with inept, inconsistent, or rejecting caregivers during periods of distress, individuals
learn that proximity seeking can have hurtful consequences (Mikulincer & Shaver, 2007). Under these circumstances, the attachment system enacts a set of secondary behavioural strategies aimed at either disengaging from the distressing event and the attachment figure, termed deactivation, or intensifying affective-behavioural attempts to achieve felt security, termed hyperactivation (Cassidy & Kobak, 1988; Main, 1990; Mikulincer & Shaver 2004).

Deactivating strategies are thought to develop as a result of repeated experiences with rejecting attachment figures that disapprove of, or punish expressions of, vulnerability and need for affection. These strategies have been described by Mikulincer and Shaver (2007) as “‘flight’ reactions to [the] attachment figure’s unavailability” (p. 32) that are designed to, at least initially, enable the avoidant individual to suppress attachment-related distress, avoid dependence, and increase distance from the attachment figure. In contrast, hyperactivating strategies are thought to result from a history of attachment experiences with inconsistent or inept caregiving by the attachment figure. Mikulincer and Shaver described these strategies as “...‘fight’ responses to frustrated attachment needs” (p.32). In essence, this pattern of caregiving places the needy individual on a partial reinforcement schedule that is rewarded by the occasional expression of care by the attachment figure. This creates a strong incentive to persist with proximity seeking, which results in hypervigilance, exaggerated threat appraisal, and excessive proximity seeking behaviours (e.g., Davila, 2009; Mikulincer, Birnbaum, Woddis, & Nachmias, 2000; Mikulincer & Florian, 1998; Mikulincer et al., 1993; Shaver & Mikulincer, 2002; Shaver, Schacner, & Mikulincer, 2005). However, these strategies can also intensify the distress experienced during times of perceived threat, often resulting in the experience of negative affect such as frustration and anger (Mikulincer, 1998a; Mikulincer & Orbarch, 1995).
Thus, across repeated interactions, an attachment figures’ competence in meeting an individual’s attachment needs, and that individual’s corresponding use of primary and secondary attachment strategies, shapes the mental representations s/he develops about attachment relationships and whether proximity maintenance is likely to be rewarding or hurtful (Collins & Allard, 2001; Main, 1990). These mental representations then guide attachment behaviour directed at either seeking out or avoiding the attachment figure in later times of need. Specifically, Bowlby (1969/1982) proposed that these mental representations can be conceptualised as two complimentary internal working models (IWMs) that appraise an individual’s own worthiness to receive care and affection (model of self), and the availability and responsiveness of attachment figures (model of other). Over time, representations of early attachment experiences become deeply ingrained, sophisticated mental models that influence how individuals perceive, evaluate, and behave in close relationships and interact with the social world across the lifespan (Main, Kaplan & Cassidy, 1985).

According to Collins and Allard (2001), these working models of attachment contain a network of: (1) autobiographical memories of attachment-related experiences, (2) attitudes, beliefs, and expectations about oneself and others in interpersonal situations, (3) attachment-related goals and needs that guide one’s behaviour in interpersonal contexts, and (4) strategies and plans for achieving attachment-related goals and for regulating the distress that is associated with a failure to attain set goals. IWMs guide attention to attachment-related information and bias the interpretation and processing of attachment-related information in ways that match an individual’s existing mental representations of relationships (Cassidy, 2000). Mikulincer and Shaver (2007) argue that these IWMs form a network of excitatory and inhibitory associations whereby activation of a model primes congruent memories,
expectations, behaviours and affective states while suppressing those that are incongruent. The excitatory and inhibitory networks that comprise these distinct mental models can operate synchronously or in conflicting ways in the regulation of attachment behaviour (see Mikulincer & Shaver, 2007 for a review). For instance, negative mental models of the self and others involve excitatory threat-related pathways that result in hypervigilant monitoring of threats, while at the same time inhibiting the excitation of pathways that would foster creative exploration and positive affect in the absence of threat-related cues (Shaver & Mikulincer, 2002; Mikulincer et al., 2003; Mikulincer & Sheffi, 2000).

Attachment IWMs have in fact been described as the motivational facets of personality that shape individual differences in the expression of the attachment system (Collins & Allard, 2001). Clearly, IWMs are responsible for the degree to which individuals are motivated to either pursue proximity to and support from attachment figures during times of distress, or maintain interpersonal distance and self-reliance, via corresponding sets of approach and avoidance tendencies (Dewitte et al., 2009; Mikulincer & Shaver, 2007). Therefore, variation in the attachment styles observed in children and adults has been attributed to systematic differences in the content of underlying internal working models of the self and others (Bowlby, 1969/1982; Ainsworth, Blehar, Waters, & Wall, 1978).

### 3.3 The Attachment Styles

An individual’s attachment style reflects his/her most accessible IWMs and behavioural response patterns in close relationships, which are derived from his/her history of attachment-related experiences (Collins & Allard, 2001). Early research
conceptualised the attachment styles as typological. Specifically, in their influential work, Ainsworth et al. (1978) used the Strange Situation paradigm to examine infants’ reactions to stressful situations upon separation (and reunion) with their attachment figures (mothers). Ainsworth and her colleagues described three attachment styles that differentiated infant behaviours based on caregiver responsiveness and warmth. Inconsistent responsiveness was associated with an anxious-ambivalent attachment style that was characterised by protest behaviour by the infant, heightened neediness for the caregiver and an inability to soothe in the presence of the mother. Consistent unresponsiveness was associated with an avoidant attachment style that was characterised by detached infant behaviour and minimal expression of distress. Consistent responsiveness by a mother to her infant’s needs was associated with a secure attachment style characterised by infant behaviour involving the seeking of proximity to the mother for comfort during distress, the ability to soothe and to confidently explore the environment in the presence of the mother.

In their seminal work, Hazan and Shaver (1987) were the first to conceptualise adult romantic love as an attachment process. This was based on the assumption that the system that gives rise to the emotional ties between infants and their caregivers is also largely responsible for the romantic bonds formed in adulthood. Using a self-report measure of adult attachment, Hazan and Shaver found that: (a) the three attachment styles were similarly prevalent in adults as they were in infancy, (b) the experience of romantic love varied predictably on the basis of these styles, and (c) that adult attachment styles were related in theoretically meaningful ways to the IWMs formed by early attachment experiences. Their research suggested that securely attached adults are generally comfortable with intimacy, confident in depending on others, and do not fear abandonment. Avoidantly attached adults emphasise self-
reliance as they are generally uncomfortable with intimacy and find it difficult to trust others. Finally, *anxiously* attached adults are preoccupied with their partner’s responsiveness, emotionally over-involved and fear abandonment. The characteristic differences associated with these adult attachment styles have been observed in many studies (e.g., Collins & Read, 1990; Feeney & Noller, 1990; Simpson, 1990; Mikulincer, 1998b; Meyers, 1998; Mikulincer et al., 2003; Ognibene & Collins, 1998; Simpson, Collins, Tran, & Haydon, 2007).

While the typological and prototypical approaches to the conceptualisation of the attachment styles dominated early adult attachment research, Fraley and Waller (1998) conducted a taxometric analysis of the attachment styles which indicated that attachment is actually a dimensional construct. The dimensional nature of the attachment construct has also been observed when these taxometric methods are applied to self-report, interview, and observational assessments of attachment (e.g., Fraley & Speiker, 2003; Roisman, Fraley, & Belsky, 2007; for a detailed review see Mikulincer & Shaver, 2007; Simpson & Rholes, 1998). Consequently, attachment styles have since been conceptualised as two continuous orthogonal dimensions termed attachment avoidance and anxiety (Bartholomew & Horowitz, 1991; Brennan, Clark, & Shaver, 1998). These dimensions reflect individual differences in the behavioural manifestations of the underlying IWMs of attachment style.

The attachment anxiety dimension is thought to reflect the extent to which an individual fears abandonment or rejection and requires validation and support from attachment figures (Hazan & Shaver, 1994). Individuals with high attachment anxiety report attachment histories characterised by inconsistent or inept caregiving by attachment figures (Main et al., 1985; Shaver & Mikulincer, 2002). As a result, these
individuals learn that approaching an attachment figure can sometimes result in affection and the attenuation of distress (Mikulincer & Shaver, 2007). Consequently, they engage in hyperactivating strategies, which can involve exaggerating distress or clinging and controlling behaviours, to gain the attachment figure’s attention and reassurance as a means of attenuating their distress (e.g., Mikulincer et al., 2003; Shaver & Mikulincer, 2002). However, hyperactivating strategies also intensify threat appraisal and rumination, leading to chronic activation of attachment system (e.g., Mikulincer et al., 2000). Therefore, high attachment anxiety is associated with constant fears of rejection and personal inadequacy, a strong yearning for affection, excessive support seeking, and a desire to merge with relationship partners (e.g., Cassidy, 2000; Mikulincer & Shaver, 2007; Mikulincer, Shaver, Bar-On, & Ein-Dor, 2010), as well as negative affect and frustration due to perceiving support as unavailable or inadequate (e.g., Florian, Mikulincer, & Bucholtz, 1995; Rholes, Simpson, Campbell, & Grich, 2001; Shaver et al., 2005). Anxiously attached individuals’ relationships tend to be characterised by emotional over-involvement, overdependence on romantic partners, and low perceived ability to manage relationship difficulties (e.g., Feeney & Collins, 2001; Pietromonaco, Greenwood, & Feldman Barrett, 2004; Simpson, 1990). They tend to experience relationships with more emotional intensity and appear to have difficulty disengaging from romantic partners; they find it difficult to be away from their partner, are the least likely to initiate a break up (Barbara & Dion, 2000), more likely to go through several break ups and reunions with the same partner (Kirkpatrick & Hazan, 1994), and more likely to become sexually re-involved with former partners (Davis, Shaver, & Vernon, 2003).

In contrast, the attachment avoidance dimension is thought to reflect the extent to which an individual is unwilling to depend on or trust others and avoids closeness
and intimacy. Attachment avoidance results from the experience of consistent rejection or insensitive caregiving by attachment figures. In such circumstances, proximity seeking and closeness to the attachment figure becomes a source of threat and punishment (Mikulincer & Shaver, 2007). This conveys to the individual that others are undependable and that attachment relationships are dangerous. Consequently, these individuals rely on deactivating strategies in order to avoid attachment-related distress or down-regulate any negative affective states that may activate the attachment system, thereby triggering painful attachment-related memories (Shaver & Mikulincer, 2002). High attachment avoidance is therefore associated with compulsive self-reliance, a desire for interpersonal distance, and reluctance to seek help or support during times of distress (e.g., Bartholomew & Horowitz, 1991; Bowlby, 1988; Dewitte & DeHouwer, 2008; Griffin & Bartholomew, 1994). Studies have shown that avoidantly attached individuals tend to keep emotional distance in relationships, are reluctant to make long-term commitments, and are most concerned with their sense of control over relationship partners (e.g. Feeney & Collins, 2001; Mikulincer, 1998b; Simpson, 1990). They also report low levels of love and are less likely to provide effective support to their partners (e.g., Collins & Read, 1990; Feeney & Noller, 1992; Mikulincer, 1998b; Shaver et al., 2005).

Individuals who are low on both the anxiety and avoidance dimensions are considered to be securely attached. Attachment security reflects a tendency to be comfortable with closeness and to confidently rely on others in times of need (Bartholomew & Horowitz, 1991). Securely attached individuals have experienced interactions with available and responsive attachment figures resulting in the regular attainment of felt security and the belief that proximity maintenance will allay distress (Mikulincer & Shaver, 2007). As such, secure individuals are confident that they are
worthy of love and affection, that seeking intimacy will lead to positive outcomes and that distress is manageable. This results in a behavioural tendency to approach attachment-relationships during times of threat (e.g., Shaver & Mikulincer, 2002; Mikulincer & Shaver, 2007). Accordingly, attachment security is associated with the use of approach-oriented coping strategies, such as problem-focused coping and constructive confrontation, to regulate emotions and alleviate distress (e.g. Mikulincer & Florian, 1998; Wei et al., 2003); more adaptive relationship behaviours, including effective support seeking, caregiving, and communication (e.g., Davila & Kashy, 2009; Feeney, 2002; Florian et al., 2005; Holland & Roisman, 2010); and an increased tendency to help others in need (Gillath et al., 2005). Relative to insecure forms of attachment (high attachment anxiety and/or avoidance), attachment security is associated with the greatest levels of comfort, intimacy, trust and satisfaction in relationships (e.g., Feeney, 2002; Feeney & Collins, 2001; Mikulincer, 1998b; Simpson, Rholes & Nelligan, 1992; Simpson, Rholes, Campbell, Tran, & Wilson, 2003), better functioning during periods of stress, and enhanced psychological well-being (Collins & Read, 1994; Kemp & Neimeyer, 1999; Mikulincer & Shaver, 2007; Mikulincer et al., 2003; Pietromonaco, Feldman Barrett, & Powers, 2006; Wei et al., 2003).

3.2 Attachment Theory and Close Relationships: Research Evidence

Over the past three decades, a large body of literature has applied attachment theory to the study of close romantic relationships in order to elucidate the ways in which attachment-related dynamics influence relationship outcomes. Research has investigated the role of attachment in general relationship functioning (e.g., Hazan &
Shaver, 1987; Holland & Roisman, 2010; Simpson, 1990), as well as more specific relationship processes including styles of love (Levy & Davis, 1988), trust (e.g., Brennan & Shaver, 1995; Mikulincer, 1998b; Simpson, Ickes, & Grich, 1999), jealousy (Sharpteen & Kirkpatrick, 1997; Shaver & Rubenstein, 1980), conflict and communication (e.g., Campbell, Simpson, Boldry, & Kashy, 2005; Creasey, 2002; Domingue & Mollen, 2009), and spousal support (Davila & Kashy, 2009; Rholes et al., 2001; Rholes, Simpson, & Orina, 1999). Within these contexts, differences in approach-avoidance motivations across the attachment styles are evident.

The literature indicates that attachment security is associated with the most adaptive relationship features. More specifically, attachment security is associated with processes that involve approach toward incentives relationships, such as higher levels of intimacy (e.g., Bartholomew & Horowitz, 1991), a greater frequency of positive daily relationship experiences (Simpson et al., 2007), and greater relationship trust, perceived support and interdependence (e.g., Feeney & Collins, 2001, 2004; Mikulincer, 1998b; Simpson, 1990). Thus, it is not surprising that attachment security is associated with more relationship stability (Kirkpatrick & Davis, 1994; Holland & Roisman, 2010) and greater relationship satisfaction (e.g., Feeney, 2008; Hazan & Shaver, 1987; Radecki-Bush, Farrell, & Bush, 1993). Notably, positive associations between attachment security and romantic relationship quality have been observed using both self-report and observer-rated measures of attachment. For example, in their longitudinal study, Holland and Roisman (2010) demonstrated that attachment security predicted both self-reported and observer-rated relationship quality, even when controlling for participants’ prior levels of interpersonal functioning, over a 12-month period. These findings are consistent with theoretical propositions regarding securely attached individuals’ approach-oriented motivations in relationships characterised by
positive expectations of relationships, comfort in seeking intimacy and support, and constructive ways of managing relationship stress (Bartholomew & Horowitz, 1991; Collins & Allard, 2001; Mikulincer & Shaver, 2007; Pietromonaco et al., 2006; Shaver & Mikulincer, 2002).

In contrast, attachment insecurity appears to be associated with processes related to avoidance motivation. Many studies have examined the role of attachment insecurity in the detection of negative attachment events. Studies have demonstrated that attachment insecurity in general is associated with a heightened monitoring for relationship threat and tendency to interpret relationship events in negative ways (e.g. Feeney & Collins, 2001, 2004; Simpson, 1990; Mikulincer, 1998b; Campbell et al., 2005). For example, Radecki-Bush et al. (1993) used imagery scenes that depicted various levels of relationship threat by a potential romantic rival and found that attachment insecurity was associated with the highest ratings of perceived relationship threat in response to the scenarios. Mikulincer (1998b) observed that insecure individuals reported a greater number of events that violated their trust toward their romantic partner, whereas secure individuals reported a greater number of events that validated their trust, within a three week period.

The link between attachment insecurity and heightened threat detection has also been supported by behavioural studies. For instance, Collins and Feeney (2004) manipulated the degree of social support participants received from their romantic partners in the context of a stressful task. The authors demonstrated that, when insecure participants received unsupportive written messages from their romantic partners, they interpreted these messages more negatively than secure participants and rated a prior interaction with their partners as having been less supportive. This pattern
of results was replicated even when partners were permitted to send genuinely supportive messages (Collins & Feeney, 2004). Overall, the findings of these studies suggest that insecure forms of attachment are associated with an increased monitoring for relationship threat that may result in the detection of a greater number of potentially threatening attachment events within romantic relationships, and the interpretation of these events in more threatening terms. Thus, as would be expected, attachment insecurity is associated with poorer relationship outcomes, including lower relationship quality and the experience of more frequent negative emotions in relationships (e.g., Collins & Read, 1990; Hazan & Shaver, 1987; Shaver et al., 2005; Simpson et al., 2007).

Research has also demonstrated that attachment system functioning influences the ways in which individuals respond to events that have the potential to disrupt attachment bonding, including relationship stress, trust violations, jealousy-provoking events, and conflict. Firstly, research shows that individuals with high attachment anxiety and/or avoidance exhibit more intense reactivity to negative attachment events. For example, studies have demonstrated that attachment insecurity is associated with stronger self-reported and physiological reactions (e.g., Holland & Roisman, 2010; Powers, Pietromonaco, Gunlicks, & Sayer, 2006) and less adaptive responses (e.g., Campbell et al., 2005; Simpson, 1990; Rholes et al., 1999) in attachment contexts that involve interpersonal stress and relationship conflict.

Secondly, the attachment dimensions are linked to distinct approach and avoidance behavioural tendencies in responses to relational stressors. Many attachment studies have found that meaningful behavioural differences exist between the attachment styles in terms of anger, jealousy, distress, support seeking, caregiving, and
the ability to emotionally recover from stressful events (e.g., Collins & Feeney, 2000, 2001; Rholes et al., 1999; Sharpsteen & Kirkpatrick, 1997). Past studies show that secure individuals engage in more constructive behavioural responses to trust violations, such as approaching one’s partner to talk about the violation (Mikulincer, 1998b), report the lowest levels of anger, jealousy, and distress in response to potential infidelity by a romantic partner (e.g., Radecki-Bush et al., 1993), and engage in the most effective support interactions in terms of both support seeking and caregiving (e.g., Davila & Kashy, 2009; Carnelley, Peitromonaco & Jaffe, 1994).

Conversely, attachment avoidance and anxiety are associated with less adaptive approach and avoidance tendencies in response to relational stress. The research indicates that avoidant individuals generally manage stressful situations by minimising emotional displays and anger (Feeney, 2008; Mikulincer & Shaver, 2007). Behavioural studies have found that highly avoidant individuals display low levels of warmth and support during relationship conflict and tend to engage in withdrawal patterns of communication (e.g., Creasey, 2002; Simpson, Rholes & Phillips, 1996). They tend to avoid discussing stressful issues, withdraw from the intimate interactions that are needed to resolve conflict, and are less obliging to their partners (Shi, 2003). Attachment avoidance has also been shown to be predictive of poor care seeking behaviours (Feeney, 2002).

Interestingly though, attachment avoidance has been linked to anger responses in some circumstances. For example, Rholes et al. (1999) unobtrusively observed dating couples during an experimentally induced stress period. Specifically, attachment avoidance was associated with the display of greater anger during the stress period. This was especially so for avoidant women who were highly distressed and
encountered anger or received little support from their partners, and for avoidant men whose partners sought more support and were more distressed. This suggests that, in relational contexts where avoidance of the situation is not possible, avoidant individuals may have a tendency engage in anger responses.

By contrast, anxious individuals tend to engage in heightened displays of anger and distress but are also acquiescent in order to gain acceptance and approval (Feeney, 2008; Shi, 2003). Campbell et al. (2005) found that individuals with high attachment anxiety reported more incidents of conflict across a 14-day period and a tendency for conflicts to intensify in severity, whereas no significant effects of attachment avoidance on levels of conflict were found. In part two of Campbell et al.’s (2005) study, couples were videotaped while discussing a major recent relationship problem. Ratings of couple behaviour by trained observers indicated that individuals who were high on attachment anxiety displayed greater distress and tended to overreact and escalate the severity of conflicts. Immediately following the taped discussion, anxious individuals also reported the highest levels of distress on a brief self-report measure designed specifically for the study. Rholes et al. (1999) also observed that women with high attachment anxiety were more likely to behave negatively toward their partners after an experimentally induced stress period if they had sought greater support and were more anxious during this period. These results suggest that anxious attachment is associated with a tendency to engage in behaviours that amplify distress, coupled with a decreased ability to emotionally recover from stressful relationship events.

This evidence illustrates that attachment system functioning is associated with individual differences in close relationship behaviours, outcomes and motivational tendencies. More specifically, the findings show that the approach and avoidance
motivations associated with attachment avoidance and anxiety manifest in distinct ways in common relationship situations. At the core of attachment theory is the proposition that the mental representations that develop early in life shape the way individuals navigate relationships across the lifespan. These components of the attachment system are proposed to influence the ways in which individuals monitor and behave in attachment-relevant contexts. Importantly, the studies discussed above have illustrated that the distinct behavioural tendencies observed within attachment contexts involving relationship threat (i.e., stress, jealousy, conflict) may reflect underlying differences in approach and avoidance motivations across the attachment orientations.

3.3 Summary

The theoretical exposition and evidence cited linking attachment to relationship processes and outcomes highlights that approach and avoidance motivational tendencies are fundamental to the operation of the attachment system. Individual differences in attachment behaviour are shaped by conditioned sources of punishment and reward in early attachment relationships. These, in turn, lead to the development of mental models, which have been conceptualised as the motivational triggers of attachment behaviour (e.g., Collins & Allard, 2001; Dewitte et al., 2009). The corresponding strategies enacted by attachment system activation organise behavioural, affective, and cognitive tendencies aimed at promoting either approach or avoidance behaviour in attachment-relevant contexts. The manifestations of these underlying processes in close relationship outcomes have been well-established in past research. It can thus be argued that attachment system functioning should, at least in
part, be linked with the operation of appetitive and aversive system functioning more generally. Moreover, given the evidence for attachment-related differences in threat detection and appraisal, and the behavioural response tendencies to attachment threat, it seems likely that there would be a link between attachment and FFFS system functioning. Yet the study of attachment processes from approach-avoidance motivational systems perspectives is in its infancy. Adult attachment theorists have recently begun investigating the parallels specifically between the RST conceptualisation of appetitive and aversive motivational systems and attachment-related responses to threat and reward. These associations are discussed in Chapter 4.
CHAPTER 4

The Parallels between RST and Attachment Theory: Reviewing the Evidence

4.0 Chapter Overview

In this chapter, the emerging research on the associations between attachment system functioning and the systems of RST is reviewed. The findings are considered in light of several methodological issues, some of which were discussed in Chapter 2. A number of directions for future research are suggested to address some of these methodological issues and to clarify the overlay between attachment and RST constructs examined in past research. This is followed by a discussion of the central argument of this thesis, which is that a key determinant of the distinction between the threat detection and behavioural tendencies associated with attachment anxiety and avoidance pertains to the differential functioning of the FFFS. The propositions regarding this argument are discussed in detail and evidence supporting the propositions is provided. Finally, specific attention is given to the construct of fearful avoidance as the disorganised pattern of approach and avoidance behaviours that characterise individuals high on attachment anxiety and avoidance are argued to be associated with the inability to resolve approach-avoidance conflicts.
4.1 Preliminary Research Linking RST and Attachment Theory

As discussed in Chapter 3, the attachment system regulates dispositional tendencies to approach or avoid attachment figures based on the content of IWMs. It has been demonstrated in the attachment literature that mental representations about whether attachment interactions are expected to lead to rewarding (e.g., intimacy and support) or punishing (e.g., rejection and hurt) outcomes, in turn, produce distinct behavioural patterns associated with the attachment dimensions. Expanding on this empirical evidence, research investigating the associations between the attachment dimensions and the systems of RST has characterised attachment-related aversive motivation as fear of rejection and attachment-related appetitive motivation as the need for affiliation and intimacy (Carnelley & Story, 2008; MacDonald & Kingsbury, 2006; Meyer et al., 2005).

To date, researchers examining the relationship between RST and attachment theory have focused on identifying the links between Gray’s original conception of RST (i.e., BIS/BAS distinction) and the two dimensions of attachment (i.e., avoidance and anxiety). These researchers (Carnelley & Story, 2008; MacDonald & Kingsbury, 2006; Meyer et al., 2005) have argued that variation in attachment anxiety is expected to be influenced by sensitivity to rejection; the most imminent of threats in the contexts of close personal relationships. This is presumed to arise from anxious individuals’ use of hyperactivating behavioural strategies, which result in heightened sensitivity to environmental cues that signal threat. Conversely, variation in attachment avoidance is argued to be influenced by the degree to which one expects closeness to a romantic partner to be rewarding. This is consistent with Mikulincer and Shaver (2003, 2007), who suggest that avoidant individuals’ use of deactivating attachment strategies, which
are aimed at reducing distress and minimising engagement in demanding and challenging tasks, results in a propensity to detach from approach-related goals. Accordingly, it has been argued that attachment anxiety should be most strongly tied to activation of the aversive motivational system, while attachment avoidance should be most strongly tied to activation of the appetitive motivational system (Carnelley & Story, 2008; MacDonald & Kingsbury, 2006; Meyer et al., 2005).

Preliminary work has yielded some empirical support for these propositions. Meyer et al. (2005) examined approach versus avoidance motivation and adult attachment styles in predicting distress responses to a relationship scenario in which the degree of threat was manipulated. They found moderate positive correlations between BIS, as measured by the BIS/BAS scales, and anxious attachment. They also found that attachment avoidance was slightly negatively correlated with BAS (the authors combined the three BAS subscales to produce a single BAS score) and strongly positively correlated with distancing tendencies. Likewise, Carnelley and Story (2008) found a positive association between attachment anxiety and aversive relationship motives and a negative association between attachment avoidance and appetitive relationship motives. The authors of these studies argued that the findings support the notion that attachment anxiety is related to dispositional threat sensitivity (i.e., BIS activation in the original RST) and attachment avoidance is related to low approach behaviour (BAS activation). Hence, these findings appear to be in accordance with the authors’ hypotheses regarding the associations between attachment and approach-avoidance motivational processes.

However, these study findings are questionable for a number of reasons. Firstly, while Meyer et al.’s (2005) results showed that attachment anxiety and BIS
scores were moderately correlated, these variables had independent effects on emotional distress. BIS scores moderated the effect of threat intensity on the prediction of participants’ distress, such that in the low threat condition even high BIS scores were not associated with distress, whereas in the high threat condition BIS scores strongly predicted participants’ distress. In contrast, attachment anxiety was strongly and positively associated with emotional distress regardless of the level of threat intensity. The authors concluded that this stable link between attachment anxiety and emotional distress could be explained, in part, by anxious individuals’ moderately elevated BIS scores. However, on the one hand, the fact that BIS and anxious attachment scores had relatively independent effects on distress suggests that these two systems may not be as closely related as the authors contend. On the other hand, the findings suggest that anxiously attached individuals are unable to distinguish between threatening and non-threatening attachment-related cues, which in terms of the original RST, indicates that the BIS (i.e., threat sensitivity system) may not be functioning properly for these individuals. These speculations highlight the need for further investigation of the associations between attachment anxiety, BIS, and threat responsiveness.

Secondly, the inverse associations found between attachment avoidance and measures of appetitive motivation, specifically the BAS subscale of the BIS/BAS scales, have been relatively weak in magnitude (i.e., $r = -0.18$; Meyer et al., 2005). Therefore, the conclusion that attachment avoidance is predominantly related to low BAS activation should be viewed cautiously. As discussed in section 3.1, the primary goal of attachment deactivation strategies is the avoidance of attachment-related threat. Indeed, it is well-documented that attachment avoidance is consistently associated with escape-avoidance tendencies in many attachment-related contexts (see Mikulincer &
Shaver, 2007 for a review; Mikulincer & Florian, 1998; Wei et al., 2003). Consequently, attachment avoidance should therefore be linked to underlying aversive motivational system functioning in some way. It is argued in this thesis that while associations between attachment avoidance and low approach motivation are to be expected, attachment avoidance should also be positively related to aversive motivation. Consideration of the how past integrative studies have conceptualised and measured RST constructs may help explain the apparent inconsistencies observed, especially for attachment avoidance.

The attachment studies described above have drawn on the original conception of RST, and, consequently, have neglected to account for the important revisions to the RST model. As noted in Chapter 2, this has a substantial impact on the interpretation of past findings. Recall that the BIS is conceptualised as the aversive motivation system, which regulates both punishment-mediated aversive responses and anxiety-mediated behavioural inhibition, in the original RST. With the modifications to RST, the FFFS is now responsible for aversive motivation while the BIS regulates behavioural inhibition in the presence of conflicting motivational cues. Hence, the use of the BIS scale of the BIS/BAS scales (Carver & White, 1994) as an index of pure threat sensitivity is problematic because this scale contains a mixture of BIS-mediated anxiety and FFFS-mediated aversive responses (Heym et al., 2008). Therefore, it remains unclear whether the findings observed for attachment and aversive motivation in previous studies can be attributed to FFFS-mediated threat sensitivity or BIS-mediated anxiety.

This has significant implications for future research linking RST with attachment theory. Moreover, these issues are particularly pertinent to this thesis
because it is argued that determining how the operation of the threat detection system (the FFFS) is associated with attachment dynamics is crucial to understanding how appetitive and aversive motivation relates to attachment behaviour. Moreover, by clarifying the functional overlay between the attachment system and the threat system, it is possible to learn more about the key mechanisms that drive how individuals respond to and manage threatening life events. Considering the lack of well-validated measures of the revised RST and, more specifically, the FFFS, further empirical investigation of the functioning of the FFFS as the aversive motivational system is needed. This type of research is expected to yield new insights into the links between motivational system functioning and attachment behaviour.

Given the difficulty in measuring the revised RST constructs, only one published study to date has attempted to integrate the revised systems of RST (emphasising the FFFS) with attachment theory. In order to examine the links between adult attachment styles and FFFS activity, MacDonald and Kingsbury (2006) measured levels of attachment insecurity, psychological adjustment and physical pain affect in a group of participants with varying degrees of persistent pain. Physical pain affect (i.e., pain tolerance and suffering) was argued to represent a signal of both physical and interpersonal threat, thereby constituting an FFFS input, while psychological adjustment (measured using the depression and anxiety subscales of the Depression, Anxiety and Stress Scale [DASS, Lovibond & Lovibond, 1995]) could be used as a proxy of FFFS functioning. Their analyses revealed attachment anxiety fully mediated the association between pain affect and anxiety, and partially mediated the association between pain affect and depression. Avoidant attachment was not significantly related to pain affect. They drew two conclusions from these results: 1) the association between attachment anxiety and pain affect indicated that attachment
anxiety is positively related to sensitivity to threat; and 2) the lack of association between attachment avoidance and pain affect indicated that it was unlikely that attachment avoidance was related to an FFFS mechanism.

However, several methodological limitations impact on the interpretability of this study, especially the conclusions drawn about the overlay between the systems of RST and attachment dynamics. Firstly, MacDonald and Kingsbury (2006) did not include any established measures of the systems of RST (e.g., BIS/BAS scales, Carver & White, 1994; SPSRQ, Torrubia et al., 2001). The extent to which the depression and anxiety subscales of the DASS are an adequate measure FFFS or BIS is uncertain as this instrument was designed as an index of psychological adjustment rather than underlying motivational system functioning. Secondly, it is unclear whether physical pain affect can be considered a valid operationalisation of input to the FFFS, as this system is responsible for threat detection and avoidance behaviour, rather than the affective regulation associated with a threat. Consequently, the associations between attachment orientations and the functioning of the FFFS remain unclear.

In light of these limitations, caution must be taken when considering these findings. In addition to a number of measurement issues, it also appears that fundamental differences in the core motivational and behavioural components that characterise attachment anxiety and avoidance have been overlooked in these studies. This appears to have resulted in some confusion regarding the role of threat detection and aversive motivation (i.e., FFFS functioning according to the revised RST) in attachment dynamics. The following section draws on the revised model of RST in order to clarify the possible links between the attachment dimensions and the FFFS. More specifically, this section describes, in detail, the proposed associations between
attachment and the systems of the revised RST, particularly the FFFS, and supporting research evidence. In doing so, it is argued that the FFFS may be a key mechanism associated with both attachment avoidance and anxiety.

4.2 Integrating the Revised RST with Attachment Theory

In past integrative studies, attachment anxiety is conceptualised as relating to fears of rejection and attachment avoidance is conceptualised as relating to a reduced desire to pursue and engage in attachment relationships (Carnelley & Story, 2008; MacDonald & Kingsbury, 2006; Meyer et al., 2005). As such, the research discussed in the previous section has linked attachment anxiety to aversive motivation and attachment avoidance to appetitive motivation. However, a review of the available literature suggests that conclusions drawn from past integrative studies may be inconsistent with the theoretical and empirical evidence regarding how approach and avoidance processes relate to the attachment dimensions. It is proposed that these incongruities may be reconciled by accounting for the revisions of RST whereby threat detection and aversive motivation are regulated by the FFFS rather than the BIS. By accounting for the revised RST model, it becomes evident that attachment avoidance and anxiety may be differentially related to FFFS system functioning, which results in distinct behavioural tendencies in threatening encounters. Therefore, the majority of the proceeding discussion is focused upon elucidating the proposed links between the FFFS and the attachment dimensions. While the interplay between adult attachment and the BAS and BIS are important, it is the operation of the FFFS that is central the arguments set out in this thesis. The proposed associations between the systems of
RST, especially the FFFS, and attachment avoidance and anxiety, respectively, are explained below.

4.2.1 Attachment Avoidance

Consistent with past studies, findings in the attachment literature support the notion that attachment avoidance is associated with a lack of appetitive motivation. For example, in a positive mood induction study, Mikulincer and Sheffi (2000) found no significant differences in affect between the positive affect induction condition and the neutral condition for avoidant individuals. This suggests that avoidant individuals are somewhat insensitive to appetitive cues in their environment. Dewitte et al. (2009) also demonstrated that attachment avoidance was associated with a reduction in the tendency to automatically approach an attachment figure during an implicit stimulus response compatibility task. In reviewing numerous attachment studies, Mikulincer and Shaver (2007) note that avoidant individuals tend not to set appetitive relationships goals; a finding more recently supported by Carnelley and Story (2008). Consistent with these findings, highly avoidant individuals also tend to display a reluctance to enter long-term relationships and little approach motivation toward long-term attachment partners (see Feeney, 2008 for a review). This evidence is in agreement with the theoretical proposition that avoidant individuals learn from their early attachment experiences that proximity seeking, which has been conceptualised as an inherent approach behaviour (e.g., Dewitte et al., 2009), is associated with negative rather than positive outcomes and should therefore be avoided (Collins & Allard, 2001).
However, a review of the attachment literature suggests that it would also be expected that attachment avoidance be related to aversive motivational processes in some way. A primary characteristic of attachment avoidance is that these individuals harbour mental representations of attachment relationships as threatening and dangerous and others as rejecting and unreliable (Collins & Allard, 2001; Mikulincer & Shaver, 2007; Shaver & Mikulincer, 2002). Furthermore, past research has shown that avoidant individuals engage in effortful strategies to avoid or minimise potentially hurtful attachment-related information that may jeopardise their sense of autonomy and control (e.g., Fraley, Gardner, & Shaver, 2000; Mikulincer & Shaver, 2003; Ognibene & Collins, 1998; Wei et al., 2003). A recent study also found that attachment avoidance was associated with greater implicit motivation for distance in attachment relationships, as measured by various self-report measures and an implicit association task (Dewitte & DeHouwer, 2008). In this study, attachment avoidance was associated with a preference for distance over proximity, larger distances between the self and the attachment figure, and lower interconnectedness. Based on these research findings, one would expect that attachment avoidance should, to some extent, be associated with aversive motivation. It is proposed that an examination of the FFFS, with its more integral role in the revised RST, is essential to understanding and assessing the role of appetitive and aversive processes in attachment avoidance.

It is argued that the primary goal of attachment avoidance is functionally similar to the goal of the FFFS, which is to accurately detect threat and engage in behaviours to avoid the impending threat. As previously stated, deactivating strategies are employed by avoidantly attached individuals in order to successfully evade the dangerous consequences associated with activation of their attachment system (i.e., rejection; Mikulincer & Shaver, 2007). Deactivation of the attachment system may be
achieved by suppression or inhibition of attachment-related threats from awareness or by diverting attention away from such cues (e.g., Edelstein & Gillath, 2008; Mikulincer et al., 2003). It is therefore essential for avoidant individuals to be highly sensitive to threatening relationship situations in order to pre-emptively deactivate their attachment system and minimise the escalation of distress (Shaver & Mikulincer, 2002). The notion that avoidant individuals are especially attuned to detecting potentially threatening emotional stimuli in their environment and controlling attentional resources has received considerable empirical support.

For example, Edelstein and Gillath (2008) administered an emotional Stroop (ES) task in order to examine attachment-related attention biases. The (ES) task is a measure of attention in which participants are presented a word printed in a particular colour of ink. Participants are asked to name the colour of the word as quickly as possible. If the word is emotionally salient (i.e., emotion-provoking) for the participant, s/he will take longer to shift attention away from the word and onto the word colour in order to name it (MacLeod & Mathews, 1988). The delay in response is thought to reflect heightened attention to the salient word, whereby the processing of the salient word interferes with the capacity to redirect attention onto the word colour (Edelstein & Gillath, 2008). According to MacLeod and Mathews, the response latencies for identifying word colours can therefore be considered reliable indices for attentional biases toward particular types of stimulus words.

Edelstein and Gillath (2008) found that individuals with high levels of attachment avoidance could inhibit their attention to both positive and negative attachment-related stimuli, as evidenced by faster reaction times in the ES task. In contrast, attachment anxiety was not associated with any ES effects (i.e., attention
biases) for either attachment-specific or general emotional stimulus words.

Interestingly, avoidant individuals’ inhibition of attention to attachment-related words was reduced by a cognitive load. That is, avoidant individuals’ capacity to inhibit their attention to attachment stimuli attenuated when they simultaneously engaged in an effortful task (i.e., remembering a numerical code) whilst completing ES trials. According to Edelstein and Gillath, this suggested that the ability of avoidant individuals to limit attention to attachment stimuli requires cognitive effort. Hence, the argument can be made that in order to apply effortful attention strategies, avoidant individuals must first be highly attuned to detecting potentially threatening stimuli when they arise.

This argument has been supported by studies examining attachment-related biases in threat detection. For example, in a threat-priming study, Mikulincer et al. (2000) found a negative association between self-reported attachment avoidance and lexical decision RTs for attachment figures names when the subliminal prime word was an attachment-related threat. Similarly, research using narrative interview measures of attachment (e.g., Adult Attachment Interview [AAI]; Main et al., 1985) has found attachment avoidance to be associated with a lower threshold for the identification of pictures portraying social interactions and emotionally-laden human faces (i.e., frightened, sad; Maier et al., 2005). These findings suggest that highly avoidant individuals are particularly adept at detecting attachment stimuli that may signal threat (Edelstein & Gillath, 2008). This provides strong support for the proposal that avoidant individuals are highly sensitive to potentially aversive stimuli in their environment; a function that, according to RST, should be primarily associated with FFFS activation.
In fact, Maier et al. (2005) speculate that attachment avoidance is likely to be related to the operation of a fear system. As mentioned above, a negative association was observed between attachment avoidance (i.e., dismissing-avoidance using the AAI classification) and the detection of emotionally-laden facial stimuli. The authors argued that this vigilant processing of potential environmental threat by avoidant individuals was “due to a heightened activation of the fear system” (p.76). They also reasoned that if avoidant individuals’ mental representations are characterised by a lack of confidence turning to others in times of distress, then it is likely that this fear system would need to be continually active in order to detect threat and ensure one’s safety.

Consistent with Maier et al.’s (2005) propositions and the findings from the aforementioned studies, the argument of this thesis is that avoidantly attached individuals harbour a *hypersensitive* FFFS that results in an increased sensitivity to, and detection of, threatening stimuli in the environment. Coupled with low BAS sensitivity, this heightened FFFS sensitivity enables the highly avoidant individual to quickly detect a potential attachment threat, thereby activating the FFFS with little or no competing BAS activation. Consequently, the individual is motivated to act out FFFS-mediated behaviours in order to avoid a threatening stimulus, which would circumvent activation of the BIS. Consistent with this, avoidant individuals’ sensitivity to threat appears to influence their behavioural response patterns during threatening encounters. For instance, studies have demonstrated that avoidant individuals perceive relationship conflicts as highly threatening, report high stress reactions during conflicts, engage in effortful strategies (i.e., withdrawal patterns of communication) to disengage from the event (e.g., Holland & Roisman, 2010; Pietromonaco & Greenwood, 2000; Powers et al., 2006; Simpson et al., 1996), or may engage in anger
responses when a stressful relationship situation is unavoidable (Rholes et al., 1999). Thus, avoidant individuals’ hypersensitive FFFS is expected to result in sensitive threat detection and greater FFFS-mediated behavioural responses (i.e., fight, flight, freeze) during threatening encounters.

Hence, it argued that attachment avoidance is likely to be associated with the functioning of the threat detection system. More specifically, it is proposed that high attachment avoidance is likely to be associated with a hypersensitive FFFS manifested by accurate threat detection and FFFS behavioural outputs (i.e., fight, flight, freeze) in threatening close relationship contexts. It is likewise proposed that the FFFS plays an important role in the behavioural expression of aversive motivation related to attachment anxiety. The following section reviews evidence pertaining to the associations between FFFS functioning and attachment anxiety.

4.2.2 Attachment Anxiety

Contrary to existing conceptualisations of attachment anxiety as positively related to threat sensitivity (e.g., MacDonald & Kingsbury, 2006), it is proposed in this thesis that anxious individuals’ chronic hyperactivation of the attachment system makes them insensitive to detecting threat, or disengaging from threat, in relationships. Explained in more detail below, in terms of RST, this suggests that the FFFS does not function properly for these individuals. Specifically, it is argued that anxiously attached individuals harbour a hyperfunctioning FFFS that is characterised by heightened threat sensitivity combined with an inability to accurately discriminate between threatening and non-threatening environmental cues or to withdraw from threatening stimuli.
Initial support for the notion of a hyperfunctioning FFFS in anxiously attached individuals comes from Meyer et al.’s (2005) study. As discussed earlier, Meyer et al. found that anxious attachment was positively associated with distress, even in the low threat condition, suggesting that these individuals had difficulty discriminating between threatening and non-threatening relationship scenarios. The adult attachment literature has also demonstrated that anxiously attached individuals have difficulty discriminating between threatening and non-threatening stimuli in their environment to the extent that they misperceive benign stimuli as threatening (Mikulincer & Sheffi, 2000; Mikulincer & Shaver, 2007). For instance, Mikulincer, Gillath, and Shaver (2002) found that individuals with high levels of attachment anxiety perceived neutral and high-threat conditions as equally threatening. Threat-priming studies have also found strong positive associations between self-reported attachment anxiety and lexical decision RTs for the names of attachment figures even when the subliminal prime words are non-threatening (e.g., Mikulincer et al., 2000). In fact, Dewitte et al. (2009) found that across two separate studies, the associations between attachment anxiety and approach-avoidance tendencies did not differ between threatening and non-threatening contexts, suggesting that anxious individuals do not, or perhaps cannot, modify their behaviour according to the presence (or absence) of threat. These findings indicate that anxious individuals tend to behave as though an attachment-related threat has been detected, even in the absence of an objective threat.

Other studies suggest that anxious individuals may also be insensitive to discriminating between positive and negative emotional stimuli in their environment, such that they can misperceive even positive stimuli as threatening (Edelstein & Gillath, 2008). Mikulincer and Sheffi (2000) found that anxious individuals’ reaction to a positive mood induction task resembled the typical effects of a negative affect
induction task, suggesting that positive stimuli may be processed as aversive. It may be that, because the system responsible for detecting aversive environmental cues (FFFS) is hyperfunctioning, the processing of appetitive cues is compromised in some way.

Further supporting the proposition of a link between attachment anxiety and a hyperfunctioning FFFS, evidence suggests that individuals with high attachment anxiety tend to behave as though threat is constantly imminent. As a result, attachment anxiety has been frequently associated with negative affect and distress (e.g., Wei et al., 2003; Schmidt et al., 2002). In an early study, Simpson (1990) found that attachment anxiety was positively associated with the experience of mild and intense negative affect for both men and women. In studies using the AAI, in which individuals are asked to recall and describe their early attachment memories, the narratives of anxiously attached adults also tend to include anger, frustration and negative affect (e.g., Crowell, Fraley, & Shaver, 1999; Rholes et al., 1999). Furthermore, behavioural studies of spousal support demonstrate that anxiously attached individuals’ desires for protection and intimacy are rarely perceived as adequately met, regardless of how much support is actually given by attachment partners (e.g., Rholes et al., 2001; Simpson et al., 2003). Consequently, the attachment system remains active, resulting in persistent fight behaviours and negative affect in response to attachment threat. This exaggerated aversive output is argued to reflect a hyperfunctioning FFFS for anxiously attached individuals.

Therefore, the evidence suggests that anxiously attached individuals harbour a hyperfunctioning FFFS that results in an inability to accurately detect threatening and non-threatening environmental cues coupled with abnormal or excessive FFFS outputs. These individuals’ hyperactivation may make them insensitive to effectively detecting
attachment-related threats in their environment, as their constant state of worry and hypervigilance may render them incapable of distinguishing benign stimuli from actual danger (i.e., hyperfunctioning FFFS). Furthermore, as a result of abnormal or excessive FFFS activity, the extent to which these individuals engage in FFFS behaviours may also be unrelated to the presence of objective threat in the environment. Combined with their excessive desire for intimacy and apparent difficulty disengaging from attachment partners, it is argued that this can result in the experience of approach-avoidance conflicts in attachment situations (Hart, Shaver, & Goldenberg, 2005).

While the characteristics of attachment anxiety seem to be related to appetitive motivation, no clear associations have been observed between measures of the attachment anxiety and BAS (Carnelley & Story, 2008; Mikulincer & Shaver, 2007). The behaviours and system goals associated with attachment anxiety share conceptual similarities with appetitive motivational system functioning. As noted above, anxiously attached individuals experience strong cravings for intimacy and support (e.g., Bartholomew & Horowitz, 1990; Cassidy, 2000; Hazan & Shaver, 1987; Mikulincer & Shaver, 2007), which have been documented as appetitive motivations in social interaction studies examining approach and avoidance motivation (e.g., Gable et al., 2006; Gable, 2007; Elliot et al., 2006). It is also well-established that hyperactivation is characterised by persistent approach behaviour involving incessant efforts to minimise distance from the attachment figure and to gain the attachment figure’s attention through clingy and controlling behaviour (Shaver & Mikulincer, 2002). In fact, Dewitte et al. (2009) found that attachment anxiety was associated with heightened automatic approach responses toward an attachment figures relative to an acquaintance, further supporting the theoretical assumption that anxious individuals
harbour a motivational tendency to seek and maintain closeness to their attachment figures. Thus, in the presence of appetitive and aversive attachment cues, it is expected that anxiously attached individuals’ excessive desires for intimacy and proximity seeking efforts combined with a hyperfunctioning FFFS would result in the experience of an approach-avoidance conflict that is likely to contribute to activation of the BIS. This line of reasoning may help to clarify the associations observed between attachment anxiety and BIS in previous research.

Support for the idea that anxiously attached individuals can experience conflicting approach-avoidance motivations in attachment situations comes from recent research examining the role of attachment anxiety in relationship ambivalence. Given anxious individuals’ conflicting desire to be close to relationship partners and strong fears of rejection, Mikulincer et al. (2010) sought to empirically test the associations between attachment anxiety and relational ambivalence across a series of six studies. While anxiously attached individuals displayed a general motivational tendency toward approaching romantic partners, they also held simultaneous positive and negative attitudes about relationship partners (both implicitly and explicitly) and reacted with heightened ambivalence to relational contexts that would typically activate either approach or avoidance tendencies. The authors concluded that anxious individuals’ relational ambivalence is characterised by the strong motivational conflict produced by simultaneous activation of opposing attachment goals (i.e., desire for intimacy versus fear of rejection). In addition, they noted that this relational ambivalence is intensified in situations that specifically encourage the activation of either approach or avoidance tendencies.
Importantly, Mikulincer et al.’s (2010) findings provide initial evidence for the link between attachment anxiety and the experience of approach-avoidance conflicts in relational contexts that activate approach or avoidance processes. To this end, the findings make a significant contribution to the understanding of the associations between attachment anxiety and approach-avoidance processes, which have important implications for the propositions set out in this thesis. In order to explore this link between attachment anxiety and approach-avoidance conflicts further, it is deemed important to consider the construct of fearful avoidance.

4.2.3 The construct of Fearful Avoidance

While attachment anxiety and avoidance are deemed independent dimensions, individuals can be concurrently high on both. This form of attachment has been termed fearful avoidance in the literature (Bartholomew & Horowitz, 1991). It is possible that this cluster of individuals exhibited the heightened relational ambivalence in Mikulincer et al.’s (2010) research. However, as this attachment style was not explicitly examined in those studies, this hypothesis cannot be confirmed. Nevertheless, the style of fearful avoidance is particularly central to the present argument. It is argued that fearful avoidance is likely to be the form of attachment that involves approach-avoidance conflicts in attachment relationships, leading to disorganised behavioural patterns during threatening encounters.

Hesse and Main (2006) explain the origins of fearful avoidance (i.e., disorganised/disoriented attachment according to the Ainsworth’s Strange Situation) in early attachment experiences of “fright without solution” (p. 310). When an infant’s primary attachment figure behaves alarmingly or in a threatening way, that attachment
figure simultaneously becomes the location of safety and the source of threat. This produces an approach-avoidance conflict for the infant that cannot be resolved at the behavioural level. According to Hesse and Main, repeated experiences of fright without solution are inherently disorganising as the simultaneous activation of antagonistic strategies affects a child’s development in terms of attention, emotional regulation, and vulnerability to psychopathology. When these children become adults, they engage in an incoherent mixture of hyperactivating and deactivating strategies, which, according to Simpson and Rholes (2002), result in contradictory approach and avoidance behaviours or inaction. This description parallels the approach-avoidance conflict that would lead to BIS activation in Gray and McNaughton’s (2000) model.

Under conditions of conflict between the motivation to approach reward and the motivation to avoid punishment the BIS is activated and responds with increased arousal and anxiety (McNaughton & Corr, 2004). Likewise, in fearfully avoidant individuals, the BIS may be activated by an internal conflict between the desire to avoid attachment relationships for fear of being hurt or rejected (i.e., high attachment avoidance) and an excessive desire for protection and support (i.e., high attachment anxiety; Riggs et al., 2007). However, it is argued that for these individuals it is possible that the conflict may not be resolved because the conflict produced by excessive FFFS activity (i.e., hyperfunctioning FFFS) and an excessive desire for love and care may be overwhelming that it results in the engagement in simultaneous hyperactivating and deactivating attachment strategies. Depending on the intensity of the conflict, these individuals may therefore display a disorganised pattern of approach and avoidance behaviours or become paralysed by an irreconcilable internal conflict in threatening conditions (Simpson & Rholes, 2002).
The empirical evidence has demonstrated that the construct of fearful avoidance is associated with the most maladaptive psychological outcomes. For example, fearful avoidance has been consistently linked to greater emotional maladjustment and behavioural disruption (see Simpson & Rholes, 2002 for a review). Riggs et al. (2007) found that fearfully avoidant adults represented the greatest proportion of a psychiatric inpatient sample of trauma survivors and had the most maladaptive personality profiles. In addition, in their clinical study relating self-reported attachment style, severity of drug use, and comorbid psychiatric disorders, Schindler et al. (2005) found that (a) the fearful attachment style was vastly overrepresented in a clinical group of opiate-using drug-dependent adolescents compared to non-clinical controls, (b) fearful attachment was significantly related to addiction severity, and (c) the presence of comorbid psychiatric disorder was significantly related to fearful attachment but was unrelated to addiction severity. Similar to RST conceptualisations of excessive BIS activity, such clinical studies suggest that fearful avoidant attachment is associated with a generalised vulnerability to psychopathology.

It is contended that this vulnerability may be explained, at least in part, by the key arguments proposed in this thesis: when exposed to an aversive event, fearfully attached individuals experience excessive FFFS activation coupled with relational ambivalence due to the conflict between a strong desire to approach their loved ones for protection and to avoid them for fear of rejection. This induces a state of heightened arousal, anxiety and aversive motivation. As the conflict is not resolved for these individuals, the risk of emotional disturbance and psychopathology is increased. Therefore, the pattern of disorganised and maladaptive behavioural and psychological outcomes associated with fearful avoidance (Mikulincer & Shaver, 2007; Simpson &
Rholes, 2002), may be partly attributable to the differential functioning of the FFFS in fearfully avoidant individuals relative to individuals with a secure, avoidant or anxious attachment style. Hence, investigating the associations between the FFFS and the interaction between levels of attachment anxiety and avoidance is important as it may enhance understandings of the mechanisms that drive the disorganised behavioural tendencies that contribute to this particular group of individuals’ levels of psychopathology.

4.3 Summary

In this chapter, important links between RST and attachment theory were made and a way of approaching this theoretical integration was put forward. The integration of RST and attachment theory was discussed in terms of how the revised RST can contribute to knowledge of: (1) a threat detection mechanism that plays a key role in attachment system functioning and (2) the associations between appetitive and aversive motivational processes and the attachment dimensions underlying attachment styles. It was argued that in order to account for the ways in which the revised RST systems relate to the dimensions of attachment, the role of the FFFS as the aversive motivational system requires further empirical investigation.

In contrast to past research, it was proposed in this chapter that attachment avoidance and anxiety are both likely to be linked to FFFS functioning in distinct ways. Specifically, attachment avoidance was proposed to be associated with a hypersensitive FFFS while attachment anxiety was proposed to be associated with a hyperfunctioning FFFS. This differential functioning of the FFFS associated with the attachment dimensions was argued to produce characteristic differences in both threat
detection and the behavioural responses to threatening stimuli. In addition, it was proposed that individuals who are classified as having a fearfully avoidant attachment style (i.e., the combination of high attachment anxiety and high attachment avoidance) experience persistent approach-avoidance conflicts in threatening attachment situations. Based on this proposal, the notion was raised that examining the combination of different levels of attachment anxiety and avoidance is likely to reveal valuable information about functioning of the FFFS across the attachment styles. In order to address these proposals, the associations between the FFFS and the attachment dimensions were empirically tested across three studies.

4.4 Research Aims and Hypotheses

The broad research question addressed in this thesis was: Does the FFFS function differently across different levels of attachment anxiety and avoidance? Contrary to past integrative studies (e.g., Carnelley & Story, 2008; Meyer et al., 2005), three studies were conducted that focused exclusively on clarifying the links between attachment avoidance and FFFS, rather than avoidance and BAS, and the association between anxiety and FFFS, rather than anxiety and BIS. The FFFS was also focused on specifically so that the associations between adult attachment and the different components of the FFFS could be explored, thereby providing evidence for the novel propositions made in this thesis regarding the distinction between the hypersensitive and hyperfunctioning FFFS.

Three studies were conducted in order to examine the associations between levels of attachment anxiety and avoidance, the threat detection component of the FFFS and its behavioural outputs. Study 1 of this thesis, which focuses specifically on
the threat detection component of FFFS functioning, comprises an experimental examination of the associations between levels of attachment anxiety and avoidance, the FFFS, and the detection of threatening and rewarding stimuli in the environment using implicit measures of behaviour. The purpose of Study 1 was to establish empirical links between the attachment dimensions and the FFFS in the detection of threat and reward. Expanding upon the findings of Study 1, Study 2 and Study 3 of this thesis were designed to examine the associations between levels of attachment anxiety and avoidance, the degree of threat, and the behavioural components of the FFFS within the specific contexts of relationships and substance use. These two studies consisted of an experimental design in which participants were asked to consider how they would respond to a vignette depicting either a relationship scenario (Study 2) or a substance use scenario (Study 3) in which degree of threat was manipulated. The three studies are presented in chapters 5 to 7 respectively, along with the specific research aims and hypotheses for each study. The broad aims of this thesis were:

Aim 1: To determine whether the associations between the FFFS and the detection of threat and reward are moderated by attachment anxiety and avoidance.

Aim 2: To determine whether the behavioural responses associated with the FFFS under varying degrees of threat are moderated by attachment anxiety and avoidance within the relationship context.
Aim 3: To determine whether the behavioural responses associated with the FFFS under varying degrees of threat are moderated by attachment anxiety and avoidance within the substance use context.
CHAPTER 5

Study 1

5.0 Chapter Overview

In this chapter, Study 1 is presented. The chapter begins with a brief introduction and rationale for the study followed by a description of the methods used. The results section is then presented, and is divided into two parts. Firstly, the data screening process is outlined, followed by a description of the results. The results are then discussed in the final section of the chapter, with reference to the overall aim and hypothesis for the study.

5.1 Introduction

This study represents a preliminary attempt to clarify the relationships between adult attachment, the threat detection mechanism of the FFFS, and sensitivity to appetitive and aversive cues under experimental conditions. The key argument in this thesis is that individual differences in attachment avoidance and anxiety are associated with differential functioning of the FFFS. Specifically, avoidant individuals harbour a hypersensitive FFFS, while for anxious individuals, the FFFS is hyperfunctioning. To briefly review, the hypersensitive FFFS is thought to result in an increased sensitivity to and detection of threatening stimuli in the environment. In contrast, a hyperfunctioning FFFS is thought to result in heightened sensitivity to threat combined with an inability to discriminate between threatening and non-threatening
environmental cues. Based on these propositions, one would expect that variation in the attachment orientations would be differentially associated with the functioning FFFS in the detection of appetitive and aversive cues in the environment. By establishing that associations exist between the FFFS and the attachment dimensions in the detection of threatening and rewarding stimuli, Study 1 was expected to provide evidence that the proposed functional links between these two systems warrant further investigation. Thus, the aim of this study was to determine whether the associations between the FFFS and the detection of threat and reward are moderated by levels of attachment anxiety and avoidance.

The study utilised the dot-probe paradigm. The dot-probe paradigm has been used to investigate the associations between appetitive and aversive motivation and attentional biases in previous research (Derryberry & Reed, 1994). In the RST context, it has been proposed that individual differences in sensitivity to threat and reward are likely to be reflected in attentional biases toward or away from appetitive and aversive stimuli in the environment. Biases toward particular motivational cues are thought to be indicative of greater sensitivity to those cues, while biases away from particular motivational cues are thought to be indicative of lower sensitivity to those cues (Gable & Berkman, 2008; Zinbarg & Yoon, 2008). In a past study, Derryberry and Reed (1994) found that higher appetitive motivation (i.e., high Extroversion, low Neuroticism) was associated with biases toward appetitive stimuli, whereas individuals with aversive motivation (i.e., low Extroversion, high Neuroticism) displayed attention biases toward aversive stimuli. It will be interesting to examine how the FFFS is associated with such attentional processes. As psychometric tools become available that incorporate components designed specifically to measure FFFS constructs,
methodologies like the dot-probe task can be used to clarify how FFFS functioning relates to threat and reward sensitivity.

The dot-probe paradigm has also been used to investigate attachment-related attentional biases. In their study, Dewitte et al. (2007) examined attentional biases for attachment-specific and general threat words. They found that insecure participants displayed a greater tendency to avoid attachment-related threat words relative to their secure counterparts. That is, attachment anxiety and avoidance were both associated with attentional biases away from threatening attachment words. Based on these results, the authors concluded that insecure attachment (i.e., high attachment anxiety, high attachment avoidance, or both) is associated with a tendency to avoid attachment threat.

In light of Dewitte et al.’s (2007) findings, it is important to consider that a necessary precondition of diverting attention away from threatening stimuli is that such stimuli can be detected as threatening in the first place. It has been suggested that, after the initial detection of threat, some individuals may orient their attention away from the threat in order to reduce their negative affect or levels of anxiety (Mogg & Bradley, 2002). This is consistent with past dot-probe research that has documented an association between social anxiety and attentional biases away from (i.e., avoidance of) threat cues (e.g., Chen, Ehlers, Clark, & Mansell, 2002; Mansell, Clark, Ehlers, & Chen, 1999). It is argued here that the FFFS is the underlying mechanism that influences this process.

Now that psychometric measures of the revised RST systems have been developed, which account for the modified role of the FFFS (e.g., Jackson, 2009), investigations to develop an understanding of the FFFS are possible. The dot-probe task was considered to be a particularly useful paradigm in which to achieve the aim of
this study as the design provides the researcher with a relatively objective index of threat and reward detection that can be correlated with newly developed dispositional measures of FFFS (Jackson, 2009) and attachment system functioning. Using the dot probe task and self report measures of the FFFS and the attachment orientations, the study was expected to help clarify the links between the attachment dimensions and the threat detection component of the FFFS. It was hypothesised that the associations between the FFFS and attentional biases to threat and reward would be moderated by levels of attachment anxiety and avoidance.

5.2 Method

5.2.1 Participants

The total sample consisted of 70 participants that included 48 (68.6%) women and 22 (31.4%) men. The age of participants ranged between 19 and 53 (\(M = 27.29, SD = 7.24\)). Seventeen (24.3%) participants were single, 25 (35.7%) were in a relationship but not living together and 28 (40%) were cohabiting. Of the participants who were living with their partners, 14 (50%) were married. The duration of relationships ranged between one and 372 months with a mean relationship duration of 40.66 months (\(SD = 74.52\)). The length of time spent living with a partner ranged between one and 336 months with a mean of 25.33 months (\(SD = 70.61\)). The number of previous relationships reported by participants ranged between zero and 30, with a median of three.

The majority of the sample (57.6%) reported that at least one parent was born in Australia or New Zealand, while another 20.5% had a parent born in European
countries, 11.4% in Great Britain, and 5.3% in India. The remaining 5.2% had a parent born in other regions, including the Middle East, Canada, and Indonesia. A total of nine different religious affiliations or beliefs were reported. 34.3% of the sample reported no religious beliefs, 4.3% were Agnostic and one participant (1.4%) was Atheist. Of the religious affiliations reported, the greatest proportions of participants were Catholic (37.1%), Christian (5.7%), Anglican (5.7%), and Orthodox (4.3%). Two (2.9%) participants were Jewish, two (2.9%) were Muslim and one (1.4%) was Presbyterian.

The majority of the sample (79.6%) had completed secondary school, although 12.9% had only completed years 9 or 10 of their secondary education. A total of 68.5% of participants had attained tertiary level qualifications (35.7% undergraduate qualifications, 27.1% postgraduate qualifications, and 5.7% diploma qualifications). Nine different occupations were reported with the greatest proportion of the sample indicating that they were students (48.6%), or employed in trades (22.9%), health services (10%) and administration (5.7%). Other areas of occupation included retail and sales (2.9%), science and technology (2.9%), social welfare (2.9%), business and finance (2.9%), and homemaking (1.4%). In total, 40% of participants reported working on a full-time basis, 7.2% on a part-time basis, and 11.4% on a casual basis. Only a small proportion of the sample was unemployed (4.3%).

5.2.2 Materials

5.2.2.1 Dot-probe task

The computer-based dot-probe task, originally developed by MacLeod et al. (1986), was utilised to measure sensitivity to appetitive and aversive stimuli. In the dot-probe paradigm, response times to the positioning of the dot-probe are collected.
over a series of trials containing paired target and neutral stimulus words. In Study 1, response times were collected over 20 trials displaying target-neutral words pairs.

**Dot-probe Stimuli.** Stimulus words were derived from the Affective Norms for English Words (ANEW) manual (Bradley & Lang, 1999). Target words were selected according to four word categories based on affective valence and arousal level: general aversive words (e.g., *rage, killer*), aversive attachment words (e.g., *betray, rejected*), general appetitive words (e.g., *win, joy*), and appetitive attachment words (e.g., *love, intimate*). Five words for each category were displayed across the 20 critical trials. In critical trials, target words were paired with neutral words (e.g., *basket, key*) that matched in frequency, length and number of syllables. In filler trials, neutral words were paired with neutral words that were matched according to the same criteria. Ten filler trials were used as practice trials and 10 were used to separate the two sets of critical trials. Thus, the complete set of stimulus words consisted of 80 words: 20 target words and 60 neutral words.

### 5.2.2.2 Questionnaires

Data were also collected using a pen and paper questionnaire booklet. The first component of the questionnaire was included to obtain information about participants’ socio-demographic background and other relevant characteristics. Self-report measures were also included in Study 1 in order to assess attachment style and appetitive and aversive motivational systems according to the revised RST. Each measure is described in more detail below. A copy of the questionnaires administered in Study 1 is included in Appendix A.

**Background questionnaire.** The background questionnaire contained 13 items assessing various socio-demographic characteristics. These included age, gender,
postcode, mother and father’s country of birth, religion, highest level of education, occupation, and work status. A number of items were also included to obtain relationship information including: the number of past relationships, relationship status, relationship duration, and length of cohabitation.

**Adult attachment.** Attachment anxiety and avoidance were measured using the Adult Attachment Questionnaire (AAQ; Simpson et al., 1996). This measure asks participants to indicate how they typically feel toward their romantic partners by selecting the extent to which they agree or disagree with 17 statements using a seven-point Likert-type scale 1 (Strongly disagree) to 7 (Strongly agree). Participants receive two subscale scores that represent their degree of attachment anxiety and avoidance toward romantic partners. The attachment anxiety score is computed by averaging nine items that include statements such as “I often worry that my partner(s) don’t really love me”. The attachment avoidance score is computed by averaging eight items that include statements such as “I don’t like people getting too close to me”. Higher scores on the subscales reflect greater attachment anxiety and avoidance, respectively. Each subscale has demonstrated good internal consistency (Attachment Anxiety: $\alpha = 0.72$ for men and 0.76 for women; Attachment Avoidance: $\alpha = 0.70$ for men and 0.74 for women; Simpson et al., 1996).

**The revised RST: FFFS Functioning.** The Jackson 5 (Jackson, 2009) was used to measure individual differences in appetitive and aversive motivational processes according to the revised RST model (Gray & McNaughton, 2000). This questionnaire comprises 30 items that ask participants to respond to statements on a five-point Likert-type scale 1 (Completely disagree) to 5 (Completely agree). While there are five subscales in the Jackson 5, which reflect the theoretically distinct components of the revised RST; BAS, FFFS (i.e., Fight, Flight, Freeze), and BIS functioning, data were
only collected for the three FFFS subscales: Fight, Flight, and Freeze. The Fight subscale measures the tendency to engage in defensive fight behaviour in response to proximal threat stimuli (e.g., “If I think somebody is going to hit me, I hit them first”). The Flight subscale measures the tendency to escape or flee in response to unpleasant stimuli (e.g., “If approached by a suspicious stranger, I run away”). The Freeze subscale measures the tendency to mentally and physically ‘freeze’ or pause in response to unpleasant stimuli or a choice of unpleasant options (e.g., If something very bad was just about to happen to me, I would just stop”). The item content of the Flight and Freeze subscales are less threatening and more distal in nature than the Fight subscale item content. Total subscale scores are computed by adding response scores for each item included in the respective subscales. Subscale scores can range between 6 and 30, whereby higher scores indicate a greater tendency to engage in the specified pattern of behaviour in response to aversive stimuli. According to Jackson (2009), all subscales demonstrated adequate reliability with Cronbach’s $\alpha$ greater than 0.70.

5.2.3 Procedure

5.2.3.1 Participant recruitment

Participant recruitment occurred in two stages. Firstly, participants were recruited using a convenience sampling method. Individuals known to the researcher were approached and given a copy of the Plain Language Statement (see Appendix D). When an individual indicated that he/she would like to volunteer for the study, a testing time was scheduled. Testing software (DirectRT, version 2.20) was installed onto a portable notebook computer to make it easier for participants to participate in the study. This maximised participation as participants did not have travel and were
able to schedule a time that was most convenient for them. The researcher ensured that the environment in which data was collected was as controlled as possible. Participants were positioned on a chair at a desk, or table, with a direct line of sight to the computer screen, in a quiet room where distracting materials, including mobile phones, posters, and other objects, were removed.

In the second stage of testing, participants were recruited from both undergraduate and postgraduate psychology courses at Deakin University. The researcher gave short presentations about the research project at the beginning of various undergraduate psychology lectures and provided student sign-up sheets. Information about the study, accompanied by the researchers contact details, was also posted in postgraduate study areas around the university (see Appendix E). Data were collected in the social psychology laboratory at Deakin University. The laboratory consisted of four computer work stations separated by partitions to ensure participants were tested in a controlled environment free from distraction. At each work station, participants were positioned on a chair at a desk with a direct line of sight to the computer screen.

5.2.3.2 Research design

The study comprised a within-subjects design in which participants were administered the dot-probe task comprising sets of threatening and rewarding stimuli. In the dot-probe task, critical trials consisted of one target word and one neutral word and filler trials consisted of neutral word pairs. The sequencing of each trial was as follows: a) a fixation point appeared in the centre of the screen for 3 seconds; b) two words were then displayed simultaneously in two different spatial locations, one on the left and one on the right sides of the screen, for 500 milliseconds; c) the two words
disappeared from the screen followed immediately by the presentation of a dot-probe in the position that was just occupied by one of the trial words; d) the dot-probe remained on the screen until the participant responded to its location by pressing one of two predetermined buttons.

Participants were first presented with 10 practice trials to allow them to become familiar with the dot-probe task. A block of 10 trials containing aversive target words and a block of 10 trials containing appetitive target words were then presented to participants separated by 10 filler trials. The order of presentation was counterbalanced so that one group of participants was presented with the block of aversive trials first and one group was presented with the block of appetitive trials first. This resulted in two presentation order conditions. Stratified random sampling was used to determine the order of trial pairs, positioning of target words on the computer screen (i.e., left or right) and the position of the dot-probe within each block of trials.

5.2.3.3 Task instructions

Upon entering the study, participants were randomly assigned to either condition 1 (aversive trials presented first) or condition 2 (appetitive trials presented first). They were instructed to concentrate on the fixation point that was to appear in the centre of the screen. They were told they would see two words flash on the screen followed by a dot and instructed to respond as quickly as possible to the position of the dot by pressing either the CAPS LOCK key if it appeared on the left side of the screen, or the ENTER key if it appeared on the right side of the screen. They then completed 10 practice trials to allow them to prepare for the actual dot-probe task. Participants responded to 10 critical trials (target-neutral words pairs) followed by 10 filler trials (neutral-neutral word pairs). Once this was complete, they were instructed to complete
the pen and paper questionnaire battery. The questionnaire battery was intentionally administered in paper-copy to shift participants’ attention away from the computer screen before re-engaging in the dot-probe task to reduce participant fatigue by having to concentrate on a computer screen for an extended period of time. Following the completion of the questionnaire, participants were reminded of the instructions for the dot-probe task and exposed to the remaining block of critical trials.

5.2.4 Data Analytic Strategy

The data were screened and analysed using PASW Statistics18 and AMOS 18 (SPSS, 2009). The associations amongst the variables were analysed using path analysis. The following section provides an overview and general explanation of this specific data analytic technique.

5.2.4.1 Overview of path analysis

Path analysis is a multivariate technique in which the interrelationships amongst numerous dependent, independent and mediating variables are estimated using a combination of statistical analyses. Path analysis is a theory-driven, confirmatory technique in which a series of hypotheses about the relationships among a set of variables are represented in a structural equation model (Hu & Bentler, 1999). Similar to traditional regression models, the research specify direct and indirect relationships amongst measured variables in path models. Unlike regression techniques however, in path analysis, multiple observed variables can be modelled simultaneously, thereby facilitating the estimation of several path coefficients. Accordingly, path analysis allows the researcher to evaluate: (a) whether a hypothesised model provides an adequate fit to the sample data and the contribution of
each variable to the overall model fit, (b) the amount of measurement error in a model and, (c) whether there are differences in the strength of path coefficients between groups (Tabachnick & Fidell, 2007).

5.2.4.1 Assessing Goodness of Fit

The chi-square ($\chi^2$) goodness of fit test is used to broadly evaluate the model fit. This statistic assesses the size of the discrepancy between the observed and implied values in a model. Given that the smallest discrepancy between these values is desirable, a small and non-significant chi-square statistic is indicative of a good fitting model. That is, a non-significant chi-square statistic indicates that the hypothesized model does not differ significantly from the data (Byrne, 2001; Kim, 2005). However, the chi-square is highly sensitive to sample size such that it can yield significant differences in large samples even when these differences are minor or trivial. Conversely, in small samples sizes where statistical power is low, the likelihood of obtaining a significant chi-square statistic is low and sometimes biased (Kim, 2005; Kline, 2005; Ullman, 2000). In order to overcome the limitations associated with the chi-square statistic, in terms of sample size and misspecification, a number of fit indices have been developed. It is recommended that these fit indices be examined in addition to the chi-square statistic (Hu & Bentler, 1999).

Fit indices provide information about the extent to which a model is an accurate or inaccurate specification of the data (Fan, Thompson, & Wang, 1999). Fit indices are typically classified as absolute or incremental fit indices (Hu & Bentler, 1999). Absolute fit indices measure the accuracy with which the hypothesised model reproduces the relationships observed in the data (i.e., the observed covariance matrix; Hu & Bentler, 1999). In contrast, incremental fit indices assess the degree of
improvement in model fit when the hypothesised model is compared to the
independence or null model (i.e., observed variables assumed to be uncorrelated; Hu &
Bentler, 1999; Kline, 2005). While numerous fit indices exist, it is recommended that
only a specific set of indices be used when evaluating SEM (Byrne, 2001; Hu &
Bentler, 1999; Kline, 2005). Hu and Bentler (1999) have determined that the most
robust absolute fit indices are the Root Mean Square Error of Approximation
(RMSEA) and the Standardised Root Mean Residual (SRMR), while the most robust
incremental fit indices are the Tucker Lewis Index (TLI) and the Comparative Fit Index
(CFI). The characteristics of each of these indices are outlined below.

The RMSEA assesses the average measurement error, or degree of poor fit, if it
were to be generalised to the population (Byrne, 2001). This index is less influenced
by sample size (Fan et al., 1999). A good fitting model is indicated by values of ≤.08
as this specifies an average of 8% error or less in the approximation of the population.
A value greater than .10 is indicative of poor fit. It has been argued that the RMSEA
may inaccurately reject true models under conditions of small sample size and,
consequently, in small samples values as high as .11 may be indicative of a good
fitting model (Hu & Bentler, 1999). Similar to the RMSEA, the SRMR also assesses
the average amount of error (i.e., residual) in the hypothesised model. However, this
index compares the hypothesised model to the observed variable matrix rather than to
an assumed population matrix. Again, smaller SRMR values indicate a good model fit.
In large samples (N > 500) SRMR values of ≤.06 are desired, whereas in small
samples (N < 250) values of .09 to .11 are considered acceptable (Hu & Bentler, 1999).

In terms of the incremental fit indices, the TLI penalises complex models as it
adjusts for degrees of freedom when comparing the goodness of fit of the hypothesised
model to the null model (Ullman, 2000). The CFI also measures the model fit of the
hypothesised model relative to the null model but does so by comparing the centrality of the chi-square distribution (Fan et al., 1999). The CFI is argued to provide a robust and accurate estimate of model fit even with small sizes (i.e., $N < 150$). TFI and CFI values can range between 0 and 1, with values higher than .90 indicating a good model fit (Thompson, 2000) and values greater than .95 of very good fit (Hu & Bentler, 1999). An incremental fit index of .90 indicates that the hypothesised model fits the data 90% better than the null model (Kline, 2005).

5.2.4.2 Multi-group Invariance Testing

Multi-group invariance testing allows a researcher to examine whether the parameter estimates of a hypothesised model are invariant or equal across groups. Multi-group invariance tests were required in the present study to determine whether there was structural invariance in the associations between FFFS variables and threat and reward response biases for varying degrees of attachment anxiety and avoidance. That is, this data analytic technique was used examine whether the FFFS functions differently in relation to the detection of threatening and rewarding stimuli in the environment depending on high or low attachment anxiety and avoidance.

In multi-group invariance testing, the null hypothesis stipulates that all groups are invariant. Initially, all paths in a model are constrained to be equal across groups (i.e., the null model) and compared to an unconstrained model in which all paths are free to vary. The chi-square difference test is used to determine whether there are significant differences between the fit of the constrained model and the fit of the model in which paths are freely estimated. Thus, the $\chi^2$ difference statistic ($\Delta \chi^2$) measures the degree of discrepancy between models that are hierarchically related (i.e., nested models). A significant $\chi^2$ difference statistic indicates that there are statistically
significant differences between the groups. Given that chi-square tests are sensitive to sample size, it has been suggested that other fit indices also be inspected to determine whether differences in model fit are of practical significance rather than statistical significance (Gignac, 2006). Gignac (2006) suggests that a difference in the TLI (ΔTLI) that is equal to or greater than .01 is indicative of a practical difference in model fit.

Where difference statistics demonstrate a significant or practical difference between the constrained and unconstrained multigroup models, the null hypothesis should be rejected. Under circumstances where the null hypothesis cannot be rejected, groups are considered to be invariant and further testing of invariance is unjustified (Byrne, 2001).

When a significant difference is observed between the constrained and unconstrained models, each pathway is tested for invariance across the groups. Sequentially, each individual path constraint is freed and the model is re-estimated. If a given parameter estimate differs significantly between groups, the path is left unconstrained. Alternatively, if the freeing of a constraint does not produce a significant difference, the path is reinstated as constrained, thereby releasing one degree of freedom. Again, differences are assessed using the chi-square difference test and by examination of the change to the TLI.

5.2.5 Study Analyses

Two types of path analyses described above were conducted to address the aim and hypothesis of Study 1. To evaluate the hypothesised associations between the attachment orientations, the FFFS and responses to threatening and rewarding stimuli, a path model was developed. The model specified direct effects amongst the measured
variables. Specifically, the association between the components of the FFFS (i.e., fight, flight, and freeze) and threatening and rewarding words as moderated by attachment were conducted separately for each of the FFFS subsystems.

5.3 Results

5.3.1 Data Preparation

5.3.1.1 Dot-probe responses biases

In order to calculate the dot-probe response bias scores for threatening and rewarding words, the procedure outlined by Dewitte et al. (2007) was followed. Initially, all non-critical trials (i.e., neutral word pairs) were removed from the analyses. Reaction times (RTs) for trials with errors were removed. Trials with RTs that were more than two standard deviations above or below a participant’s mean RT were also judged as outliers and removed. Following this procedure, one case contained more than 10% missing data and was deleted.

Threat and reward response bias scores were computed separately for each participant. Consistent with past studies (e.g., Bradley et al., 2000; Mogg & Bradley, 1999), the mean RT for the dot-probe appearing in the same location as target words was subtracted from the mean RT for the dot-probe appearing in the same location as neutral words, thereby yielding one response bias score for trials containing threatening words and one response bias score for trials contained rewarding words for each participant. Positive bias scores indicate that a participant was quicker to respond to the position of a dot-probe appearing in the same position as a target word relative to a neutral word. In contrast, negative values indicate that a participant was slower to respond to the position of a dot-probe appearing in the same position as a target word.
relative to a neutral word. That is, positive values indicate a bias toward target words, whereas negative values indicate a bias away from target words (Dewitte et al., 2007).

5.3.1.2 Data screening

A Missing Value Analysis (MVA) was conducted in order to screen the data for missing values. MVA revealed that the proportion of missing values for each of the item did not exceed 5% and that missing values occurred completely at random. Missing values were initially substituted using Expectation Maximisation (EM) method, which resulted in a series of out of range values. Given the errors resulting from this estimation procedure, a more conservative estimate of missing values was computed using series mean substitution. A comparison of the data before and after series mean substitution revealed no significant differences in scores across the measured variables.

Data were then screened for univariate and multivariate outliers. A total of three univariate outliers were detected with standardised residuals of greater than ±3.29 ($p < .001$, two-tailed test). No multivariate outliers were detected. All Mahalanobis distance values fell below the critical value of $\chi^2(18) = 42.31$, $p < .001$. Based on these analyses, a total of 3 cases were deleted from the data.

Tests for violations of assumptions of normality, linearity, homoscedasticity, multicollinearity, and singularity were also conducted on the total sample. Normality was assessed by inspection of histograms and assessing absolute skewness and kurtosis values for all variables included in the study. Absolute skewness and kurtosis values were examined in accordance with Hu and Bentler’s (1999) recommendations for using SEM. Based on Monte Carlo simulation studies, Hu and Bentler argue that data transformations are not necessary if absolute skewness values are within the range of
±2.0 and absolute kurtosis values are no greater than ±4.0. Inspection of the absolute skewness and kurtosis values for the study variables revealed that all values fell within the acceptable ranges. Mardia’s multivariate statistic of kurtosis also indicated that the data were free from multivariate kurtosis (Mardia’s coefficient = 1.930, \( p > .01 \)). The absolute skewness and kurtosis values, as well as the standardised skewness and kurtosis values for all continuous variables included in the path models are reported in Table 5.1.

However, an examination of histograms revealed a bimodal distribution for both attachment anxiety and avoidance suggesting the need to separate these variables into groups rather than treat these variables as continuous. While this is not common practice, the distribution of the data across the attachment dimensions was bimodal to the extent that the only to reliably treat the data was to separate the attachment variables into groups. As such, each of these variables was converted into dichotomised variables representing high and low attachment anxiety and avoidance. The value at which the distinction between the categories of the bimodal distribution placed participants in the high attachment groups were ≥ 3.56 for attachment anxiety and ≥3.38 for attachment avoidance. The groups of individuals scoring above these cut-offs were labelled as high on anxiety and avoidance respectively, while those groups of individuals scoring below these cut-offs were labelled as low. The dichotomised attachment variables were then used as grouping variables in separate multigroup invariance tests to examine whether levels of attachment anxiety and avoidance (high or low) moderated the associations between the FFFS variables and threat and reward response biases.

Reliability analyses were conducted on all subscales in order to confirm the internal consistency of measures used. The Fight and Flight subscales included in the
hypothesised model demonstrated adequate reliability; however, the reliability of the Freeze subscale fell below an alpha of .60 suggesting poor internal consistency. The internal consistencies for all subscales included in the hypothesised model are reported in Table 5.1.

Linearity, singularity and mutlicollinearity were evaluated by inspecting the bivariate correlations between all variables included in the hypothesised model. No bivariate correlations exceeded .80. The means, standard deviations and intercorrelations amongst all subscales included in the Study 1 are presented in Table 5.2.

Table 5.1

*Internal consistencies of subscales included in the Study 1 analyses and absolute and standardised skewness and kurtosis values for all continuous model variables*

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Cronbach’s α</th>
<th>Absolute Skewness (Standardised Skewness)</th>
<th>Absolute Kurtosis (Standardised Kurtosis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threat bias</td>
<td>-</td>
<td>-.505 (-1.485)</td>
<td>.090 (.133)</td>
</tr>
<tr>
<td>Reward bias</td>
<td>-</td>
<td>.368 (1.085)</td>
<td>.639 (.941)</td>
</tr>
<tr>
<td>AAQ</td>
<td>.84</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Attachment Anxiety</td>
<td>.81</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Jackson 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jackson 5 Fight</td>
<td>.82</td>
<td>.333 (.982)</td>
<td>-.038 (-.056)</td>
</tr>
<tr>
<td>Jackson 5 Flight</td>
<td>.74</td>
<td>.449 (1.322)</td>
<td>-.063 (-.092)</td>
</tr>
<tr>
<td>Jackson 5 Freeze</td>
<td>.58</td>
<td>.409 (.988)</td>
<td>.523 (.631)</td>
</tr>
</tbody>
</table>

*Note.* AAQ = Adult Attachment Questionnaire.

*N* = 66.
Table 5.2

Means and standard deviations for all subscales, and correlations amongst all Study 1 variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Threat</th>
<th>Reward</th>
<th>Avoidance</th>
<th>Anxiety</th>
<th>J5 Fight</th>
<th>J5 Flight</th>
<th>J5 Freeze</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threat</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reward</td>
<td>.05</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoidance</td>
<td>-.11</td>
<td>.11</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>-.05</td>
<td>.06</td>
<td>.36**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J5 Fight</td>
<td>-.12</td>
<td>.20</td>
<td>.36**</td>
<td>.30*</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J5 Flight</td>
<td>.11</td>
<td>.06</td>
<td>-.15</td>
<td>.04</td>
<td>-.21</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>J5 Freeze</td>
<td>.13</td>
<td>.13</td>
<td>.14</td>
<td>-.02</td>
<td>-.13</td>
<td>.63**</td>
<td>-</td>
</tr>
<tr>
<td>M</td>
<td>-9.94</td>
<td>5.70</td>
<td>3.07</td>
<td>2.93</td>
<td>3.01</td>
<td>2.66</td>
<td>2.83</td>
</tr>
<tr>
<td>SD</td>
<td>39.21</td>
<td>33.34</td>
<td>1.13</td>
<td>1.05</td>
<td>.82</td>
<td>.72</td>
<td>.65</td>
</tr>
</tbody>
</table>

Note. Threat = Dot-probe Threat Bias; Reward = Dot-probe Reward Bias; Avoidance = Attachment Avoidance; Anxiety = Attachment Anxiety; J5 Fight = Jackson 5 Fight; J5 Flight = Jackson 5 Flight; J5 Freeze = Jackson 5 Freeze.
N = 66.
* p < .05 two tailed. ** p < .01 two tailed.

5.3.2 Data Analysis

Multigroup invariance analyses were conducted to explore whether the associations between the distinct components of the FFFS (i.e., Fight, Flight, and Freeze) and threat and reward response biases differed across the: a) high and low attachment avoidance groups, and b) high and low attachment anxiety groups. A total of six multigroup invariance tests were conducted in which each of the three components of the FFFS was regressed onto threat and reward bias as moderated by attachment anxiety (high, low) and attachment avoidance (high, low). This section is structured such that the results of the multigroup analyses for attachment avoidance and anxiety are presented for each respective component of the FFFS.
5.3.2.1 Fight

The initial unconstrained model specifying regression paths between fight and threat and reward bias resulted in excellent fit to the data for attachment avoidance $\chi^2(2, N = 66) = .04, p > .05; CFI = 1.000; TLI = 1.016; RMSEA = .000; SRMR = .008$. To determine whether either of the regression pathways between fight and threat and reward bias significantly differed between the high and low attachment avoidance groups, each path was constrained. The constrained model demonstrated a poor model fit $\chi^2(4, N = 66) = 6.11, p < .05; CFI = .704; TLI = .556; RMSEA = .091; SRMR = .092$. The $\Delta\chi^2$ test revealed significant differences in path coefficients between high and low attachment avoidance $\Delta\chi^2(2) = 6.08, p < .05$. To determine which regression paths differed across the high and low groups, each path was released one at a time.

The release of the path from fight to threat bias resulted in marginal model fit $\chi^2(3, N = 66) = 3.44, p < .05; CFI = .939; TLI = .878; RMSEA = .048; SRMR = .047$. While examination of the $\Delta\chi^2$ values suggested that there was no significant difference between the path coefficients from fight to threat bias for the high and low attachment avoidance groups $\Delta\chi^2(1) = 2.67, p < .05$, a comparison of the TLI values suggested there was a difference of practical significance between the two groups $\Delta$TLI = .032.

The path between fight and reward bias was then released. This resulted in excellent model fit $\chi^2(2, N = 66) = .04, p > .05; CFI = 1.000; TLI = 1.016; RMSEA = .000; SRMR = .008$. Inspection of the $\Delta\chi^2$ values suggested that there were no significant differences between the path coefficients from fight to reward bias for high and low attachment avoidance $\Delta\chi^2(1) = 2.67, p > .05$. However, a comparison of the $\Delta$TLI values indicated a practical difference in the associations between fight and reward bias between high and low attachment avoidance ($\Delta$TLI = .138). A significant positive association was found between fight and reward bias ($\beta = .50$) in the low attachment avoidance group.
avoidance group whereas, in the high attachment avoidance group, a significant negative association was found between fight and threat bias ($\beta = -.31$).

The initial unconstrained model for attachment anxiety resulted in excellent fit $\chi^2(2, N = 66) = .17, p > .05; \text{CFI} = 1.000; \text{TLI} = 1.021; \text{RMSEA} = .000; \text{SRMR} = .007$.

To determine whether either of the regression pathways between fight and threat and reward bias significantly differed across high and low attachment anxiety, regression paths were constrained. The constrained model demonstrated a poor fit to the data $\chi^2(4, N = 66) = 10.92, p < .05; \text{CFI} = .064; \text{TLI} = .004; \text{RMSEA} = .164; \text{SRMR} = .091$.

Comparison of the $\Delta\chi^2$ values for the constrained model to the unconstrained model indicated significant differences in path coefficients between high and low attachment anxiety $\Delta\chi^2(2) = 10.75, p < .05$. In order to determine which regression paths differed across the high and low groups, each path was released one at a time. The release of the path from fight to threat bias resulted in improved model fit $\chi^2(3, N = 66) = 6.78, p < .05; \text{CFI} = .933; \text{TLI} = .933; \text{RMSEA} = .193; \text{SRMR} = .088$. Furthermore, a significant chi-square difference was found between the constrained and unconstrained model ($\Delta\chi^2[1] = 4.14, p < .05$), as was a practical difference between the models ($\Delta\text{TLI} = .929$). The path between fight and reward bias was then released. This resulted in a model of excellent fit to the data $\chi^2(2, N = 66) = .17, p > .05; \text{CFI} = 1.000; \text{TLI} = 1.020; \text{RMSEA} = .000; \text{SRMR} = .007$. Chi-square difference tests revealed both significant and practical differences between the path coefficients from fight to reward bias for the high and low attachment anxiety groups ($\Delta\chi^2[1] = 6.61, p < .05; \Delta\text{TLI} = .08$). A significant positive association was found between fight and reward bias ($\beta = .37$) for the low anxiety group. In contrast, significant negative associations were observed between fight and threat bias ($\beta = -.35$) and fight and reward bias ($\beta = -.49$) for the high attachment anxiety group.
5.3.2.2 Flight

The unconstrained model specifying regression paths between flight and threat and reward bias resulted in an overall poor fit to the data for attachment avoidance $\chi^2(2, N = 66) = .13, p > .05; \text{CFI} = .767; \text{TLI} = .722; \text{RMSEA} = .066; \text{SRMR} = .021$. The constrained model also demonstrated poor fit $\chi^2(4, N = 66) = .876, p > .05; \text{CFI} = .740; \text{TLI} = .733; \text{RMSEA} = .059; \text{SRMR} = .027$. Comparison of the $\Delta\chi^2$ values for the constrained model to the unconstrained model indicated no significant differences in path coefficients between high and low attachment avoidance $\Delta\chi^2(2) = .745, p > .05$. Furthermore, comparison of the chi-square values revealed no practically significant differences between the models ($\Delta\text{TLI} = .003$).

The unconstrained path model for flight and threat and reward bias also demonstrated a poor model fit for attachment anxiety $\chi^2(2, N = 66) = .84, p > .05; \text{CFI} = .723; \text{TLI} = .733; \text{RMSEA} = .056; \text{SRMR} = .010$. In addition, the constrained model for high and low attachment anxiety was a poor fit to the data $\chi^2(4, N = 66) = 2.22, p > .05; \text{CFI} = .740; \text{TLI} = .733; \text{RMSEA} = .059; \text{SRMR} = .027$. Comparison of the chi-square values for the constrained model to the unconstrained model indicated no significant differences in path coefficients between high and low attachment anxiety $\Delta\chi^2(2) = 1.38, p > .05$. Furthermore, there was no difference in TLI values between the models.

5.3.2.3 Freeze

The unconstrained model specifying regression paths between freeze and threat and reward bias demonstrated a poor model fit for attachment avoidance $\chi^2(2, N = 66) = .09, p > .05; \text{CFI} = .868; \text{TLI} = .862; \text{RMSEA} = .053; \text{SRMR} = .018$. The constrained model for high and low attachment avoidance was also an overall poor fit.
to the data $\chi^2(4, N = 66) = .792, p > .05$; CFI = .878; TLI = .873; RMSEA = .056; SRMR = .034. Comparison of the chi-square values for the constrained model against the unconstrained model suggested there were no significant differences in path coefficients between high and low attachment avoidance $\Delta \chi^2(2) = .698, p > .05$. There were no practically significant differences between the models ($\Delta \text{TLI} = .009$).

The unconstrained path model for freeze and threat and reward bias was also a poor model fit for attachment anxiety $\chi^2(2, N = 66) = .86, p > .05$; CFI = .739; TLI = .549; RMSEA = .082; SRMR = .012. The constrained model for high and low attachment anxiety also demonstrated a poor fit to the data $\chi^2(4, N = 66) = 1.06, p > .05$; CFI = .738; TLI = .621; RMSEA = .084; SRMR = .019. Comparison of the $\Delta \chi^2$ values for the constrained model to the unconstrained model indicated no significant differences in path coefficients between high and low attachment anxiety $\Delta \chi^2(2) = 1.38, p > .05$. While an inspection of the $\Delta \text{TLI}$ between the models suggested some practically significant differences between them ($\Delta \text{TLI} = .072$), further invariance testing was not warranted as the model for freeze was an overall poor fit to the data.

### 5.2.3 Discussion

The aim of this study was to determine whether the associations between the FFFS and the detection of threat and reward are moderated by levels of attachment avoidance and anxiety. The results demonstrated that adult attachment moderated the relationship between the FFFS, specifically fight, and attentional biases to threatening and rewarding stimuli. According to RST, fight outputs occur when an animal is confronted with proximal threat stimuli (Gray & McNaughton, 2000; Smillie et al., 2006). It may be that fight was the specific aspect of the FFFS associated with threat
and reward bias in this study because participants were exposed momentarily to appetitive and aversive words that were relatively inescapable from attention.

In terms of the moderating effect of attachment, there was a significant association between higher levels of fight and an attentional bias toward rewarding words for individuals in the low attachment avoidance and low attachment anxiety groups. In contrast, there was a significant association between higher levels of fight and bias away from threat words for individuals with high attachment avoidance. For individuals with high attachment anxiety, there was a significant association between higher levels of fight and bias away from both threatening and rewarding words. These findings suggest that the detection or attentive component of the FFFS functions differently across the attachment orientations. Contrary to past integrative studies (e.g., MacDonald & Kingsbury, 2006; Meyer et al., 2005), the results suggest that the operation of the FFFS is linked to both attachment anxiety and avoidance.

In the low attachment avoidance and anxiety groups, fight was associated with a bias toward rewarding words. This association between fight and reward bias may be explained by links that have been made between fight responses and appetitive motivational processes in the RST literature. Recall that positive associations have been observed between fight processes and measures of approach motivation in previous research (e.g., Carver, 2004; Carver & Harmon-Jones, 2009; Harmon-Jones, 2003). Researchers have attributed this association to the inherent approach component of fight-oriented behaviours (Carver & Harmon-Jones, 2009). The findings are also consistent with propositions made in the attachment literature, which suggest that the characteristics of attachment security (i.e., low attachment anxiety or avoidance) are linked to appetitive motivational processes. For instance, attachment security has been associated with appetitive processes in previous research, including support seeking,
achievement motivation, approach-oriented coping strategies, and positive affect (e.g., Mikulincer & Florian, 1998; Mikulincer & Shaver, 2007; Wei et al., 2003; Shaver & Mikulincer, 2002).

The findings are especially important with regards to the differential functioning of the FFFS across insecure forms of attachment. Firstly, for both the high attachment anxiety and avoidance groups, FFFS was associated with a bias away from threat. This contrasts with previous accounts of how the RST systems might relate to attentional biases in the dot-probe task, whereby higher aversive motivation is expected to be related to attentional biases toward threatening words (e.g., Gable & Berkman, 2008; Zinbarg & Yoon, 2008). However, the findings are consistent with previous attachment studies (Dewitte et al., 2007) and also fit with the proposition that, after initial detection of threat stimuli, some individuals may engage in secondary attentional strategies to divert attention away from threat (Mogg & Bradley, 2002). The associations observed also support the notion that the FFFS may be a key mechanism underlying these attentional processes in individuals with high attachment anxiety or high attachment avoidance.

Furthermore, the results suggest that the FFFS operates in distinct ways for highly avoidant and highly anxious individuals. Considering that fight is a way of combating against an inescapable threat, the findings for highly avoidant individuals may reflect the notion of a hypersensitive FFFS. It can be speculated that, for highly avoidant individuals, fight may have been associated with attentional biases away from threatening words because they were able to accurately detect those words as threatening and fought against attending to the threatening cue.

For highly anxious individuals fight was associated with a bias away from both threat and reward. This suggests that there was little differentiation between the
detection of threatening and rewarding stimuli for these individuals, such that they may have fought against attending to both appetitive and aversive stimuli. This is consistent with past findings in the attachment literature, which have demonstrated that highly anxious individuals tend to misperceive positive stimuli as threatening (Edelstein & Gillath, 2008; Mikulincer et al., 2002) and respond to positive tasks as though they were aversive (Mikulincer & Sheffi, 2000). The lack of differentiation between fight and threat bias and fight and reward bias suggest that the threat detection component of the FFFS may indeed operate in abnormal or excessive way in highly anxious individuals. Thus, the results provide preliminary support the notion of a hyperfunctioning FFFS in highly anxious individuals, in which FFFS functioning may be characterised by abnormal threat detection and an inability to distinguish threatening from non-threatening stimuli.

The fact that high attachment anxiety and FFFS were associated with biased responses away from threat and reward stimuli and high avoidance and FFFS was associated with bias away from threatening stimuli, suggests that there may exist a cluster of individuals who, when high on both forms of attachment insecurity, experience a disorganised pattern of attentional processing of threatening and rewarding environmental cues. Consistent with this idea, a number of attachment researchers have speculated that the fearful avoidant attachment style (i.e., high attachment anxiety and avoidance) may be associated with ineffective processing of environmental cues as the effects of opposing attachment strategies aimed at averting attention away from threat (deactivating strategies) and remaining vigilant to potential danger (hyperactivating strategies) may lead to a collapse in attentional processes mitigating against accurate threat detection (Fraley et al., 2000; Shaver & Mikulincer, 2002; Simpson & Rholes, 2002). This failing of attentional processes may thus
contribute to the disorganised approach and avoidance behaviours demonstrated by fearful-avoidant individuals in close relationship contexts and situations of personal distress.

In interpreting the findings of the study, it is important to consider several issues regarding the measurement of the FFFS. Firstly, at a conceptual level, there may be concerns about the extent to which the Fight, Flight, Freeze subscales of the Jackson 5 can be used as a measure of the sensitivity of the FFFS to threatening environmental cues. Indeed some contend that the capacity for self-report measures of RST to reliably assess the underlying sensitivity or activation of a behavioural system is questionable (e.g., Pickering, 2004; Smillie, 2008). However, as a trait measure of RST, the item content of these scales is designed to capture dispositional tendencies to engage in particular behavioural responses associated with the three FFFS outputs (Jackson, 2009). As such, it can be argued that an individual’s responses reflect a predisposition to engage in such behaviours when environmental threat is detected, which is likely to reflect in some way the baseline sensitivity of the FFFS to such cues. Thus, while fight, flight and freeze are behavioural outcomes, dispositional biases to exhibit such responses across the course of interaction with one’s environment can be plausibly interpreted as representative of the sensitivity of the FFFS to detection of those cues.

Nevertheless, the psychometric properties of the Jackson 5 subscales in this study must also be considered. Specifically, the Freeze subscale of the Jackson 5 demonstrated low internal consistency ($\alpha = .58$). Thus, the items designed to measure the Freeze behavioural component of the FFFS did not converge to form a highly reliable scale. Such measurement issues preclude any firm conclusions from being drawn about the associations between the attachment dimensions, FFFS-freeze, and
threat and reward bias. This issue highlights the need for further empirical investigation and validation of the self-report measure.

Another empirical issue relates to the small sample size associated with each of the attachment groups (high and low avoidance and anxiety). The modest sample sizes across these attachment groups may have contributed to the lack of significant or practical findings across some of the FFFS constructs. Path analysis, like other covariance-modelling techniques are generally-regarded as large sampling statistical procedures. Having said this, the group sizes did not violate assumptions regarding the ratio of cases to model parameter estimates (Klem, 1995).

Despite these measurement issues, based on this empirical exploration, a number of preliminary conclusions can be drawn about the associations between the threat detection component of the FFFS and attachment dynamics. The findings suggest that the FFFS is likely to be a key mechanism that operates differently in the detection of threat and reward depending on levels of attachment avoidance and anxiety. In particular, the study provides preliminary support for the argument that the FFFS is a key system in the appetitive and aversive motivations of all insecurely attached individuals. For highly avoidant individuals, the findings suggest that the FFFS is associated with accurate threat detection and a bias away from threatening cues in the environment, thereby supporting the notion of a hypersensitive FFFS. For highly anxious individuals, the findings provide support for the proposal that a hyperfunctioning FFFS results in irregularities in the detection of threatening and rewarding environmental cues. One can also speculate that the functioning of the FFFS may be associated with deficits or biases in attentional processing of threatening and rewarding environmental cues in individuals who are concurrently high on both forms of insecure attachment.
CHAPTER 6

Study 2

6.0 Chapter Overview

In this chapter, Study 2 is presented. The chapter begins with a brief introduction and rationale for the study followed by a description of the methods used. The results section is then presented, and is divided into two parts. Firstly, the data screening process is outlined, followed by a description of the results. The results are then discussed in the final section of the chapter, with reference to the overall aim and hypothesis for the study.

6.1 Introduction

Study 2 was conducted in order to examine the second aim of this thesis, namely, to determine whether individual differences in attachment are associated with different behavioural responses of the FFFS under conditions of high and low relationship threat. Given the context of this thesis, it was important to investigate the associations between adult attachment and the FFFS within the relationship context where evidence for the role of attachment system functioning in influencing approach and avoidance behaviour has been established. Moreover, determining the links between attachment theory and RST constructs within the context of threatening relationship situations has been recognised as a key step toward the integration of these
behavioural systems theories of appetitive and aversive motivation (Meyer et al., 2005).

In contrast to Study 1 which focused upon elucidating how the threat detection component of the FFFS is associated with attachment, Study 2 was designed to elucidate how the behavioural outputs of the FFFS, as manifested in potentially threatening relationship contexts, differ as a function of the attachment dimensions. In this regard, the study represents an attempt to understand the links between the behavioural components of the FFFS and adult attachment. Based on the theoretical propositions outlined in Chapter 2 to 4, one would expect the behavioural outputs of the FFFS across circumstances of high and low threat to differ depending on levels of attachment anxiety and avoidance. Moreover, given the argument in this thesis regarding the attachment construct of fearful avoidance, which is characterised by the combination high attachment anxiety and high attachment avoidance, one would further expect that the interaction between levels of attachment anxiety and avoidance may be associated with different FFFS behavioural outputs in response to varying degrees attachment threat. Therefore, it was hypothesised that FFFS responses would significantly differ in high and low threat conditions as moderated by the interaction between attachment anxiety and avoidance.

6.2 Method

6.2.1 Participants

The total sample consisted of 327 participants that included 255 (78%) women and 72 (22%) men. The age of participants ranged between 18 and 68 years ($M = 27.45$, $SD = 9.55$). The majority of the sample were of heterosexual orientation
(81.9%), 12.8% were bisexual and 5.2% were homosexual. One hundred and ten (34%) participants were single, 90 (28%) were in a relationship but not living together and 123 (38%) were cohabiting. Of the participants who were cohabiting, 39 (32%) were married. The relationship length of participants ranged between one and 431 months and the mean relationship duration was 55.72 months ($SD = 77.94$). Of those couples who were living together, the length of cohabitation ranged between one and 455 months ($M = 68.67, SD = 91.31$). The number of previous relationships recorded by participants ranged between zero and 27, with a median of three.

The majority of the sample (65.3%) reported that at least one parent was Australian or New Zealand born, while another 11.2% had a parent born in European countries, 10.7% in Great Britain, 5.4% in Asian countries. Another 5.4% of the sample had a parent born in other regions, including the Middle East, North America and Africa, while 2% were not specified. A total of 23 different religious affiliations were reported. Over a third (36.4%) of the sample reported no religious beliefs, 9.2% were Atheist, and 5.5% were Agnostic. Of the religious affiliations reported, the greatest proportions of participants were Catholic (16.8%), Christian (9.8%), Anglican (2.4%), Orthodox (2.1%), or held non-religious spiritual beliefs (1.5%).

The largest proportion of participants (41.9%) had completed tertiary studies (27.2% undergraduate degree, 8.3% postgraduate, 6.4% a diploma or certificate) as their highest level of education. An additional 39.8% of the sample had completed secondary education, or the equivalent, while 11% did not finish high school. Another 5.2% were qualified in industry and trade. Occupations were reported across 11 different occupational fields; the highest proportions of the sample were students (26.3%), followed by those employed in the health services and fitness (12.5%), and business and finance (10.1%) industries. Other areas of occupation included trades and
services (8.0%), administration and secretarial (6.7%), retail and sales (5.8%), homemaking (5.5%), education (5.5%), science and technology (4.9%), government (2.8%), and hospitality and tourism (2.4%). A small proportion of participants (4.6%) reported no occupation and 1.2% were in receipt of a disability pension. In terms of employment status, 33.9% of participants were working on a full-time basis, 14.4% were employed on a part-time basis, 11.9% were working casually and 12.8% were unemployed.

6.2.2 Materials

Data were collected using an online questionnaire. The first section of the questionnaire comprised the demographic questions utilised in Study 1. Given the context of the study, an item was also included that asked participants to indicate their sexual orientation.

6.2.2.1 Relationship vignette

Similar to the methodology used by Meyer et al. (2005), the online questionnaire consisted of a relationship vignette in which the degree of threat was manipulated, such that participants were exposed to either a low or highly threatening relationship scenario. Participants were instructed to imagine a scenario in which their romantic partner had been spending more time with a fellow classmate and that, during the week, their partner cancelled the plans they had made for Saturday in order to spend the day and evening studying with this person (see Appendix B). For male participants, a colour photograph of this classmate; either an attractive male (high
threat) or a female of average attractiveness (low threat) was presented below the vignette. Conversely, females were presented with a colour photograph of either an attractive female (high threat) or a male of average attractiveness (low threat). The colour photographs were selected from a freely accessible face recognition database. Ratings of the attractiveness of the stimulus faces and the realism of the scenario were piloted prior to the study. On a scale of 1 to 10, a small community sample (N = 16) rated the stimulus faces as varying in the degree of attractiveness between the high (Male face: $M = 5.44$; Female face: $M = 8.31$) and low threat conditions (Male face: $M = 3.38$; Female face: $M = 3.44$). A small community sample (N = 6) also rated the scenario as realistic ($M = 7.2$) on a 10-point scale.

Following presentation of the vignette, participants were then asked questions about how they would respond to the hypothetical scenario. Four questions were rationally devised for this study to measure Fight, Flight, and Freeze responses to the potential relationship threat. One item was designed to tap the flight FFFS response. The flight item was (1) “To what extent would this situation cause you to leave your partner?” Two items were developed to measure FFFS fight as it was considered important to make the distinction between a constructive fight response and an aggressive fight response. This distinction was made because, particularly in interpersonal situations, human defensive responses can often involve what would be conceptualised in RST terms as fight-oriented behaviour toward the source of threat (Gray & McNaughton, 2000), without necessarily producing overt aggression. Thus, the fight items were (2) “To what extent would this situation make you unhappy and cause you to confront your partner, but do so in a rational and assertive manner?” and (3) “To what extent would this situation make you so upset that you would become aggressive towards your partner (either verbally or physically)?”. Finally, the freeze
item, which was designed to tap the halting of behaviour in response to threat, was “To what extent would you panic and not know what to say or do?” Participants were asked to rate the extent to which they would respond to each of the four questions using a 7-point scale ranging from 1 (definitely no) to 7 (definitely yes).

6.2.2.2 Manipulation check items

Two items were used to assess the experimental manipulation of threat. Participants were asked to rate the degree to which they would find this scenario worrying and the degree to which they would perceive this situation as a threat to their relationship. These items were rated on seven-point Likert-type scale from 1 (not at all) to 7 (extremely).

6.2.2.3 Adult attachment

The AAQ (Simpson et al., 1996) used in Study 1 was used to assess attachment.

6.2.3 Procedure

To maximise the rate of participant recruitment, the online questionnaire was advertised on a major social networking website (Facebook). A short description of the study, which included the link to the online questionnaire, was posted on various websites in order to receive the greatest exposure to the general community and maximise the likelihood of obtaining a representative community sample. Two separate identical advertisements were used; however, one advertisement contained the link to the questionnaire that included high threat vignette and one contained the link to the questionnaire that included the low threat vignette. Over the course of 18 days,
the advertisements were randomly posted next to internet users’ personal networking pages, identified as living in Australia and being 18 years of age or older. The random positioning of the two advertisements was intended to ensure random allocation to experimental conditions.

Participants volunteered to participate in the study by clicking on the active url link, which directed them to the study’s Plain Language Statement (see Appendix D). Their consent was implied by completing the anonymous online questionnaire and they were free to withdraw at any time by simply exiting the website at any time prior to submission of results. Upon answering the demographic questions, which included nomination of the participant’s gender, participants were then presented with the gender-appropriate vignette. Participants were asked to respond to the vignette and manipulation check items before being directed to complete the remaining questionnaire. The online questionnaire took approximately 20 minutes to complete.

6.2.4 Study Analyses

The data were screened and analysed using PASW Statistics18. The associations between attachment, threat and FFFS-related responses to the relationship vignette were examined using between groups factorial ANOVA.

6.3 Results

6.3.1 Data Screening

A Missing Value Analysis (MVA) was conducted in order to screen the data for missing values. MVA revealed that the proportion of missing values for each of the
items did not exceed 8% and that missing values occurred completely at random. Missing values were initially substituted using Expectation Maximisation (EM) method, which resulted in a series of out of range values. Therefore, more conservative and accurate estimates of missing values were computed using series mean substitution. A comparison of the data before and after series mean substitution revealed no significant differences in scores across the independent and dependent variables.

Data were then screened for multivariate and univariate outliers. The analyses revealed a total of four multivariate outliers with a Mahalanobis distance exceeding the critical value, $\chi^2(23) = 49.73, p < .001$. Ten additional univariate outliers with standardised residuals of greater than $\pm 3.29 (p < .001, \text{two-tailed})$ were also detected. Based on these analyses, a total of 14 cases were deleted from the data.

In order to compute the attachment dimension subscales, items were reverse coded and summed according to scale instructions. Reliability analyses were conducted on the AAQ subscales, which demonstrated acceptable internal consistencies (Attachment Anxiety: $\alpha = 0.79$; Attachment Avoidance: $\alpha = 0.79$).

Linearity, singularity and multicollinearity were evaluated through the inspection of the bivariate correlations between all variables included in the analyses. No bivariate correlations exceeded .80. The intercorrelations amongst all subscales included in Study 2 are presented in Table 6.1.

Tests for violations of assumptions of normality, linearity, and homoscedasticity, were also conducted on the total sample. Normality was assessed by examining the histograms and assessing absolute skewness and kurtosis values for all variables included in the study. Standardised skewness and kurtosis values were examined and are reported in Table 6.2. All standardised skewness and kurtosis values
fell below the critical value of ± 3.29 ($\alpha = .001$). Examination of histograms revealed that both attachment anxiety and avoidance were again bimodally distributed suggesting the need to separate these subscales into high and low groups. As such, each of these variables was dichotomised into a categorical variable representing high and low attachment anxiety or avoidance. For both attachment anxiety and avoidance, participants with scores $\geq 3.51$ were classified as belonging to the high attachment groups. The means and standard deviations for the attachment groups by threat condition for each of the dependent variables are presented in Table 6.3.

Levene’s Test of Equality of Error Variances were significant across all four FFFS items ($F[7, 305] = 8.21, p < .05$, flight; $F[7, 305] = 7.65, p < .05$, rational fight; $F[7, 305] = 2.49, p < .05$, aggressive fight; $F[7, 305] = 2.87, p < .05$, freeze) suggesting that the assumption of homogeneity of variance was violated. However, caution needs to be exercised in interpreting the significance of these values due to the large sample size of the each group. Levene’s test has been identified as a test statistic that is highly sensitive to large sample sizes (e.g., O’Neil & Matthews, 2000). As a result, Type II error rates are significantly increased when estimating homogeneity of variance with large $N$. It is recommended that visual plots such as histograms are used to examine the similarity of distributions across groups in such instances. Inspection of these plots revealed very little difference between groups, and as such no adjustments were made to the group distributions.
Table 6.1

*Bivariate correlations for all measured variables included in Study 2 analyses by condition*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Flee</th>
<th>Fight</th>
<th>Fight</th>
<th>Freeze</th>
<th>Avoidance</th>
<th>Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Confront</td>
<td>Aggressive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flee</td>
<td>-</td>
<td>.40**</td>
<td>.22**</td>
<td>.37**</td>
<td>.05</td>
<td>.15</td>
</tr>
<tr>
<td>Fight Confront</td>
<td>.24**</td>
<td>-</td>
<td>.33**</td>
<td>.26**</td>
<td>.00</td>
<td>-.06</td>
</tr>
<tr>
<td>Fight Aggressive</td>
<td>.41**</td>
<td>.19*</td>
<td>-</td>
<td>.16*</td>
<td>.02</td>
<td>0.00</td>
</tr>
<tr>
<td>Freeze</td>
<td>.18*</td>
<td>.10</td>
<td>.30**</td>
<td>-</td>
<td>.24**</td>
<td>.20*</td>
</tr>
<tr>
<td>Avoidance</td>
<td>-.09</td>
<td>-.01</td>
<td>-.06</td>
<td>-.01</td>
<td>-</td>
<td>.32**</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.18*</td>
<td>.06</td>
<td>.23**</td>
<td>.28**</td>
<td>.13</td>
<td>-</td>
</tr>
</tbody>
</table>

*Note.* Intercorrelations for Low Threat Condition (n = 159) are presented above the diagonal, and intercorrelations for High Threat Condition (n = 154) are presented below the diagonal. Avoidance = AAQ Attachment Avoidance; Anxiety = AAQ Attachment Anxiety.

N = 313.

*p < .05 two tailed. **p < .01 two tailed.

Table 6.2

*Standardised skewness and kurtosis values for FFFS items and attachment subscales included in Study 2 analyses*

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Standardised Skewness</th>
<th>Standardised Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vignette responses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flee</td>
<td>1.19</td>
<td>.54</td>
</tr>
<tr>
<td>Fight Confront</td>
<td>1.29</td>
<td>.89</td>
</tr>
<tr>
<td>Fight Aggressive</td>
<td>-.58</td>
<td>-.92</td>
</tr>
<tr>
<td>Freeze</td>
<td>.81</td>
<td>-.38</td>
</tr>
<tr>
<td>AAQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoidance</td>
<td>.41</td>
<td>-.11</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.15</td>
<td>-.39</td>
</tr>
</tbody>
</table>

*Note.* AAQ = Adult Attachment Questionnaire; Avoidance = AAQ Attachment Avoidance; Anxiety = AAQ Attachment Anxiety.

N = 313.
Table 6.3
Means and standard deviations of FFFS responses by relationship threat condition and attachment.

<table>
<thead>
<tr>
<th>FFFS Response</th>
<th>Threat Condition</th>
<th>Avoidance</th>
<th>Anxiety</th>
<th>M</th>
<th>(SD)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>Low</td>
<td>1.27</td>
<td>(.54)</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>High</td>
<td>1.87</td>
<td>(1.41)</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>1.55</td>
<td>(1.08)</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>Low</td>
<td>1.45</td>
<td>(.74)</td>
<td>22</td>
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*Note: N = 313.*
6.3.2 Data Analysis

To examine the main effects and interaction effects for attachment anxiety and avoidance and threat condition on mean FFFS responses to the relationship scenario, four three-way between groups ANOVAs (2 [high and low attachment avoidance] × 2 [high and low attachment anxiety] × 2 [high and low threat condition] were conducted. ANOVA was the preferred as an analytic technique over MANOVA as the correlations between the DVs were low to moderate (.16 - .41) (Tabachnick & Fiddell, 2007).

6.3.2.1 Manipulation check

In order to confirm that there was a significant difference between the degree of perceived threat between the high and low threat conditions, independent samples t-tests were conducted on the manipulation check items. The independent samples t-tests revealed significant differences between the high and low threat groups on the items assessing worry and threat. Participants in the high threat condition rated the scenario as significantly more worrying ($M = 4.58, SD = 1.54$) than participants in the low threat condition ($M = 2.77, SD = 1.66$); $t(311) = 9.95, p < .001$, two-tailed. Participants in the high threat condition also rated the scenario as significantly more of a threat to their relationship ($M = 4.31, SD = 1.74$) than participants in the low threat condition ($M = 2.53, SD = 1.56$); $t(311) = 9.52, p < .001$, two-tailed.

6.3.2.2 Flight

The results of the ANOVA for flight revealed significant main effects for condition; $F(1, 305) = 24.26, p < .05$, partial $\eta^2 = .07$, power = 1.00, and attachment anxiety; $F(1, 305) = 11.23, p < .05$, partial $\eta^2 = .04$, power = .92. Participants in the
high threat condition were significantly more likely ($M = 2.29, SD = 1.34$) to leave their partner than participants in the low threat condition ($M = 1.55, SD = .97$). High attachment anxiety was associated with a greater tendency to want to leave the relationship partner ($M = 2.09, SD = 1.30$) than low attachment anxiety ($M = 1.68, SD = 1.07$). While there were no significant two-way interactions, the analysis revealed a significant three-way interaction for threat condition × attachment avoidance × attachment anxiety; $F(1, 305) = 3.82$, $p < .05$, partial $\eta^2 = .01$, power = .50. Simple effects analysis of the three-way interaction revealed that there were significant differences between the high and low attachment anxiety groups when threat was low and attachment avoidance was low; $F(1, 82) = 5.75$, $p < .05$, such that the high attachment anxiety group ($M = 1.87, SD = 1.42$) were more likely to respond by leaving their partner than the low attachment anxiety group ($M = 1.27, SD = .54$). There were also significant differences between the high and low attachment anxiety groups when both threat and attachment avoidance were high $F(1, 82) = 65.91$, $p < .05$. In the high threat condition, when avoidance was high, the high attachment anxiety group ($M = 2.59, SD = 1.43$) were more likely to want to leave their partner than the low attachment anxiety group ($M = 1.74, SD = 1.18$). The interaction effects are displayed in Figure 1 and Figure 2, respectively. As can be seen by inspecting the right side of Figure 1, individuals who were high on attachment anxiety and low attachment avoidance exhibited a much stronger flight response compared to those who were low in attachment anxiety and avoidance in the non-threatening condition. In contrast, as can be seen by inspecting the left side of Figure 2, the combination of high avoidance and low anxiety was associated with a low flight response in the highly threatening relationship situation.
Figure 1. Two-way interaction between dichotomised attachment avoidance and anxiety in the low relationship threat condition for Flight.

Figure 2. Two-way interaction between dichotomised attachment avoidance and anxiety in the high relationship threat condition for Flight.
6.3.2.3 Rational fight

The results of the ANOVA for the fight item involving assertive confrontation revealed a significant main effect for condition; $F(1, 305) = 47.15, p < .05$, partial $\eta^2 = .13$, power = 1.00. Participants exposed to the high threat condition ($M = 5.59, SD = 1.52$) were significantly more likely to confront their partner in a rational and assertive manner than participants in the low threat condition ($M = 4.06, SD = 2.01$). While there were no significant two-way interactions, the analysis revealed a significant three-way interaction for threat condition $\times$ attachment avoidance $\times$ attachment anxiety; $F(1, 305) = 14.09, p < .05$, partial $\eta^2 = .01$, power = .56. Simple effects analysis of the three-way interaction revealed that there were significant differences between high and low attachment anxiety when threat was low and attachment avoidance was low; $F(1, 86) = 5.99, p < .05$, such that the high attachment anxiety group ($M = 4.47, SD = 1.94$) were more likely to confront their partner in a rational way than the low attachment anxiety group ($M = 3.93, SD = 2.29$). There were also significant differences between high and low attachment anxiety when threat and attachment avoidance were high; $F(1, 86) = 5.44, p < .05$. Compared to the low attachment anxiety group ($M = 5.35, SD = 1.82$), the high attachment anxiety group ($M = 5.96, SD = 1.08$) were more likely to confront their partner in a rational and assertive manner. In addition, there were marginally significant differences between the high and low attachment anxiety groups when threat was high and attachment avoidance was low; $F(1, 86) = 5.26, p = .05$. Specifically, the high attachment anxiety group ($M = 5.18, SD = 1.69$) were less likely to assertively confront their partner than the low attachment anxiety group ($M = 5.66, SD = 1.55$). The interaction effects are displayed in Figure 3 and Figure 4, respectively. As can be seen by inspecting the left side of Figure 3, in the low threat condition, individuals with low attachment avoidance were
significantly more likely to confront their partner in a rational and assertive manner if they were high on attachment anxiety rather than low on attachment anxiety. By contrast, the right side of Figure 4 demonstrates that those individuals with high attachment avoidance and anxiety were more likely to respond with rational fight behaviours than those with high attachment avoidance and low attachment anxiety.
Figure 3. Two-way interaction between dichotomised attachment avoidance and anxiety in the low relationship threat condition for Rational Fight.

Figure 4. Two-way interaction between dichotomised attachment avoidance and anxiety in the high relationship threat condition for Rational Fight.
6.3.2.4 Aggressive fight

The results of the ANOVA for fight item that involved becoming aggressive toward one’s partner revealed a significant main effects for condition; $F(1, 305) = 21.34, p < .05$, partial $\eta^2 = .07$, power = 1.00, and attachment anxiety; $F(1, 305) = 4.40, p < .05$, partial $\eta^2 = .01$, power = .55. Participants in the high threat condition ($M = 2.42, SD = 1.42$) were significantly more likely to get so upset they would become aggressive toward their partner than participants in the low threat condition ($M = 1.70, SD = 1.07$). The high attachment anxiety group ($M = 2.19, SD = 1.35$) were also significantly more likely to become aggressive toward their partners than the low attachment anxiety group ($M = 1.88, SD = 1.23$). There were no significant two or three-way interaction effects.

6.3.2.5 Freeze

The results of the ANOVA for freeze revealed significant main effects for condition; $F(1, 305) = 28.26 , p < .05$, partial $\eta^2 = .09$, power = 1.00, and attachment anxiety; $F(1, 305) = 14.02, p < .05$, partial $\eta^2 = .04$, power = .96. Participants in the high threat condition ($M = 3.10, SD = 1.75$) were significantly more likely to panic and not know what to do in the situation than participants in the low threat condition ($M = 2.07, SD = 1.42$). The high attachment anxiety group ($M = 2.88, SD = 1.75$) were also likely to panic to greater extent than the low attachment anxiety group ($M = 2.16, SD = 1.45$). There were no significant two or three-way interaction effects.
6.4 Discussion

This study aimed to determine whether the behavioural expression of the FFFS under varying conditions of relationship threat differs as a function of the attachment dimensions. The hypothesis that FFFS responses would differ significantly in the high and low threat conditions as moderated by attachment anxiety and avoidance was partially supported by the results. Specifically, significant three-way interactions were found for both the flight and rational fight behavioural responses to relationship threat. In the high threat condition, individuals high on attachment anxiety and avoidance were significantly more likely to want to engage in the flight response than those with low attachment anxiety and high attachment avoidance. Rational fight responses also differed significantly between high and low attachment anxiety when attachment avoidance was high. Again, individuals with high attachment avoidance and anxiety endorsed a greater tendency to respond with rational fight behaviours than those with high attachment avoidance and low attachment anxiety in the high threat condition. In the low threat condition, individuals who were high on attachment anxiety and low attachment avoidance were significantly less likely to engage in a rational fight response than individuals with low attachment anxiety and avoidance. In contrast, no interaction effects were observed for the aggressive fight and freeze behavioural responses.

The results for individuals who were high on both attachment anxiety and avoidance in the high threat condition are particularly noteworthy. These individuals constitute the fearful avoidance attachment style reported in the attachment literature (Bartholomew & Horowitz, 1991). Specifically, it is interesting that these individuals simultaneously displayed the strongest flight and rational fight responses when faced
with relationship threat. That is, in response to the scenario, this group of individuals endorsed a heightened desire to want to both leave their partner but also to confront them rationally about the situation. This may in some way reflect fearfully avoidant individuals’ state of internal conflict between the desire to avoid attachment relationships for fear of being rejected or hurt (i.e., high attachment avoidance) and their desire to seek proximity to attachment figures to allay distress (i.e., high attachment anxiety; Riggs et al., 2007). It may be that the persistent internal conflict coupled with the FFFS activity experienced by these individuals in attachment situations produces an incoherent mixture of FFFS behavioural outputs. According to Simpson and Rholes (2002), the pattern of disorganised approach-avoidance behaviours in fearfully avoidant individuals results from engagement in a mixture of hyperactivating and deactivating attachment strategies. One may speculate that the simultaneous enactment of these contradictory attachment strategies by the attachment system affects in some way the operation, or expression, of the FFFS in response to attachment threat. This notion may partly explain the association between attachment anxiety and heightened relational ambivalence observed in recent attachment studies (Mikulincer et al., 2010). While these contentions need to be addressed further in future research, they provide preliminary support for the proposition that a key mechanism that is likely to be associated with the expression of the disorganised behavioural tendencies in fearful individuals is the FFFS.

Individuals with high attachment avoidance and low anxiety exhibited comparatively lower flight reactions in the high threat condition than their fearful avoidant counterparts. While a flight response may have been expected for high avoidance/low anxiety individuals based on avoidant individuals’ use of behavioural
strategies to disengage from attachment threat (e.g., Pietromonaco & Greenwood, 2000; Creasey, 2002), this was not observed in the present study. Consistent with past research (e.g., Edelstien & Gillath, 2008; Mikulincer & Sheffi, 2000), it may be that these individuals were able to suppress their fears of rejection and down-play the implications of the threatening situation through attachment deactivation, thereby circumventing the expression of heightened FFFS behavioural outputs in the high threat condition.

In relation to the low threat condition, individuals who were high on attachment anxiety and low attachment avoidance exhibited a much stronger flight response compared to those with low attachment anxiety and avoidance. This suggests that high anxiety/low avoidance individuals are likely to react with a heightened flight response even when the relationship scenario is relatively benign. In the RST literature, individuals who report greater levels of fear and sensitivity to threat tend to select behavioural responses to threat scenarios that are oriented away from threat, such as leaving or escaping (e.g., Perkins et al., 2010; Perkins & Corr, 2006). Therefore, the fact that high attachment anxiety was associated with a greater flight response suggests that this form of attachment is associated with the fear system. Moreover, that elevated flight outputs were observed in the low threat condition supports the proposition that attachment anxiety may be associated a hyperfunctioning FFFS, whereby abnormal or excessive FFFS activity results in exaggerated FFFS output in non-threatening situations. For these individuals, the excessive FFFS activity appears to have manifested as a heightened flight behavioural response. This finding is consistent with research by Dewitte et al. (2009), who demonstrated that anxious individuals’ approach-avoidance tendencies did not differ between threatening and
non-threatening contexts, suggesting that they do not, or perhaps cannot, modify their behaviour according to the presence (or absence) of threat. The heightened FFFS output under conditions of low threat also fits with Meyer et al.’s (2005) finding that attachment anxiety was related to heightened distress, even in low relationship threat conditions. Taken together, the findings support the proposition that the behavioural tendencies displayed by anxious individuals may be attributable to a hyperfunctioning FFFS.

In the low threat condition, it was also found that those individuals with low attachment avoidance and high anxiety were less likely to exhibit rational fight behaviours than those with low avoidance and anxiety, although these effects were only marginally significant. That is, highly anxious individuals were less likely to confront their partner in a rational way than secure individuals. These findings may be explained by considering the characteristic behavioural tendencies and motivations of anxious versus securely attached individuals. This finding may reflect anxious individuals’ tendency to engage in less adaptive behavioural strategies to manage the relationship threat, such as exaggerating distress, becoming clingy, and escalating the severity of the potential relationship issue (Campbell et al., 2005; Mikulincer & Shaver, 2007; Rholes et al., 1999), rather than confronting their partner in a rational way. In contrast, secure individuals are more likely to confront their partner rationally as they view threat as manageable and engage in positive communication and constructive problem-solving strategies to manage relationship stress (e.g., Creasey, 2002; Shi, 2003; Wei et al., 2003).

In contrast, no significant effects were evident in the low threat condition for individuals low on attachment anxiety but high on attachment avoidance. This finding
may be explained by a hypersensitive FFFS whereby, for highly avoidant individuals, the FFFS functions in an appropriate manner such that FFFS behavioural responses are not activated under non-threatening attachment conditions. This is consistent with previous attachment research which demonstrated that attachment avoidance is associated with accurate discrimination between threatening and non-threatening attachment cues (Edelstein & Gillath, 2008; Mikulincer et al., 2002).

No interaction effects were observed for the aggressive fight and freeze behavioural responses. It is important to consider why the interactions effects found for flight and rational fight responses were not observed for these other FFFS outputs. One possible explanation is that the content of the scenarios were not acute enough to incite aggressive fight or freeze responses. According to RST, different behavioural FFFS outputs occur depending on the nature of the threatening stimulus. The theory specifies that fight occurs in response to proximal threat stimuli, whereas freeze responses occur when escape from the distal threat (i.e., flight) is not possible (Gray & McNaughton, 2000; Jackson, 2009). Perhaps the task of imagining a hypothetical relationship situation was not experienced as a serious enough threat to require activation of an aggressive fight response. Indeed, ratings of perceived threat in the scenarios were somewhat low for both the high and low threat situations in absolute terms. Along similar lines, a possible explanation for the lack of interaction effects for freeze might be that the situation was not perceived as an inescapable threat that was severe enough to incite a freeze response.

Of interest nonetheless, main effects were observed for attachment anxiety for both of these FFFS responses. Regardless of the degree of threat or levels of attachment avoidance, high attachment anxiety was associated with heightened
aggressive fight and freeze responses. These findings again support the notion of a hyperfunctioning FFFS in anxious individuals. That is, despite the degree of threat and attachment avoidance tendencies, highly anxious individuals are more likely to express behavioural responses of aggressive fight and freeze than individuals low on attachment anxiety due to a hyperfunctioning FFFS.

In summary, the results indicate that, under conditions of low threat, anxious attachment (i.e., high attachment anxiety and low attachment avoidance) was associated with exaggerated flight and rational fight outputs relative to attachment security. In addition, high attachment anxiety was associated with greater FFFS responses regardless of the degree of the threat in a situation or one’s levels of attachment avoidance. These findings provide support for the link between attachment anxiety and the hyperfunctioning FFFS. The results of the study also provide support for a link between attachment avoidance and a hypersensitive FFFS as the extent to which FFFS behavioural responses were expressed varied as a function of the degree of attachment avoidance across high and low threat conditions; at least for flight and rational fight responses. These findings also make an interesting contribution to our understanding of the fearful avoidance attachment style and the distinct ways in which the FFFS may contribute to the state of ambivalence and disorganised attachment behaviours exhibited by these individuals.
CHAPTER 7

Study 3

7.0 Chapter Overview

In this chapter, Study 3 is presented. The chapter begins with a brief introduction and rationale for the study followed by a description of the methods used. The results section is then presented, and is divided into two parts. Firstly, the data screening process is outlined, followed by a description of the results. The results are then discussed in the final section of the chapter, with reference to the overall aim and hypothesis for the study.

7.1 Introduction

Study 3 was conducted in order to address the final aim of this thesis. Specifically, the goal of the study was to determine whether attachment influences the behavioural responses of the FFFS under conditions of high and low substance use threat. Expanding upon Study 2, Study 3 represents an attempt to further explore the interrelationships between the behavioural components of the FFFS and adult attachment within a broader context than relationships. Thus, Study 3 is based on the rationale that, if the behavioural systems of RST and attachment are hierarchical in nature, then it is possible that nested systems of RST, such as the functioning of the attachment system, may over the course of time, yield such strong behavioral patterns, that these in turn exert influence on the functioning of broad (i.e., higher-order)
systems of RST. Consequently, the associations between the attachment system and the FFFS could manifest in more generalised approach-avoidance contexts. If this is the case, then it may be that feedback from this nested subsystem exerts bottom-up effects on the operation of FFFS outside the relationship context. The speculation regarding the hierarchical nature of behavioural systems and possible feedback processes are based on work by Carver and others who suggest such a nested behavioural systems perspective (Carver & Scheier, 1982; Carver et al., 2000). If the attachment system is a nested system of RST, and nested systems can reciprocally influence functioning at higher-order levels, then the associations observed in Study 2 between the FFFS and the attachment orientations are likely to be found in other contexts that activate appetitive and aversive motivational processes, such as that involving substance use. If no associations are found between the FFFS and attachment in the substance use context, then it is perhaps the case that the attachment system functioning does not feed back into the broader systems of RST.

The substance use context was chosen purposely. RST has been used as a framework for understanding addiction and substance use behaviour (e.g., Franken et al., 2006; Kambouropoulos & Staiger, 2004). Likewise, links between adult attachment characteristics and substance use have also been made in the literature (e.g., Kassel, Wardle, & Roberts, 2007; Schindler et al., 2005). Therefore, it was deemed particularly valuable to examine whether the associations found between attachment and the FFFS in Study 2 would be replicated in this context where both RST system functioning and the attachment constructs have been shown to influence approach and avoidance behaviours. Consistent with Study 2, it was hypothesised that FFFS
responses would significantly differ in high and low threat conditions as moderated by attachment anxiety and avoidance.

7.2 Method

7.2.1 Participants

The total sample consisted of 302 participants from the wider community, including 210 women and 92 men, who were again recruited via the same methods as those described in Study 2. The age of participants ranged between 18 and 75 ($M = 28.33$, $SD = 11.94$). One hundred and four (34.4%) participants were single, 81 (26.8%) were in a relationship but not living together and 115 (38.3%) were cohabiting. Of the participants who were cohabiting 50 (43.5%) were married. The duration of current relationships ranged between 1 and 588 months and the mean relationship duration was 63.22 ($SD = 94.69$) months. The length of cohabitation also ranged between 1 and 588 months ($M = 79.21$, $SD = 111.12$). The number of previous relationships recorded by participants ranged between zero and 60, with a median of three.

The majority of the sample (64.9%) reported that at least one parent was Australian or New Zealand born, while another 12.9% had a parent born in Great Britain, 8.4% in European countries, and 8.1% in Asian countries, 3.1% in other regions, and 2.6% in unknown locations. A total of 22 different religious affiliations were reported. 31.5% of the sample reported no religious beliefs, 12.9% were Atheist and 7.9% were Agnostic. Of the religious affiliations, the greatest proportions of participants were Catholic (14.2%), Christian (12.3%), Anglican (3.6%), Orthodox (2.6%), Pagan (2.3%), and Buddhist (1.7%).
A total of 36.1% of the sample had completed secondary studies, 17.6% had not finished secondary school and one participant (.3%) reported no formal education. A total of 32.8% of participants had completed tertiary level qualifications (21.5% undergraduate degree, 7% postgraduate, 4.3% a diploma or certificate) and 11.6% were qualified in industry and trade. Occupations were reported across 11 different occupational fields; the highest proportions of the sample were students (19.9%) or employed in trades and services (12.9%) and business and finance (9.9%) industries. Other areas of occupation included health services and fitness (8.9%), hospitality and tourism (6.3%), retail and sales (6.3%), home duties (6%), education (6%), administration and secretarial (5%), science and technology (4.6%), government (3.3%), and performing arts (1%). Eleven (3.6%) participants reported no occupation and 1.7% were in receipt of a pension. In terms of employment status, 33.1% of participants were working on a full-time basis, 16.9% were employed on a part-time basis, 14.9% were working casually and 14.6% were unemployed.

Finally, given that the study investigated the links between attachment and FFFS in the context of substance use, participants reported on their substance use behaviour. Specifically, the majority of participants (64.9%) reported consuming a beverage containing alcohol two to four times a month or less. Just over three-quarters (78%) of participants also reported that they would drink more than six alcoholic beverages on the one occasion only once a month or less. About a third (38%) of the sample had never used tobacco. Of those who had smoked tobacco, 53.4% did so four or more times a week. 20.1% of the sample used cannabis, 7.7% used ecstasy, 4.6% used methamphetamines, 2.7% used cocaine, 2.4% used crystal methamphetamine, and 2% used opioids on a regular basis (i.e., 2 to 4 times a month or more). Eighteen
participants (6%) also reported the use of other substances regularly, including prescription medications, hallucinogens, dissociative anaesthetics, anabolic steroids.

7.2.2 Materials

Data were collected using an online questionnaire. The first section of the questionnaire comprised the demographic questions utilised in Study 1.

7.2.2.1 Substance use vignette

The next section of the questionnaire consisted of a substance use vignette in which the degree of threat was manipulated such that participants were exposed to either a minimally or highly threatening substance use scenario. The content of the scenario was based on a vignette that was originally developed by Bjorck and Cohen (1993) as part of their analysis of coping responses to different types of major stressors. In the present study, participants were asked to imagine a scenario in which they had unexpectedly been laid off from a highly valued job and were feeling depressed and concerned about what the future would hold. They were instructed to imagine that upon leaving the office after receiving the news, they passed a co-worker who, noticing the participant’s distress offered them (a) an alcoholic beverage the participant specifically disliked (low threat), or (b) a pill that would make the participant stop worrying and feel better (high threat) (see Appendix C).

The substance use vignettes were designed in such a way that individuals were presented with an aversive stimulus in both conditions. When designing the high threat condition, it was important that the scenario was not perceived as so unrealistic, or so
threatening, that all individuals would respond in a highly appetitive or aversive manner as this would produce either ceiling or floor effects in the data, and consequently reduce the variability in responses. Thus, the high threat condition was designed to be moderately to highly threatening to most participants rather than extremely threatening to all participants. In contrast, the low threat condition was designed to be aversive but not particularly threatening to most participants. The study vignettes were piloted to determine the extent to which each scenario was perceived as realistic or plausible on a seven-point Likert-type scale from 1 (definitely not) to 7 (definitely yes). Piloting with a small community sample (N = 4) revealed that the high and low threat vignettes were perceived as realistic situations (high threat: $M = 4.75$; low threat: $M = 4.25$). In response to the item, “Reflecting on scenario 1 and 2, did you perceive a big difference in how threatening/stressful they are?”, three of the four participants answered “Yes”.

Following presentation of the vignette, participants were asked to reflect on how they would respond to the hypothetical scenario. Five questions were rationally devised to measure these responses using a seven-point Likert-type scale ranging from 1 (definitely no) to 7(definitely yes). In order to ensure consistency across studies 2 and 3, the questions used to measure Flight, Fight, and Freeze responses to the substance use threat were constructed to be as compatible as possible with the items used to measure responses to the relationship vignette used in Study 2. The flight item was (1) “To what extent would the offer of this substance (i.e., disliked alcoholic beverage, pill) cause you to walk away from this person?”; the fight items were (2) “To what extent would the offer of this substance make you unhappy and cause you to confront this person, but do so in a rational and assertive manner?” and (3) “To what extent would the offer of this substance make you so upset that you would become aggressive
towards this person (either verbally or physically)?”; and the freeze item was (4) “To what extent would the offer of this substance cause you panic and not know what to say or do?”.

7.2.2.2 Manipulation check items

One item was used to assess the experimental manipulation of threat. Participants were asked to rate the degree to which they would find this scenario worrying on a seven-point Likert-type scale ranging from 1 (not at all) to 7 (extremely).

7.2.2.3 Questionnaires

Consistent with Study 2, participants completed the background questionnaire and the AAQ (Simpson et al., 1996). In addition, a number of substance use measures were included to account for levels of substance use within the sample, which are detailed below. Copies of the substance use measures are included in Appendix A.

Substance Use. The Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, De La Fuente, & Grant, 1993) was used to measure participants’ alcohol use and drinking-related behaviour. The AUDIT consists of 10-items of which the first eight are five point scale ranging from 0 (never) to 4 (daily or almost daily). The first eight items of the questionnaire includes questions, such as “How often during the last year have you found it difficult to get the thought of alcohol out of your mind?”, are scored on a 5-point Likert-type scale. Items 9 and 10 are rated on a three-point scale comprising: 0 (no), 2 (yes, but not in the last year), and 4 (yes, during the last year). Item responses across all 10 items are added to generate a single
score ranging from 0 to 40, whereby higher scores indicate more hazardous and harmful alcohol consumption. Specifically, scores above 8 are considered to be indicative of clinically hazardous and problematic levels of drinking (Saunders et al., 1993). In this study, the scale demonstrated acceptable reliability with Cronbach’s $\alpha = .86$.

Participants’ use of other substances was measured using a 10-item questionnaire in which they were asked to indicate how often they had taken a given substance on a five-point scale from 0 (never) to 4 (4 or more times a week). The substances listed were tobacco, cannabis, cocaine, ice, methamphetamine (other), opiates, and “Other”; this item included an open-ended response box for participants to specify the use of a specific substance(s).

7.2.3 Procedure

To maximise the rate of participant recruitment, the online questionnaire was advertised on a major social networking website (Facebook). The same short description that was used in Study 2 was used in Study 3, which included the link to the online questionnaire. This was posted on the website to gain the greatest exposure to the general community and maximise the likelihood of obtaining a representative community sample. Again, two separate advertisements were used. These advertisements were identical except that one advertisement contained the link to the questionnaire that included high threat vignette and one contained the link to the questionnaire that included the low threat vignette. Over the course of 18 days, the advertisements were randomly posted next to internet users’ personal networking pages, who were identified as living in Australia and being 18 years of age or older.
The random positioning of the advertisements on social network users’ personal sites was intended to ensure random allocation to experimental conditions.

Participants volunteered to participate in the study by clicking on the active link in the advertisement, which directed them to the Plain Language Statement, which is presented in Appendix D. Their consent was implied by completing the anonymous online questionnaire and they were free to withdraw at any time prior to the submission of their responses by simply exiting from the website.

7.2.4 Study analyses

The data were screened and analysed using PASW Statistics18. The relationships between degree of threat, the attachment dimensions, and FFFS responses to the substance use vignette were examined using between-groups ANOVA.

7.3 Results

7.3.1 Data Screening

Missing Value Analysis (MVA) was conducted to screen the data for missing values. MVA revealed that the proportion of missing values for each of the items did not exceed 8.9% and that missing values occurred completely at random. Missing values were initially substituted using Expectation Maximisation (EM) method, which resulted in a series of out of range values. Therefore, more conservative estimates of missing values were computed using series mean substitution. A comparison of the data before and after series mean substitution revealed no significant differences in scores across the independent and dependent variables.
Data were then screened for univariate and multivariate outliers. The analyses revealed a total of 10 univariate outliers with standardised residuals of greater than ±3.29 \( (p < .001, \text{two-tailed test}) \). Four additional multivariate outliers were also detected as having maximum Mahalanobis distance exceeding the critical value, \( \chi^2(22) = 48.27, p < .001 \). These outliers were deleted.

In order to compute measures, items were reverse coded and summed according to scale instructions. Reliability analyses were conducted on the AAQ subscales, which demonstrated acceptable internal consistencies (attachment anxiety: \( \alpha = 0.80 \); attachment avoidance: \( \alpha = 0.80 \)). Linearity, singularity and multicollinearity were evaluated by inspecting the bivariate correlations between all variables included in the analyses. No bivariate correlations exceeded .80. The intercorrelations amongst the variables included in the Study 3 analyses are presented in Table 7.1.

Tests for violations of assumptions of normality, linearity, and homoscedasticity, were also conducted on the total sample. Normality was assessed by inspection of histograms and assessing standardised skewness and kurtosis values for all variables included in the study (see Table 7.2). As shown in Table 7.2, all were deemed to be normally distributed aside from aggressive fight, which was found to be highly kurtotic. Similar to studies 1 and 2, an examination of histograms revealed a bimodal distribution for both attachment anxiety and avoidance suggesting the need to separate these continuous variables into groups. As such, each of these variables was dichotomised into a categorical variable representing high and low attachment anxiety or avoidance, respectively. The values at which the distinction between the categories of the bimodal distribution was most apparent were \( \geq 3.58 \) for attachment anxiety and \( \geq 3.55 \) for attachment avoidance. The groups of individuals scoring above these cut-offs
were labelled as high on anxiety and avoidance respectively, while those groups of individuals scoring below these cut-offs were labelled as low.

Further inspection of the sample characteristics revealed that approximately half of the sample \((n = 152, 50.3\%)\) were classified as hazardous or problematic drinkers, according to the AUDIT cut-off scores of 8 or above (Saunders et al., 1993). The decision was made to exclude these participants from the study analyses as their tendency toward hazardous substance use may have confounded their responses to the substance use vignettes. Importantly, the exclusion of hazardous drinkers reduced the standardised kurtosis for the aggressive fight item to 3.15. Excluding all hazardous drinkers from the total sample, the means and standard deviations for the attachment groups by threat condition for each of the dependent variables are presented in Table 7.3.

Table 7.1

Bivariate correlations for all measured variables included in Study 3 analyses by condition

<table>
<thead>
<tr>
<th>Variable</th>
<th>Flight</th>
<th>Rational Fight</th>
<th>Aggressive Fight</th>
<th>Freeze</th>
<th>Avoidance</th>
<th>Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flight</td>
<td>-</td>
<td>.33**</td>
<td>.29**</td>
<td>.20*</td>
<td>.11</td>
<td>.14</td>
</tr>
<tr>
<td>Rational Fight</td>
<td>.36**</td>
<td>-</td>
<td>.33**</td>
<td>.09</td>
<td>-.05</td>
<td>-.03</td>
</tr>
<tr>
<td>Aggressive Fight</td>
<td>.40**</td>
<td>.41**</td>
<td>-</td>
<td>.26**</td>
<td>-.02</td>
<td>.19*</td>
</tr>
<tr>
<td>Freeze</td>
<td>.17*</td>
<td>.00</td>
<td>.08</td>
<td>-</td>
<td>-.01</td>
<td>.20*</td>
</tr>
<tr>
<td>Avoidance</td>
<td>-.10</td>
<td>-.09</td>
<td>.14</td>
<td>.10</td>
<td>-</td>
<td>.20*</td>
</tr>
<tr>
<td>Anxiety</td>
<td>-.01</td>
<td>-.07</td>
<td>.19*</td>
<td>.19*</td>
<td>.29**</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. Intercorrelations for Low Threat Condition \((n = 135)\) are presented above the diagonal, and intercorrelations for High Threat Condition \((n = 153)\) are presented below the diagonal. Avoidance = AAQ Attachment Avoidance, Anxiety = AAQ Attachment Anxiety.

\(N = 288.\)

\(* p < .05\) two tailed. \(* * p < .01\) two tailed.
Table 7.2

*Standardised skewness and kurtosis values for all continuous variables included in Study 3*

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Note. AAQ = Adult Attachment Questionnaire; Avoidance = AAQ Attachment Avoidance; Anxiety = AAQ Attachment Anxiety. 
N = 288.
Table 7.3
*Means and standard deviations of FFFS responses by substance use threat condition and attachment*

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N = 288.
7.3.2 Data Analysis

Consistent with Study 2, a series of 2 (high and low attachment avoidance) × 2 (high and low attachment anxiety) × 2 (high and low threat condition) between subjects ANOVA were employed to examine the main effects and interaction effects for attachment and threat condition on FFFS behavioural responses. Separate univariate ANOVAs were conducted using each of the FFFS response items as single dependent variables, equating to a total of four three-way between groups ANOVAs. In line with the recommendations of Tabachnick and Fidell (2007), it was not appropriate to conduct a multivariate analysis of variance (MANOVA) as the magnitude of correlations between the dependent variables was weak to moderate (see Table 7.1). Levene’s Test of Equality of Error Variances were not significant across all four FFFS items ($F[7, 150] = 2.21, p > .05$, flight; $F[7, 150] = 1.66, p > .05$, rational fight; $F[7, 150] = 2.16, p > .05$, aggressive fight; $F[7, 150] = 2.14, p > .05$, freeze) suggesting that the assumption of homogeneity of variance was not violated.

7.3.2.1 Manipulation check

In order to confirm that there was a significant difference between the degree of perceived threat between the high and low threat conditions, an independent samples t-test was conducted on the threat manipulation item (i.e., Please rate the degree to which you find this scenario worrying). The independent samples t-test for the manipulation of threat demonstrated that participants in the high threat condition rated the scenario as significantly more threatening ($M = 3.52, SD = 2.02$) than participants in the low threat condition ($M = 1.90, SD = 1.53$); $t(300) = 7.75, p < .001$, two-tailed.
7.3.2.2 Flight

The results of the ANOVA for Flight revealed a significant main effect for condition; $F(1, 142) = 23.13, p < .05$, partial $\eta^2 = .14$, power = 1.00. Participants in the high threat condition ($M = 3.98, SD = 1.93$) were significantly more likely to want to walk away from the person than participants in the low threat condition ($M = 2.48, SD = 1.67$). There were no significant two-way or three-way interaction effects.

7.3.2.3 Rational fight

The results of the ANOVA for the rational fight item involving assertive confrontation also revealed a significant main effect for condition; $F(1, 142) = 7.78, p < .05$, partial $\eta^2 = .05$, power = .79. Participants exposed to the high threat condition ($M = 3.57, SD = 2.00$) were significantly more likely to confront the person in a rational and assertive manner than participants in the low threat condition ($M = 2.71, SD = 1.88$). There were no significant two-way or three-way interaction effects.

7.3.2.4 Aggressive fight

The results of the ANOVA for the aggressive fight response revealed significant main effects for condition; $F(1, 142) = 4.16, p < .05$, partial $\eta^2 = .03$, power = .53, and attachment anxiety; $F(1, 142) = 4.60, p < .05$, partial $\eta^2 = .03$, power = .53. Participants in the high threat condition ($M = 1.68, SD = 1.18$) were significantly more likely to become aggressive toward the person than participants in the low threat condition ($M = 1.27, SD = .88$). The high attachment anxiety group ($M = 1.71, SD = 1.30$) were also significantly more likely to become aggressive toward the person than the low attachment anxiety group ($M = 1.33, SD = .83$). There were no significant two or three-way interaction effects.
7.3.2.5 Freeze

The results of the ANOVA for freeze revealed a significant main effect for attachment anxiety; $F(1, 142) = 5.70, p < .05$, partial $\eta^2 = .04$, power = .66. The high attachment anxiety group ($M = 2.26, SD = 1.49$) were likely to panic to a greater extent than the low attachment anxiety group ($M = 1.80, SD = 1.38$). While there were no significant two-way interactions, the analysis revealed a significant three-way interaction $F(1, 142) = 5.08, p < .05$, partial $\eta^2 = .04$, power = .61. Simple effects analysis of the three-way interaction revealed that there were significant differences between the high and low attachment anxiety groups when threat was low and attachment avoidance was low; $F(1, 40) = 4.11, p < .05$, such that the high attachment anxiety group ($M = 2.86, SD = 2.19$) were more likely to respond by walking away from the person than the low attachment anxiety group ($M = 1.20, SD = .41$). There also were significant differences between the high and low attachment anxiety groups when both threat and attachment avoidance were high $F(1, 40) = 3.56, p < .05$. In the high threat condition, individuals high on attachment avoidance and anxiety ($M = 2.64, SD = 1.62$) were more likely to walk away from the person than those with high avoidance and low attachment anxiety ($M = 1.86, SD = 1.32$). The interaction effects are displayed in Figure 5 and Figure 6, respectively. As can be seen by inspecting the left side of Figure 5, in the low threat condition, individuals who were high on attachment anxiety and low attachment avoidance exhibited a greater tendency to freeze than those who were low on both attachment anxiety and avoidance. In contrast, as can be seen by inspecting the right side of Figure 6, in the high threatening condition the combination of high attachment avoidance and low attachment anxiety was associated with a low freeze response, whereas the combination of high attachment avoidance and anxiety was associated with an exaggerated freeze response.
Figure 5. Two-way interaction between dichotomised attachment avoidance and anxiety in the low substance use threat condition for Freeze.

Figure 6. Two-way interaction between dichotomised attachment avoidance and anxiety in the high substance use threat condition for Freeze.
7.4 Discussion

This study aimed to determine whether attachment is associated with different behavioural expressions of the FFFS under varying conditions of substance use threat. The hypothesis that FFFS responses would differ significantly in the high and low threat conditions, as moderated by attachment anxiety and avoidance, was partially supported by the study findings. Specifically, a significant three-way interaction effect was found between threat condition x attachment anxiety x attachment avoidance for the freeze behavioural response to substance use threat. In contrast, no interaction effects were observed for the flight, rational fight or aggressive fight behavioural responses. As expected, across the FFFS items, there was a main effect for condition indicating that exposure to the high threat condition resulted in heightened FFFS behavioural responses compared to the low threat condition.

With regards to the interaction effects observed for freeze, in the non-threatening condition, individuals who were high on attachment anxiety and low attachment avoidance exhibited a greater tendency to freeze than those who were low on both attachment anxiety and avoidance. This suggests that individuals with high attachment anxiety and low attachment avoidance reacted with a heightened FFFS response even though the substance use scenario was relatively benign. In the high threat condition however, those with high attachment anxiety were significantly more likely to panic than those with low attachment anxiety, only if they were also high on attachment avoidance. That is, the combination of high attachment avoidance and anxiety was associated with an exaggerated freeze response, whereas the combination of high attachment avoidance and low attachment anxiety was associated with a low freeze response in the highly threatening substance use situation.
It can be argued that the pattern of findings in the low threat condition supports the notion that attachment anxiety is associated with a hyperfunctioning FFFS. Specifically, individuals who were high on attachment anxiety and low on attachment avoidance displayed a heightened freeze response when the situation was relatively non-threatening. This finding is consistent with the conceptualisation of the hyperfunctioning FFFS, which is characterised by abnormal or excessive FFFS activity and difficulty in discriminating between threatening and non-threatening environmental cues. This line of reasoning is supported by past attachment studies which have found that attachment anxiety is associated with an inability to distinguish between, or appropriately modify behaviour in response to, threatening and non-threatening conditions (Mikulincer et al., 2002; Mikulincer & Sheffi, 2000; Dewitte et al., 2009). In contrast, no significant effects were evident in the low threat condition when attachment avoidance was high. This may reflect effective threat detection by individuals with high attachment avoidance, whereby highly avoidant individuals may have been able to correctly determine that the situation was non-threatening due to the hypersensitivity of their FFFS and, therefore, displayed a low freeze response regardless of the degree of attachment anxiety.

In the high threat condition, individuals with high attachment anxiety and avoidance exhibited a more intense freeze response than those who were low on attachment anxiety but high on attachment avoidance. The finding that individuals with high attachment avoidance and low attachment anxiety exhibited comparatively lower freeze responses suggests that it may be the anxiety component of attachment that is associated with a heightened tendency to panic in response to threat. Again, this
is consistent with the proposed association between attachment anxiety and a hyperfunctioning FFFS that results in heightened FFFS behavioural outputs.

In addition, it is argued that high anxiety/high avoidance individuals’ heightened tendency to freeze in response to the threatening substance use situation reflects a combination of hypersensitivity to threat and excessive FFFS activity in threatening conditions. This group of individuals characterise the fearful avoidant attachment style reported in the attachment literature (Bartholomew & Horowitz, 1991). Recall that fearfully avoidant individuals experience a patterning of disorganised approach-avoidance motivations, which result from engagement in contradictory hyperactivating and deactivating attachment strategies during threatening encounters (Mikulincer & Shaver, 2007; Riggs et al., 2007; Simpson & Rholes, 2002). Consequently, they can display a mixture of approach and avoidance behaviours or become so overwhelmed by an internal conflict related to their simultaneous approach-avoidance motivations that they become paralysed in threatening conditions (Simpson & Rholes, 2002).

In RST, these simultaneous approach and avoidance motivations would engage the BIS, which would resolve the conflict with greater weight placed on inputs from the FFFS (Gray & McNaughton, 2000; McNaughton & Corr, 2004). One interpretation of the findings for fearful avoidance and freeze is that, due to excessive FFFS activity, these individuals experienced a desire to achieve relief from distress (i.e., taking the substance) coupled with a desire to avoid the potential harms of the unknown substance. This conflict may have activated the BIS, which further input to the FFFS, thereby produced heightened FFFS behavioural output. According to RST, the FFFS can produce freeze outputs when escape from threat is not possible (Gray &
McNaughton, 2000). In this particular instance, it may be that the threat of taking a potentially harmful unknown substance was experienced as inescapable for fearfully avoidant individuals because of the intensity of a conflicting motivation to experience the relieving properties of the drug. Hence, FFFS-mediated inaction (i.e. freeze) may have been the behavioural output that was produced in order to avoid the threat. It is acknowledged, however, that it is difficult to distinguish between FFFS-mediated inaction and BIS-mediated behavioural inhibition with a single response item. Moreover, future research is needed to investigate these propositions as there are no studies to the researcher’s knowledge that have directly investigated these RST pathways.

Nevertheless, this line of reasoning might explain why no interaction effects were observed for flight or fight responses as these FFFS outputs were subsumed by the three-way interaction for freeze. The conditions may have been such that, for highly anxious individuals, especially those who were also high on attachment avoidance; who experience excessive FFFS activity and the propensity to experience approach-avoidance conflicts, freeze was the response produced by the FFFS.

While no interactions were found for the flight or fight FFFS responses, a main effect for attachment anxiety was observed for the aggressive fight response. This provides further support for the link between attachment anxiety and a hyperfunctioning FFFS as high attachment anxiety was associated with higher aggressive fight response regardless of the degree of threat condition or participants’ level of attachment avoidance. This finding is consistent with the persistent, approach-oriented hyperactivating strategies used by anxious individuals, which have been described as fight behaviours in the attachment literature (Mikulincer & Shaver, 2007).
It may be that anxiously attached individuals have a heightened predisposition for fight responses due to their hyperfunctioning FFFS.

Taken together, the findings from Study 3 have implications for the proposition that the attachment system may operate as a context-specific sub-system of RST. Importantly, while the attachment system may be calibrated to specifically organise approach-avoidance behaviours in attachment contexts, the findings of Study 3 seem to suggest that attachment processes may invoke some kind of a bottom-up influence on the operation of the RST systems more generally. In this regard, the findings may represent an example of where the processes and systematic behavioural tendencies governed by nested systems of RST, such as attachment, influence the operation of the broader, superordinate systems of RST, in this case the FFFS, across broader contexts that activate approach-avoidance processes (i.e., substance use threat). If this were not the case, then one would not necessarily expect attachment to moderate FFFS tendencies in high and low threat conditions in contexts other than that of relationships. Again, these propositions require further research to specifically unpack the causal influence of these broad and more specific systems of approach and avoidance behaviour.

In summary, the results of this study were partially consistent with expectations. While the findings indicated that only the freeze FFFS response differed significantly in the high and low threat conditions as moderated by attachment anxiety and avoidance, no interaction effects were observed for the remaining FFFS outputs. Overall, the findings provide empirical support for the notion that highly anxious individuals harbour a hyperfunctioning FFFS, while for highly avoidant individuals the FFFS is hypersensitive. A number of suggestions were offered to explain the lack of
interaction effects for the remaining FFFS outputs. One interpretation focused upon the attachment construct of fearful avoidance. This attachment style is characterised by an internal conflict between approach-avoidance motivations that can result in contradictory approach and avoidance behaviours or behavioural inaction. It may be that the propensity to experience approach-avoidance conflicts, coupled with excessive FFFS activity, resulted in a heightened freeze response for fearful avoidant individuals. At the broader level, the results also suggest is that it is possible that the attachment system and the FFFS are hierarchically organised. It may be that the processes and systematic behavioural tendencies governed by the attachment system become so embedded that they feed back into the calibration and organisation of higher-order behavioural systems, in this case the FFFS, in broader contexts that activate approach-avoidance processes. These propositions offer new directions for future integrative research.
CHAPTER 8

General Discussion

8.0 Chapter Overview

In this chapter, the general discussion is presented. Firstly, the results from the three studies are explained with reference to the aims and hypotheses of this thesis. The findings are discussed in terms of past research and in accordance with the main arguments proposed in this thesis regarding the associations between the FFFS and adult attachment. The contributions of this thesis to the current literature are then outlined. The chapter concludes with a discussion of the limitations of the studies, recommended directions for future research, and the overall research implications of this thesis.

8.1 Adult Attachment and FFFS Functioning

The key propositions made in this thesis regarding the theoretical links between the systems of RST and attachment theory were novel. In accounting for important revisions made to RST it was proposed that the FFFS is likely to be a key system associated with both the attachment dimensions underlying attachment styles. The three studies conducted to empirically test whether the FFFS functions differently across different levels of attachment anxiety and avoidance; more specifically, to examine whether attachment anxiety is associated with a hyperfunctioning FFFS and
attachment avoidance is associated with a hypersensitive FFFS, yielded new insights into how these constructs are related. Each study was designed to explore a specific research aim directed toward elucidating the ways in which both the threat detection mechanism and the behavioural outputs of the FFFS are associated with the attachment dimensions. Across the three studies, analyses revealed that the associations between the FFFS and attachment were generally consistent with the key arguments made in this thesis.

The aim of Study 1 was to determine whether the associations between the FFFS and the threat and reward bias were moderated by levels of attachment avoidance and anxiety. The results showed that attachment moderated the relationship between the FFFS, specifically fight, and attentional biases to threatening and rewarding stimuli. This finding suggests that the detection or attentive component of the FFFS does function differently across the attachment orientations. For the low attachment avoidance and anxiety groups, higher fight scores were associated with a bias toward rewarding words. In contrast, for individuals with high levels of attachment avoidance the FFFS was associated with a bias away from threatening words, while for individuals with high attachment anxiety the FFFS was associated with a bias away from both threatening and rewarding words. These findings were consistent with the proposed distinction between a hypersensitive and hyperfunctioning FFFS.

In contrast to Study 1, Study 2 and Study 3 were designed to examine the associations between the behavioural outputs of the FFFS and the attachment dimensions. Within the context of relationship threat (Study 2) and the broader context of substance use threat (Study 3), it was hypothesised that FFFS responses would
differ significantly in the high and low threat conditions as moderated by attachment anxiety and avoidance. These hypotheses were partially supported by the results. In Study 2, significant three-way interactions were found for both the flight and rational fight behavioural responses to relationship threat. In the high threat condition, individuals high on attachment anxiety and avoidance were significantly more likely to exhibit both the flight and rational fight responses than those with low attachment anxiety and high attachment avoidance. In the low threat condition, individuals who were high on attachment anxiety and low attachment avoidance were significantly more likely to exhibit a flight response and significantly less likely to exhibit rational fight responses than individuals with low attachment anxiety and avoidance. While no interaction effects were observed for the aggressive fight and freeze, main effects were observed for attachment anxiety for both of these responses. That is, regardless of the degree of threat or levels of attachment avoidance, high attachment anxiety was associated with heightened aggressive fight and freeze responses.

In Study 3, a significant three-way interaction was only observed for the freeze response. Interestingly, the analyses revealed a similar pattern of interaction effects for freeze as were found for the flight and rational fight responses in Study 2. In the high substance use threat condition, the combination of high attachment avoidance and anxiety was associated with an exaggerated freeze response, whereas the combination of high attachment avoidance and low attachment anxiety was associated with a significantly lower freeze response. In the low threat condition, individuals who were high on attachment anxiety and low attachment avoidance exhibited a greater tendency to freeze than those who were low on both attachment anxiety and avoidance. While no interaction effects were found for the flight or either of the fight FFFS responses, a
main effect of attachment anxiety was observed for the aggressive fight response, whereby high attachment anxiety was associated a greater aggressive fight response regardless of the degree of threat or participants’ levels of attachment avoidance.

The results of Study 1 provide two important insights into the associations between the threat detection component of the FFFS and the attachment dimensions. Firstly, the finding that the FFFS was associated with a bias away from threat across both forms of attachment insecurity suggests that the operation of the threat sensitivity system is linked to attachment anxiety and avoidance. This supports the proposition that the FFFS is key system in the appetitive and aversive motivations of insecurely attachment individuals. In contrast to past studies (e.g., MacDonald & Kingsbury, 2006), this finding seems more consistent with central tenets of Bowlby’s attachment theory, in which he states that a key function of the attachment system is to regulate behaviour during times of threat (Bowlby, 1969/1982; Mikulincer & Shaver, 2007). Moreover, this finding fits well with past attachment studies that have shown that attachment insecurity is associated with heightened monitoring for relationship threat and a tendency to interpret threatening events as more intense (e.g. Feeney & Collins, 2001, 2004; Simpson, 1990; Mikulincer, 1998b; Campbell et al., 2005).

Secondly, the pattern of associations observed between the high attachment avoidance and high attachment anxiety groups provide evidence for the differential functioning of the FFFS across insecure forms of attachment. For highly avoidant individuals, higher fight scores were associated with a bias away from threatening words. Considering that in RST terms fight is a way of defending against proximal threat (e.g., Gray & McNaughton, 2000; Jackson, 2009), the links between high attachment avoidance, fight and bias away from threat could be interpreted as
reflecting a hypersensitive FFFS. That is, it can be speculated that, for highly avoidant individuals, fight may have been associated with attentional biases away from threatening words because they detected those words as threatening and fought against attending to the proximal threat cue. In any case, the results run counter to the conclusions drawn from past studies that attachment avoidance is related primarily to low activity in the appetitive motivational system (e.g., Carnelley & Story, 2008; MacDonald & Kingsbury, 2006; Meyer et al., 2005). In contrast, the findings are congruent with evidence from the attachment literature regarding the positive association between attachment avoidance and the detection of threat-related cues (Mikulincer et al., 2002; Mikulincer & Sheffi, 2000; Maier et al., 2005).

The results pertaining to high attachment anxiety also provide evidence for a hyperfunctioning FFFS in highly anxious individuals. The findings for the high attachment anxiety group suggests that, for these individuals, higher FFFS functioning is associated with a lack of differentiation between the detection of threatening and rewarding stimuli as the results were interpreted such that these individuals fought against attending to both appetitive and aversive words. Consistent with findings from the attachment literature, which demonstrate that highly anxious individuals can misperceive positive stimuli as threatening (Edelstein & Gillath, 2008; Mikulincer et al., 2002) and respond to positive tasks as though they were aversive (Mikulincer & Sheffi, 2000), the lack of differentiation between fight and threat bias and fight and reward bias suggests that for these individuals the threat detection component of the FFFS may operate in abnormal or excessive way, or what is proposed in this thesis as a hyperfunctioning FFFS.
Importantly, these findings for high attachment anxiety in Study 1, along with the proposition that attachment anxiety is associated with a hyperfunctioning FFFS, may help to explain why attachment anxiety is frequently associated with the experience of negative emotional states such as anger, frustration and distress (e.g., Crowell et al., 1999; Rholes et al., 1999). In this thesis, a hyperfunctioning FFFS is defined as vigilance to the detection of threat coupled with the inability to distinguish between threatening and non-threatening stimuli. Accordingly, if anxious individuals perceive both punishing and rewarding relationship experiences as threatening, then it is not surprising that they will experience chronic negative affect. Numerous studies report on the chronic negative affect experienced by anxious individuals (e.g., Mikulincer 1998; Mikulincer & Florian, 1995; Wei et al., 2005). Furthermore, studies documenting the relationship experiences of anxious individuals frequently report that these people rarely perceive their relationships as characterised by positive experiences and instances of receiving adequate emotional support and comfort (Collins & Feeney, 2000; Collins & Read, 1990; Rholes et al., 2001). For instance, in numerous dyadic studies, findings consistently highlight that anxious individuals perceive their relationship partners as providing care and support that is either rejecting or consistently falls below their desired needs for love, comfort and security, despite partners providing adequate to high levels of support (e.g., Cassidy & Shaver, 1999; Collins & Feeney, 2004; Rholes et al., 2001; Simpson et al., 2003). Based on the preliminary findings of this thesis and the propositions put forward, it is argued that anxious individuals hyperfunctioning FFFS results in the detection of rewarding stimuli (such as care and support) as threatening. As a result, rather than having their needs for approval and overprotection fulfilled, anxious individuals’ misperception of this rewarding stimulus as threatening results in feeling that their attachment needs are
not being met and that the behaviour of the relationship partners may be somewhat threatening.

Alternatively, this apparent inaccurate processing of cues of reward may also be related to the construct of frustrative non-reward proposed in the RST literature (Carver, 2004; Carver & Harmon-Jones, 2009; Corr, 2002b). By definition, when an appetitive stimulus does not meet an individual’s expected level of reward, anger and frustration are produced. This affective state is termed frustrative non-reward. Put differently, when an individual experiences approach motivation toward a potential reward that then falls below his or her expectations of reward attainment (i.e., an anxious person expects a certain degree of social support, but perceives it as falling short of their needs), negative affect is produced. This negative affect is thought to operate as a signal to the individual that progress toward the desired goal (i.e., reward attainment) has not been sufficient to attain the reward (Carver & Harmon-Jones, 2009). Hence, this negative affective state becomes an aversive stimulus for the individual that inputs to the aversive motivational system (i.e., the FFFS) leading to greater aversive output (e.g., negative affect). One can speculate that because the FFFS is hyperfunctioning in highly anxious individuals, stimuli that fall short of their high need for reward results in rewarding attachment cues being experienced or misperceived as non-rewarding. This signals to the anxious individual a lack of desired goal attainment (i.e., felt security), leading to frustrating non-reward in attachment contexts, and thus, heightened negative affective experiences. It is however important to re-iterate that, given the novelty of this research, these explanations are somewhat speculative, and thus further research is required to validate the veracity of these claims.
In relation to anxious individuals’ responses to threatening words in Study 1, it is also important to note that the FFFS was associated with a bias away from threatening words. According to Gable and Berkman (2008), attentional biases toward particular stimuli are indicative of an individual’s sensitivity to cues of that nature, whereas attentional biases away are indicative of his/her relative insensitivity to those cues. In a past study (Derryberry & Reed, 1994), reward sensitivity was associated with a bias toward appetitive stimuli, whereas threat sensitivity scores were associated with a bias toward aversive stimuli. While this seems inconsistent with the present results, it is important to consider the role of the revised RST systems in these processes.

By accounting for the distinction between the FFFS and the BIS in the revised RST, the BIS is understood to activate cautious risk assessment, which one would be expect to be associated with bias toward threat. In contrast, in can be argued that the FFFS, which is responsible for the removal of an animal from a source of threat (Gray & McNaughton, 2000), might be expected to be associated with a bias away. Consistent with this interpretation, the tendency to orient away from threat has been argued to be reflective of a high sensitivity to punishment in past scenario-based research (Perkins & Corr, 2006; Perkins et al., 2010). However, there are no known studies that have incorporated the revised role of the FFFS in studies of attentional processes. In order to substantiate this claim it would be necessary to further investigate the role of FFFS processes in attentional biases and to distinguish between proximal and distal threat stimuli. While further research is needed to investigate this argument, there is potential for this point of distinction between the attentional
components of these systems to delineate between FFFS-mediated and BIS-mediated processes in future research.

In contrast to the findings for insecure attachment in Study 1, in the low attachment avoidance and anxiety groups, fight was associated with a bias toward rewarding words. While this association between the fight construct and a bias toward reward might initially seem unexpected, this finding can be reconciled by considering that aggression and fight are linked to appetitive motivational system functioning due to the approach toward a stimulus that is involved in fight behaviours (e.g., Carver, 2004; Carver & Harmon-Jones, 2009; Harmon-Jones, 2003). Thus, it may be that significant associations were found between fight and positive reward bias due to the common approach component to these constructs. Furthermore, there was an expectation that low attachment avoidance and anxiety would be related to a bias toward reward as these characteristics of attachment security have been associated with appetitive motivational processes, such as greater achievement motivation, approach-oriented coping strategies, intimacy seeking and positive affect in the attachment literature (e.g., Mikulincer & Florian, 1998; Mikulincer & Shaver, 2007; Wei et al., 2003; Shaver & Mikulincer, 2002).

In interpreting the findings of Study 1, it must be noted that moderation was only observed for the fight component of the FFFS. There are a number of possible explanations as to why this was the case. Firstly, according to RST, fight outputs occur when an animal is confronted with proximal threat stimuli (Smillie et al., 2006; Gray & McNaughton, 2000). It may be that fight was the specific aspect of the FFFS associated with threat and reward bias because participants were momentarily exposed to appetitive and aversive words that were relatively inescapable from attention.
Alternatively, the findings may also have been confounded by measurement issues related to the psychometric properties of Jackson 5 subscales. This issue is discussed in more detail in section 8.3.

It is important to consider the measurement of the FFFS in Study 1 at a conceptual level. It was noted that there may have been concerns about the extent to which the Fight, Flight, Freeze subscales of the Jackson 5 could be used as a measure of the sensitivity or activation of the FFFS in response to threatening environmental cues. Indeed some argue that the capacity for self-report measures of RST to reliably assess the underlying sensitivity or activation of a behavioural system is questionable (e.g., Pickering, 2004; Smillie, 2008). The argument could also be made that subscales which are designed to measure patterns of FFFS behavioural output, may not be a valid measure of the threat detection mechanism of the system. However, as a trait measure of RST, the item content of the FFFS subscales are designed to capture the intensity of dispositional tendencies to engage in the behavioural responses associated the FFFS (Jackson, 2009). Thus, the intensity with which an individual tends to engage in particular FFFS behaviours when environmental threat is detected, can be argued to reflect the baseline sensitivity of the FFFS to such cues. Thus, dispositional biases to exhibit the FFFS behavioural responses in response to threat were interpreted as representative of the sensitivity of the FFFS to detection of those cues.

While acknowledging the potential measurement debate outlined above and how this contributes to understanding the Study 1 findings, overall, the results of Study 1 suggest that the threat detection component of the FFFS is likely to be linked to attachment anxiety and avoidance in distinct ways. Moreover, the results provide preliminary support for the proposed differences between the hypersensitive and
hyperfunctioning FFFS related to the dimensions of attachment avoidance and anxiety respectively.

The findings from Study 2 and 3, which partially supported the study hypotheses, also seem to be consistent with the differential FFFS functioning argument. In both the attachment and substance use contexts, the three-way interactions observed provide interesting data about the proposition that attachment avoidance is related to a hypersensitive FFFS and attachment anxiety is related to a hyperfunctioning FFFS. The patterning of interaction effects in studies 2 and 3 under conditions of low threat support the differential functional functioning of the FFFS for insecure individuals, especially the relationship between a hyperfunctioning FFFS and attachment anxiety. Recall that, in Study 2, individuals high on attachment anxiety and low attachment avoidance reacted with a heightened flight response compared to secure individuals (low attachment anxiety and avoidance) when the potential attachment threat was low. Likewise, in Study 3, compared to secure individuals, the group of high attachment anxiety and low attachment avoidance individuals were likely to react to a relatively non-threatening scenario of being offered a disliked alcoholic beverage with a heightened freeze response. These results suggest that, consistent with a hyperfunctioning FFFS, high attachment anxiety is associated with excessive FFFS behavioural outputs in situations of low threat. Adding to these findings is the fact that, in both threat contexts, attachment anxiety had a significant main effect on other FFFS responses, regardless of the degree of threat or levels of attachment avoidance. These provide further support for these individuals’ hyperfunctioning FFFS.
What these research findings suggest is that, due to abnormal or excessive FFFS activity, anxiously attached individuals may be unable to distinguish between threatening and non-threatening conditions or perhaps cannot modify their behaviour according to whether an objective threat is present, resulting in exaggerated FFFS outputs in non-threatening contexts. The association between attachment anxiety and inaccurate processing of threatening and non-threatening cues is supported past attachment studies (e.g., Mikulincer et al., 2002; Mikulincer & Sheffi, 2000; Dewitte et al., 2009). In particular, this interpretation is consistent with Dewitte et al.’s (2009) finding that anxious individuals’ approach-avoidance tendencies do not differ between threatening and non-threatening contexts. It seems likely that, in Study 2 and 3, the exaggerated FFFS behaviours exhibited by highly anxious individuals are a manifestation of the abnormal functioning of the threat system. The heightened FFFS outputs observed under conditions of low threat may help to explain Meyer et al.s’ (2005) finding that attachment anxiety was related to heightened distress, even in low relationship threat conditions. Here, excessive FFFS activity may have produced greater aversive motivation and negative affect even though the degree of objective threat was low.

A finding that seems inconsistent with the argument for a hyperfunctioning FFFS in highly anxious individuals relates to Study 2. In this study, individuals who were high on attachment anxiety and low on attachment avoidance were significantly less likely to react with a rational fight response than secure individuals when the attachment threat was low. That is, while only marginal, highly anxious individuals were less likely to confront their partner in a rational way than secure individuals. One way to interpret this finding is to consider the behavioural tendencies and motivations
associated with anxious versus securely attached individuals. It may be that anxious individuals are less likely to endorse a rational and assertive response to situations due to their tendency to engage in less adaptive behavioural strategies to manage the relationship threat, such as exaggerating distress, becoming clingy, and escalating the severity of the potential relationship issue – behavioural tendencies characteristic of the hyperactivating attachment strategies associated with anxious attachment (Campbell et al., 2005; Mikulincer & Shaver, 2007; Rholes et al., 1999). In contrast, it would be expected that secure individuals would respond with a rational and assertive response in the low relationship threat condition as they view threat as manageable and tend to engage in positive communication and constructive problem-solving strategies to manage relationship stress (e.g., Creasey, 2002; Shi, 2003; Wei et al., 2003).

In contrast to the findings for attachment anxiety and low attachment avoidance, no interactions were observed in the low threat conditions when attachment avoidance was high. This finding is interpreted as reflecting highly avoidant individuals’ hypersensitive FFFS. For highly avoidant individuals, it is argued that the FFFS functions in an appropriate manner such that they are particularly skilled at discerning between threatening and non-threatening environmental cues. Indeed, attachment studies have demonstrated that attachment avoidance is associated with superior threat detection compared to the threat detection capabilities of anxious individuals (e.g., Edelstein & Gillath, 2008; Maier et al., 2005; Mikulincer et al., 2002). As such, regardless of their level of attachment anxiety, highly avoidant individuals were not expected to exhibit FFFS behavioural responses under non-threatening conditions. Therefore, the findings from the low threat conditions in studies 2 and 3 suggest that, while the high attachment anxiety appears to be associated
with amplified FFFS outputs in non-threatening conditions for individuals with low attachment avoidance, it can be argued that attachment avoidance is associated with an attenuation of the activity of the FFFS individuals high on attachment anxiety and avoidance in non-threatening conditions. This is likely to be related to highly avoidant individuals’ hypersensitivity to threat-related cues (i.e., hypersensitive FFFS), which allows them to correctly detect that the situation is benign. The ways in which the interactions between attachment anxiety and avoidance moderate FFFS functioning require further empirical investigation in future research.

Additionally, studies 2 and 3 also yielded particularly interesting results regarding the functioning of the FFFS for the cluster of individuals who would be classified in the attachment literature as fearfully avoidant (i.e., high on both attachment anxiety and avoidance). The findings provide new evidence as to why these individuals’ may be prone to experience a maladaptive pattern of disorganised behavioural responses in threatening situations. To review, Study 2 revealed that this group of highly anxious/highly avoidant individuals simultaneously displayed stronger flight and rational fight responses than those who were low on attachment anxiety and high attachment avoidance when faced with high relationship threat. In Study 3, the combination of high attachment avoidance and anxiety was associated with a high freeze response, whereas the combination of high attachment avoidance and low attachment anxiety was associated with a low freeze response in the highly threatening substance use situation.

It is interesting that these fearfully attached individuals simultaneously displayed the strongest flight and rational fight responses to high attachment threat (Study 2). It has been acknowledged in the attachment literature that fearful individuals
tend to exhibit chaotic and incoherent behaviours under stress (Mikulincer & Shaver, 2007; Simpson & Rholes, 2002). It may be that, due to the disorganised use of hyperactivating and deactivating strategies enacted by fearful individuals in response to threat, the operation of the FFFS is such that it too functions in a disorganised manner. The mixture of FFFS responses observed in fearful individuals (i.e., the simultaneous tendency to flee and fight) may reflect these individuals’ state of internal conflict between the desire to engage in anxious hyperactivation to gain the attachment figures attention and gain relief from distress and avoidant deactivation to avoid being rejected or hurt (Mikulincer & Shaver, 2007; Simpson & Rholes, 2002; Riggs et al., 2007). This is not to say that the conflicting flight and rational fight responses are a manifestation of an approach-avoidance conflict. Rather, it may be that, due to the persistent attachment conflict experienced by these individuals, and their inability to determine which secondary attachment strategy is most adaptive, the FFFS malfunctions thereby producing disorganised patterns of behavioural outputs in attachment contexts. The argument in this thesis is that this malfunctioning of the FFFS is likely to be characterised by the combination of heightened threat sensitivity (i.e., hypersensitive FFFS) and excessive FFFS activity (i.e., hyperfunctioning FFFS). Thus, while simultaneous fight and flight outputs may be unexpected from an RST perspective, it is argued that this contradictory mixture of FFFS responses exhibited in response to high attachment threat is a manifestation, or a consequence, of the combination of overactivity of the FFFS in fearfully avoidant individuals.

In contrast to the findings for attachment threat, in the context of high substance use threat (Study 3), individuals with high attachment anxiety and avoidance exhibited a more intense freeze response than those who were low on attachment
anxiety and high on attachment avoidance. That is, individuals who were high on both attachment dimensions were more likely to report that they would panic in response to the threatening substance use situation than individuals who were low on attachment anxiety and high on attachment avoidance. This suggests that it may be the anxiety component of attachment that is associated with a heightened tendency to panic in response to threat, which is consistent with proposed link between attachment anxiety and a hyperfunctioning FFFS. More specifically, fearfully avoidant individuals’ heightened tendency to freeze in response to the threatening substance use situation may also reflect the combination of hypersensitivity to threat and excessive FFFS activity in threatening conditions. It may be that the heightened freeze output exhibited by these individuals is the result of their disorganised behavioural repertoires of a want to approach and avoid threatening situations.

According to Simpson and Rholes (2002), fearfully avoidant individuals display a pattern of disorganised approach-avoidance behaviours, resulting from engagement in contradictory hyperactivating and deactivating attachment strategies during threatening encounters (Mikulincer & Shaver, 2007; Riggs et al., 2007; Simpson & Rholes, 2002). Simpson and Rholes propose that fearful individuals can become so overwhelmed by this internal attachment conflict that they become paralysed in threatening conditions. Within the RST framework, such a conflict would engage the BIS, which would resolve the conflict with greater weight placed on inputs from the FFFS (Gray & McNaughton, 2000; Zinbarg & Yoon, 2008). One interpretation of the findings is that the excessive desire to approach for a want to relieve distress (i.e., taking the substance to reduce the negative affect associated with losing one’s job) is likely to be coupled with an equal want to avoid the danger of approaching the
stimulus that cannot be resolved by the BIS. That is, in fearful avoidant individuals the BIS does not function to resolve the conflict. Therefore, for these individuals, the high threat condition may have been interpreted such that the threat was evaluated as inescapable due to intensity of the opposing motivations to approach and avoid the potential danger, resulting in a freeze response. While this interpretation seems reasonable, it is highly speculative and requires further empirical investigation.

In interpreting the findings of studies 2 and 3 it is important to explore why significant associations were observed between the attachment dimensions and several of the FFFS behavioural outputs in each context. According to RST, the FFFS will produce the behavioural output (i.e., fight, flight, or freeze) that is most adaptive for responding to the particular threat stimulus that is detected (Gray & McNaughton, 2000; Smillie et al., 2006). The three behavioural outputs are mutually exclusive. Which output is produced is dependent on the nature of the threatening stimulus encountered (Gray & McNaughton, 2000). This raises questions as to why the attachment dimensions, especially attachment anxiety, were associated with simultaneous FFFS behaviours in response to threat. It is proposed that the behavioural manifestations of multiple FFFS outputs across these two contexts may be attributable to the ways in which the attachment system and the FFFS function together in the organisation of threat-related behaviour.

There may exist feedback processes that occur between attachment system and the FFFS in contexts of threat. This speculation pertains to an earlier proposal in this thesis that the attachment system may operate as a context-specific nested system of RST. Carver et al. (2000) propose that hierarchically organised systems function in a way that the higher-order systems determine the functional goals to lower-order
systems. In turn, the functional goals are achieved by the behavioural dynamics of each calibrated subsystem. The relationship between the attachment system and the systems of RST (in this particular case the FFFS) can be viewed in this way. However, so too can subsystems influence the functioning of broader systems, much like cognitive processing comprising of both top-down and bottom-up processing (Carreti et al., 2008; Fales et al., 2008). Thus, it is proposed that the behavioural tendencies associated with threat and reward pertaining to attachment system functioning, may over the course of time, yield such strong behavioural patterns, that these in turn exert influence in the functioning of broad (i.e., higher-order) systems of RST. Supposing this conceptualisation is accurate, the findings across studies 2 and 3 suggest that there may be both top-down and bottom-up influences at play between the attachment system and the systems of RST.

8.2 Contributions to the Literature

Overall, the findings provide new evidence about the associations between the attachment system and the FFFS. To summarise, Study 1 demonstrated that the threat detection mechanism of the FFFS is likely to function differently across levels of attachment anxiety and avoidance. For highly avoidant individuals, the FFFS was associated with a bias away from threatening words, whereas for highly anxious individuals, the FFFS was associated with a bias away from both threatening and rewarding words. This lends support to the idea attachment avoidance is associated FFFS functioning that results in accurate threat detection. In contrast, attachment anxiety is associated with FFFS functioning and an inability to discriminate between appetitive and aversive cues. Adding to these findings, the results of studies 2 and 3
demonstrate that high attachment anxiety is associated heightened FFFS outputs in threatening and non-threatening conditions compared to individuals low on attachment anxiety. The findings also suggest that due to a hypersensitive FFFS, the high avoidance component of attachment seems to attenuate highly anxious individuals’ FFFS responses under conditions of low threat. Furthermore, the findings from Studies 2 and 3 especially suggest that the FFFS is likely to be a key mechanism associated with the expression of disorganised behavioural tendencies in fearful avoidant individuals.

Notably, the findings contrast with existing integrative studies in which researchers have proposed that attachment avoidance is related to low BAS activity and attachment anxiety is related to high BIS activity (e.g., Carnelley & Story, 2008; MacDonald & Kingsbury, 2006; Meyer et al., 2005). In this thesis, inconsistencies between the conclusions drawn from past studies and key theoretical and empirical evidence from both the attachment theory and RST were highlighted. In an attempt to reconcile these anomalies, it was proposed that future integration of these behavioural systems theories would need to account for the revisions made to RST, whereby threat detection and aversive motivation are posited to be regulated by the FFFS, while the BIS is conceptualisation as a system of conflict resolution (Gray & McNaughton, 2000). Indeed, it appears that delineating the expected relationships between the attachment dimensions and the FFFS has contributed to a greater understanding of how the threat system, which is now distinct from the BIS, may be associated with attachment system functioning.

While preliminary, the findings across the three studies provide support the argument that the FFFS is a key system associated with approach and avoidance
motivations in insecurely attached individuals. More specifically, the findings regarding the threat detection mechanism and the behavioural outputs of the FFFS in distinct contexts provide new insights into the proposition that the FFFS is differentially associated with the attachment dimensions, such that attachment avoidance is related to a hypersensitive FFFS and attachment anxiety to a hyperfunctioning FFFS.

To reconcile the present findings with past research, it is important to consider the distinction between the FFFS and the BIS in the revised RST. Recall that Meyer et al. (2005) and Carnelley and Story (2008) drew on the original RST in their investigations of the relationship between attachment and appetitive and aversive motivational processes. As such, they did not distinguish between processes that were associated with the FFFS and the BIS. Without accounting for the important distinction between these constructs, it cannot be determined whether their results reflect the functional associations between the attachment dimensions and FFFS-mediated aversive motivation and BIS-mediated behavioural inhibition. Contrasting with their conclusions, the present research suggests that both forms of insecure attachment are significantly related FFFS-mediated aversive motivation. The reason for this discrepancy could be that measures used in past studies were tapping into processes associated with the BIS rather than the FFFS. Thus, the findings reported here add to this growing body of research by indicating that a third and equally important system needs to be accounted for in future integrative work linking the systems of RST to attachment theory. The findings from this thesis will contribute to a clearer understanding of the interplay between the three RST systems and the attachment system.
In their investigation of the links between attachment and the FFFS, MacDonald and Kingsbury (2006) argued that attachment anxiety is positively related to sensitivity to threat, while attachment avoidance is unlikely to be related an FFFS mechanism. In contrast, both attachment avoidance and attachment anxiety were associated with the operation of the threat detection system across all three studies in this thesis. These disparities may be attributable to the ways in which the FFFS was operationalised, as MacDonald and Kingsbury operationalised the FFFS as physical pain affect.

Contrary to MacDonald and Kingsbury’s (2006) conclusions, the findings presented in this thesis regarding attachment avoidance and the FFFS seem more consistent with the primary characteristics of attachment avoidance, including mental representations of attachment relationships as threatening and dangerous, others as rejecting and unreliable (Collins & Allard, 2001; Mikulincer & Shaver, 2007; Shaver & Mikulincer, 2002), and the use of deactivating strategies to avoid or minimise potentially hurtful attachment-related information (e.g., Fraley et al., 2000; Mikulincer & Shaver, 2003; Ognibene & Collins, 1998; Wei et al., 2003). Moreover, the present findings also indicate that attachment anxiety, while associated with the threat system, is more likely to be associated with an insensitivity to threat, rather than heightened sensitivity, and abnormal functioning of the threat system. Consistent with the attachment literature, the findings indicate that for individuals with high attachment anxiety, the FFFS is associated with abnormal processing of appetitive and aversive environmental cues such that appetitive stimuli may be detected as aversive, and problems discriminating between threatening and non-threatening conditions that result in a reduced capacity to modify behaviour in response to the presence or absence
of objective threat. It is argued here that this is due to a hyperfunctioning FFFS in anxiously attached individuals. Hence, it is contended that the hyperfunctioning FFFS is likely to be a key mechanism underlying the associations observed between attachment anxiety and the relational ambivalence exhibited by anxiously attached individuals in past attachment studies (Mikulincer et al., 2010).

In addition, this research contributes something unique to understandings of the construct of fearful avoidance. The patterning of associations suggests that there may be distinct processes related to FFFS functioning in these individuals. Recall that in Study 1, high attachment anxiety and FFFS was associated with bias away from both threat and reward stimuli while high attachment avoidance and FFFS was associated with bias away from threat stimuli. Taken together, these findings suggest that individuals high on attachment anxiety and avoidance may experience a disorganised pattern of attentional processing of threatening and rewarding environmental cues. Some have speculated that this abnormal processing of environmental cues is due to the effects of opposing secondary attachment strategies (hyperactivation and deactivation). The heightened use of these opposing strategies is thought to tax attentional processes to the extent that effective attentional processing may collapse resulting in inaccurate threat and reward detection (Fraley et al., 2000; Shaver & Mikulincer, 2000; Simpson & Rholes, 2002).

When the origins of fearful avoidance are considered, it is likely that these attentional abnormalities occur early in life during repeated attachment experiences in which the attachment figure is both the source of threat and location safety (Hesse & Main, 2006). As argued by Hesse and Main (2006), early parent-child experiences with carers who elicit threat and safety are inherently disorganising as the activation of
antagonistic attachment strategies affects the development of information processing and emotional regulation, and increases vulnerability to psychopathology (Mikulincer, Shaver, Cassidy, & Berant, 2009; Nakashi-Eisikovits, Dutra, & Westen, 2002; Schindler et al., 2005). It is conceivable that these early experiences might shape the reinforcement sensitivity of the FFFS which may contribute to the disorganised patterns of attentional processing and behavioural responses to threat seen in these individuals across the lifespan.

The research findings regarding fearful avoidance also make a significant contribution to the RST literature. RST research has, to a large extent, neglected to incorporate the revisions to RST or to examine the functioning of the revised FFFS as the threat detection system in human personality (Smillie et al., 2006). Traditionally, this has perhaps been attributable to difficulties in delineating between FFFS- and BIS-related behaviours and identifying correlates between the FFFS and other personality constructs (Smillie et al., 2006; Jackson, 2003). Adding to these challenges are the difficulties in developing psychometric tools to measure the FFFS or experimental paradigms that allow the functioning of the FFFS to be tested. More recently, researchers have adopted the scenario-based paradigm to examine FFFS and to clarify the normative functioning of the system (e.g., Perkins & Corr, 2006; Perkins et al., 2010). At this stage, while research on the non-normative functioning of the BAS and BIS and the relationships to personality functioning and psychopathology is ubiquitous, research into the non-normative functioning of the FFFS is relatively scant. The studies presented in this thesis were a preliminary attempt to explore propositions regarding the non-normative functioning of the FFFS. Indeed, the studies have yielded
some interesting insights into how this system can function, or malfunction, in the
detection of and responses to threatening stimuli.

In addition, this research has helped to elucidate the role FFFS in close
relationship behaviours. Despite the salience of threatening and rewarding cues in
relationships and the key adaptive function that close personal relationships serve, this
area has been relatively under-researched from an RST perspective (Gable, 2007;
Gable & Berkman, 2008). The present research contributes to understanding the role of
a key RST system in regulating close relationship behaviour. More specifically, the
findings provide valuable information about how the FFFS operates in association with
the key behavioural system responsible for regulating approach and avoidance
behaviours in relationship contexts – the attachment system.

At a broader theoretical level, this research makes a unique contribution to
perspectives on how distinct behavioural systems may interact in the regulation of
appetitive and aversive processes. The findings indicate that adult attachment is
associated with the differential functioning of the FFFS in the detection of threat and
reward and the behavioural responses to threat in the contexts of attachment and
substance use. This raises questions about how these systems are related. Early in this
thesis the idea was raised that the attachment system may operate as a purposely
calibrated sub-system of the broader systems of RST. The findings provide preliminary
clues to suggest that this may be the case and that the systems of RST and attachment
theory may indeed be hierarchical in nature. The results were interpreted as suggesting
that, while a nested system of RST, attachment system functioning exerts an influence
on threat-related behaviour in the significant, meaningful context of close personal
relationships. Conversely, while the patterns of behavioural outputs manifested by the
FFFS in the substance use context were distinct from those in the attachment context, attachment-related differences in the expression of the FFFS were still evident. Further research is needed to explore these possible theoretical links in greater detail.

8.3 Limitations and Future Directions

A number of limitations need to be considered when interpreting the results and drawing conclusions from the research findings. Some of these are specific to particular studies while others are more general. These limitations and directions for future research are discussed in this section.

Firstly, it was difficult to control for the confounding effects of testing conditions and environmental variables across the studies. In Study 1, testing occurred in different locations. While steps were taken to ensure that the conditions were as controlled and consistent as possible, the results may have been confounded by variations in testing conditions and locations (e.g., room temperature, outdoor noise). In this instance, the risk that environmental variables may confound the results had to be weighed against the need to enable maximum participant recruitment. In studies 2 and 3, there was no way to control testing conditions as participants completed the studies online.

Secondly, the findings are somewhat limited in their generalisability to the wider population. Across the studies presented in this thesis, the representativeness of the samples to the broader community was most likely to be low. In each of the three studies, there was an uneven distribution of gender in the sample, the majority of the participants were from Caucasian backgrounds, had greater than secondary level
education and were currently in romantic relationships. While it would have been ideal to have a large and diverse sample, the self-selecting nature of the study meant that it was difficult to account for these factors. In addition participant variables such as gender were not controlled for in the analyses. The limited samples sizes and characteristics of sample participants precluded such analyses from being conducted, particularly in Study 1. However, it is worth noting that gender differences are not usually found in the attachment literature (e.g., Mikulincer & Shaver, 2007; Schmitt et al., 2003; Mohr, 2008). Furthermore, given that the processes being examined are related to evolutionarily adaptive systems that are geared for survival, gender differences were not expected.

With regards to Study 1, in addition to the homogeneity of the sample, it is noted that the sample was particularly small. Contributing to this issue was the need to dichotomise the attachment dimensions into high and low attachment anxiety and avoidance, which resulted in unequal groups and even smaller \( n \)'s. Furthermore, it also acknowledged that the dot-probe task comprised a limited number of trials. Consequently, it was not possible to conduct analyses to compare attentional biases to general and attachment-related words. Replicating the study findings in a larger, more diverse sample with a greater number of trials would help to further validate the results of Study 1. Incorporating a larger number of trials into future studies would also help to expand the current findings by allowing separate analyses and comparisons of attentional biases to attachment and more general appetitive and aversive words.

Furthermore, the findings of Study 1 may also have been confounded by measurement issues. As previously noted, data screening revealed that the Jackson 5 subscales demonstrated fairly poor internal consistency, which may have compromised
the study findings. The flight and freeze subscales demonstrated lower internal consistency than the fight subscale. In particular, the freeze subscale had poor internal consistency ($\alpha = .58$). The amount of error in this subscale suggests that the items designed to assess the Freeze behavioural component of the FFFS do not seem to converge to form a reliable measure of the construct. This may explain why there no significant associations were found between Freeze and threat and reward bias in the path model. Hence, the psychometric properties of the Jackson 5 subscales in Study 1 indicate that the measure requires further refinement and validation in future research and highlight the need for further research to develop well-validated measures of the revised RST. While there were no alternative measures for use in Study 1, in order to avoid further compromising the research presented in this thesis, the Jackson 5 subscales were omitted from studies 2 and 3.

It is also acknowledged that some proponents of RST have questioned the validity of using self-report measures to assess the underlying sensitivity of biobehavioral systems (e.g., Smillie, 2008). While the use of more direct measures of reinforcement sensitivity such as those from the neuroscience field (e.g., neuroimaging and psychopharmacological techniques) would have been ideal, this was beyond the scope of this thesis. Nevertheless, this issue was partially addressed in Study 1 by utilising the implicit dot-probe task to examine the detection mechanism of the FFFS. This provided a more reliable and objective measure of threat detection than self-report. In addition, the experimental design is likely to have provided clearer evidence about the associations amongst the constructs examined in this study.

Studies 2 and 3 have a number of common limitations. Firstly, similar to Study 1, the need to dichotomise attachment anxiety and avoidance into high and low groups
resulted in unequal groups with smaller sample sizes across these studies. In Study 3, this was further compounded by the fact that approximately half of the study participants were omitted from the analyses due to their levels of hazardous alcohol use.

While there were significant differences between the high and low threat conditions, the mean ratings for perceived threat fell close to the mid-point in both studies 2 and 3. This indicates that the content of the high threat vignettes was not appraised as particularly threatening in either study. Furthermore, while significant differences were observed between the absolute values of threat across the dichotomised groups, the values of the groups scoring significantly higher were still generally situated at the low end of the FFFS output items. Hence, it may be that the content of the high threat vignettes was so not acute as to evoke more intense FFFS responses. These issues could be reconciled by further developing the vignettes in future research. In addition, attachment and threat explained a modest amount of variance in FFFS functioning across the studies (.01-.14). While this may be a concern, given that the processes investigated across the studies are highly specific, it may be expected that they may explain a limited amount of variance. This being said, the low amount of variance explained could also be due to measurement issues.

Only four items were devised to operationalise fight, flight, and freeze outputs across the two studies. While the items had high face validity, the extent to which these items accurately tap FFFS constructs is unclear. In particular, with regards to the freeze items in the respective studies, Gray and McNaughton (2000) note that, while FFFS-freezing is neurally distinct from BIS-inhibition, the outputs are difficult to distinguish at the behavioural level. Thus, the freeze items need to be interpreted with
caution as it they may tap aspects of BIS functioning. This potential limitation is particularly salient for Study 3. Firstly, it was difficult to devise substance use scenarios that would activate aversive behaviours. Secondly, given that use of psychoactive substances has been established as an appetitively motivated task (e.g., Franken, 2002; Franken et al., 2006), it is possible that the scenarios activated BIS-mediated behaviours rather than FFFS-mediated behaviours. It cannot be determined whether the item designed to measure freeze output captured elements of BIS-mediated behavioural inhibition. Accounting for the extent to which participants would have considered taking the pill may have provided more information about the likelihood that BIS processes were activated. Furthermore, it may also be that the relational aspects of the scenario may have conflated the associations between the attachment dimensions and FFFS responses. Clearly, future studies should expand upon this preliminary research by developing well-validated vignette response items that reflect the behavioural components of the FFFS.

At the broader level, a significant limitation of the research presented in this thesis is that the focus was on the FFFS exclusively, such that measures of the BAS and BIS were not included in the investigations. Theoretically, the FFFS will interact with the other systems of RST in producing responses to approach-avoidance contexts. Indeed the BAS and BIS are likely to be involved in the detection of rewarding stimuli (Study 1) and in organising behavioural responses to conditions that can signal the need to approach potential danger (Study 2 and Study 3). However, this thesis purposely focused on the FFFS as the research was a first attempt to investigate the associations between adult attachment and the different components of the FFFS. Future research is needed to further explore the interplay between the concurrent
functioning of the systems of RST and the attachment system, especially with regards to the conflict resolution role of the BIS. Drawing on methods used in the RST literature (e.g., behavioural learning tasks), it would be useful to design studies to specifically examine the functioning of the BIS in association with attachment dimensions, especially with regards to individuals classified as fearfully avoidant due to their concurrent approach-avoidance tendencies.

8.4 Implications

While acknowledging the limitations outlined in the previous section, the research findings have numerous implications for theoretical understandings of the links between attachment theory and RST, broader perspectives of appetitive and aversive motivational processes, and future research. By delineating the specific components of the FFFS, the findings of this research provide preliminary evidence for the role of the FFFS in the appetitive and aversive motivations of insecurely attached individuals. This has important implications for the growing body research attempting to clarify the functional relationships between these motivational systems theories. In this thesis, a new approach to this theoretical integration has been offered that highlights the important role of the FFFS and the need to incorporate the revisions made to RST into future integrative work. While the preliminary findings provide valuable insights into the functioning of the FFFS across the attachment dimensions, it will be essential to develop well-validated ways to measure the FFFS in future research. Furthermore, studies are also needed to investigate how all the systems of RST operate concurrently in association with the attachment system in approach-avoidance contexts.
Nonetheless, the preliminary evidence presented herein offers new ideas about the how seemingly distinct motivational systems (i.e., RST and attachment) are functionally organised, whereby the broader behavioural systems of RST may influence the calibration of context-specific systems, such as the attachment system, which is designed to regulate appetitive and aversive motivations related to one particular area of adaptive functioning. Furthermore, this thesis provides insight into how context-specific subsystems of RST may feedback to influence the operation of the broad systems of RST. Hence, this research has provided a new perspective on the ways in which they might interact in the regulation of appetitive and aversive motivational processes. Future work in this area could contribute to the development of a more comprehensive model of appetitive and aversive motivational system functioning that specifies how distinct systems interact in the regulation of appetitive and aversive behaviours.

The studies presented in this thesis have also helped to clarify how FFFS processes are likely to be involved in attachment behaviour and approach-avoidance behaviour beyond the context of relationships. Specifically, the findings suggest that attachment avoidance is associated with a hypersensitive FFFS while attachment anxiety is associated with a hyperfunctioning FFFS. This has implications for understanding the mechanisms that shape insecurely attached people’s responses to stressful situations and their capacities to deal with relationship difficulties and conflict. Adding to current literature, the present research has identified key RST processes that are likely to be integral in how people respond to and manage relationship conflict and other stressful situations.
Hence, this research offers novel evidence about how people respond to and manage threat. This has important implications for understanding and predicting the behaviour of individuals who have been exposed to threatening life events. By exploring the associations between attachment, FFFS functioning, and exposure to threat further, this type of research has the potential to enhance explanatory models of threat appraisal and response that can be applied to areas such as trauma, abuse, and grief and loss. For example, by understanding individual vulnerabilities to maladaptive threat responses, such as complicated grief and the development of post traumatic stress, there is potential to develop therapeutic interventions that could assist individuals to build their capacities to respond more adaptively to threatening life events.

To this end, the research findings also have particular implications for understanding the construct of fearful avoidance. This research has provided important clues that the operation of a broad motivational system may contribute to the increased vulnerability to psychopathology seen in individuals classified as having a fearful avoidant attachment style. As demonstrated in previous studies, these individuals have been shown to display the most maladaptive personality profiles and are over-represented in psychiatric samples (Schmidt et al., 2005; Simpson & Rholes, 2002; Riggs et al., 2007). Furthermore, studies have demonstrated that fearful avoidance may be a common factor that predisposes individuals to developing comorbid psychiatric conditions (Schmidt et al., 2005). The findings presented in this thesis suggest that the maladaptive functioning of the FFFS in threatening contexts may be a key factor that contributes to these vulnerabilities. From a theoretical standpoint, such findings provide insights into how early attachment experiences might affect the calibration of
the broader systems that regulate appetitive and aversive behaviours within and outside the attachment context. At the practical level, the findings provide important clues about the mechanisms that drive this particular group of individuals’ propensity to display maladaptive patterns of behaviour in response to threat. Exploring further how the RST systems operate for these individuals is likely to contribute to a better understanding of the systems that are responsible for these individuals’ generalised vulnerability to psychopathology and to the development of more comprehensive explanatory models of their disorganised behavioural patterns under stress.

8.5 Conclusions

The overarching aim of this thesis was to investigate whether the integration of RST and attachment theory would contribute to understanding the theoretical links between motivational systems that govern appetitive and aversive motivational processes. This thesis adopted a particularly specific goal focused upon elucidating the associations between the attachment system and the functioning of the FFFS, a key but relatively under-researched system of the revised RST. Overall, the findings provide important insights into the ways in which the attachment system and the FFFS interact in the organisation of individual differences in behaviour across the attachment context and more general contexts of threat. In doing so, this research has contributed to current conceptualisations of the interplay between the systems of RST and attachment theory by providing preliminary evidence for role of the FFFS in the appetitive and aversive motivations of insecurely attached individuals. Most importantly, the findings
generally support the proposition that attachment avoidance is associated with a hypersensitive FFFS, while attachment anxiety is associated with hyperfunctioning FFFS.

Notably, this research was based on a unique account of the how the revised RST systems, specifically the FFFS, are expected to be linked with the attachment dimensions, which has provided a novel framework for future integrative work and many directions for future research. It will be important to extend the current research by addressing the limitations of the studies presented herein and replicating the study findings. Although beyond the scope and purpose of this thesis, which was to understand the associations between attachment and the FFFS in particular, further research is needed to investigate how all the systems of RST operate concurrently in association with the attachment system. A significant challenge will be to develop paradigms within which to examine the associations between attachment system dynamics and the concurrent functioning of the BAS, FFFS, and BIS in future research. Nevertheless, this empirical attempt to integrate these motivational systems theories represents a significant step toward developing a deeper and more encompassing understanding of the function and dynamics of key motivational systems that regulate appetitive and aversive processes.
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APPENDICES
Appendix A

Questionnaires
Appendix A.1

Background Questionnaire

Demographic Information

Please take the time to answer the following questions.

Age: __________.

Gender: Male  Female

Postcode: __________.

Mother’s birth country: ____________________________.

Father’s birth country: ____________________________.

Religion: ____________________________.

Highest level of education: ____________________________.

Occupation: ____________________________.

Work Status (circle): Unemployed  Student  Casual  Part-time  Full-time

How many romantic relationships have you had it the past? ____________________________.

What is your current relationships status?

☐ Single

☐ Steady relationship but not living together

☐ Steady relationship and living together

☐ De facto

☐ Married

What is the duration of your current relationship (in months)? ____________________________.

If cohabiting (i.e., living together, de facto, or married), how long have you been living together? :

_____________________________.
Appendix A. 2

Adult Attachment Questionnaire (AAQ, Simpson et al., 1996)

Show how much you agree with each of the following items by rating them on this scale: 1 = totally disagree; 2 = strongly disagree; 3 = slightly disagree; 4 = slightly agree; 5 = strongly agree; or 6 = totally agree. Write your response in the space provided next to each item.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>I find it relatively easy to get close to others.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>I'm not very comfortable having to depend on other people.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>I'm comfortable having others depend on me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>I rarely worry about being abandoned by others.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>I don't like people getting too close to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>I'm somewhat uncomfortable being too close to others.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>8</td>
<td>I find it difficult to trust others completely.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>I'm nervous whenever anyone gets too close to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Others often want me to be more intimate than I feel comfortable being.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Others often are reluctant to get as close as I would like</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>I often worry that my partner(s) don't really love me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>I rarely worry about my partner(s) leaving me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>I often want to merge completely with others, and this desire sometimes scares them away.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>I'm confident others would never hurt me by suddenly ending our relationship.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>I usually want more closeness and intimacy than others do.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>The thought of being left by others rarely enters my mind.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>I'm confident that my partner(s) love me just as much as I love them.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Appendix A.3**

**The Jackson 5 (Jackson, 2009)**

Show extent to which you agree or disagree with each of the following items by rating them on a scale from 1 = completely disagree to 5 = completely agree.

<table>
<thead>
<tr>
<th></th>
<th>1 Completely Disagree</th>
<th>2 Disagree</th>
<th>3 Undecided</th>
<th>4 Agree</th>
<th>5 Completely Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I like to do things that are new and different.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I aim to do better than my peers.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I would fight back if someone hit me first.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>If approached by a suspicious stranger, I run away.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>If something very bad was just about to happen to me, I would just stop.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I like to do things spontaneously.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I want to do well compared to my peers.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>When provoked, I easily get into a fight.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I am likely to run if harassed by a stranger in an unfamiliar place.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>If I got scared in my bed at night, I would remain motionless.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I actively look for new experiences.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I like my peers to know I am doing well.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>If a burglar broke into my house, I would immediately look for a weapon.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>If a dog barks at me, I would run away.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I don’t know what to say if a stranger is rude to me in the street.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Statement</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>---</td>
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</tr>
<tr>
<td>I have a feel for how things work.</td>
<td></td>
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<tr>
<td>I prefer to work on projects where I can prove my ability to others.</td>
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<tr>
<td>If I caught somebody stealing my belongings, I would attack.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>If the fire alarm rang, I immediately rush out of the building.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>If my boss told me two contradictory things, I would not know what to do.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>I look for new sensations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I want to avoid looking bad.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If I think somebody is going to hit me, I hit them first.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>I can’t help but feel terrified if I see a dangerous animal.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>If there is a choice of products in a shop, I find it hard to decide what to buy.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>I am excited by what is new in my field.</td>
<td></td>
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<tr>
<td>I avoid work that makes me look bad.</td>
<td></td>
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</tr>
<tr>
<td>If somebody does something bad to me, I would retaliate.</td>
<td></td>
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<tr>
<td>I used to hide behind a chair as a child when I watched a frightening TV show.</td>
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<tr>
<td>In a crowd, my mind freezes and then I never know what to say.</td>
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</tbody>
</table>
### Appendix A.4

**Alcohol Use Disorders Inventory Test (AUDIT; Saunders et al., 1993)**

Please circle the answer that is most correct for you:

1. How often do you have a drink containing alcohol?
   - NEVER
   - MONTHLY
   - 2-4 TIMES
   - 2-3 TIMES
   - 4 OR MORE OR LESS
   - A MONTH
   - A WEEK
   - TIMES A WEEK

2. How many drinks containing alcohol do you have on a typical day when you are drinking?
   - 1 OR 2
   - 3 OR 4
   - 5 OR 6
   - 7 TO 9
   - 10 OR MORE

3. How often do you have six or more drinks on one occasion?
   - NEVER
   - LESS THAN MONTHLY
   - WEEKLY
   - DAILY OR MONTHLY
   - ALMOST DAILY

4. How often during the last year have you found it difficult to get the thought of alcohol out of your mind?
   - NEVER
   - LESS THAN MONTHLY
   - WEEKLY
   - DAILY OR MONTHLY
   - ALMOST DAILY

5. How often during the last year have you found that you were not able to stop drinking once you had started?
   - NEVER
   - LESS THAN MONTHLY
   - WEEKLY
   - DAILY OR MONTHLY
   - ALMOST DAILY

6. How often during the last year have you been unable to remember what happened the night before because you had been drinking?
   - NEVER
   - LESS THAN MONTHLY
   - WEEKLY
   - DAILY OR MONTHLY
   - ALMOST DAILY

7. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?
   - NEVER
   - LESS THAN MONTHLY
   - WEEKLY
   - DAILY OR MONTHLY
   - ALMOST DAILY

8. How often during the last year have you had a feeling of guilt or remorse after drinking?
   - NEVER
   - LESS THAN MONTHLY
   - WEEKLY
   - DAILY OR MONTHLY
   - ALMOST DAILY

9. Have you or someone else been injured as a result of your drinking?
   - NO
   - YES, BUT NOT IN THE LAST YEAR
   - YES, DURING THE LAST YEAR

10. Has a relative or friend or a doctor or other health worker, been concerned about your drinking or suggested you cut down?
    - NO
    - YES, BUT NOT IN THE LAST YEAR
    - YES, DURING THE LAST YEAR
Appendix A.5

Use of Other Substances

Please indicate how often you have taken the following substances:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Never</th>
<th>Monthly or less</th>
<th>2-4 times a month</th>
<th>2-3 times a week</th>
<th>4 or more times a week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco</td>
<td>Never</td>
<td>Monthly or less</td>
<td>2-4 times a month</td>
<td>2-3 times a week</td>
<td>4 or more times a week</td>
</tr>
<tr>
<td>Cannabis</td>
<td>Never</td>
<td>Monthly or less</td>
<td>2-4 times a month</td>
<td>2-3 times a week</td>
<td>4 or more times a week</td>
</tr>
<tr>
<td>Cocaine</td>
<td>Never</td>
<td>Monthly or less</td>
<td>2-4 times a month</td>
<td>2-3 times a week</td>
<td>4 or more times a week</td>
</tr>
<tr>
<td>Ecstasy</td>
<td>Never</td>
<td>Monthly or less</td>
<td>2-4 times a month</td>
<td>2-3 times a week</td>
<td>4 or more times a week</td>
</tr>
<tr>
<td>Ice</td>
<td>Never</td>
<td>Monthly or less</td>
<td>2-4 times a month</td>
<td>2-3 times a week</td>
<td>4 or more times a week</td>
</tr>
<tr>
<td>Methamphetamine (other)</td>
<td>Never</td>
<td>Monthly or less</td>
<td>2-4 times a month</td>
<td>2-3 times a week</td>
<td>4 or more times a week</td>
</tr>
<tr>
<td>Opioid</td>
<td>Never</td>
<td>Monthly or less</td>
<td>2-4 times a month</td>
<td>2-3 times a week</td>
<td>4 or more times a week</td>
</tr>
<tr>
<td>Other (please specify below)</td>
<td>Never</td>
<td>Monthly or less</td>
<td>2-4 times a month</td>
<td>2-3 times a week</td>
<td>4 or more times a week</td>
</tr>
</tbody>
</table>

Other: ______________________
Appendix B

Study 2 Vignette

Please imagine yourself in the following scenario:
Imagine that you are 21 years old and have been with your romantic partner for about 12 months. Emma, who is photographed below, is a classmate of your romantic partner and the two of them share a few classes together at university. You have met Emma/John once or twice but do not know him/her very well. Lately, the two of them have been spending more time together in and out of class. During the week, your partner cancels the plans you had made together for Saturday in order to spend the day and evening studying with Emma/John.

[Photo image displayed]

Now think about how you might react in this scenario and answer the following questions.

1. To what extent would this situation cause you to leave your partner?

   Definitely not 1 2 3 4 5 6 7 Definitely yes

2. To what extent would this situation make you unhappy and cause you to confront your partner, but do so in a rational and assertive manner?

   Definitely not 1 2 3 4 5 6 7 Definitely yes

3. To what extent would this situation make you so upset that you would become aggressive towards your partner (either verbally or physically)?

   Definitely not 1 2 3 4 5 6 7 Definitely yes

4. To what extent would you panic and not know what to say or do?

   Definitely not 1 2 3 4 5 6 7 Definitely yes

Please rate the degree to which you would find this scenario worrying.

Not at all 1 2 3 4 5 6 7 Extremely

To what extent would you perceive this situation as a threat to your relationship?

Not at all 1 2 3 4 5 6 7 Extremely
Appendix C

Study 3 Vignettes
Substance Use Vignette 1: Low threat

Please read the following carefully and imagine yourself in this situation:

You're unexpectedly been laid off from a job that you value greatly, immediately after moving into a more expensive home and obtaining a car loan.

Taken aback by the news you feel depressed, worried, vulnerable and concerned about what future holds. Upon leaving you office after receiving this news, you pass the desk of a co-worker who you've occasionally run into in the office. Noticing your distress, the co-worker asks what's wrong. Upon you telling them, they offer you an alcoholic drink to help you feel better. However, it is an alcoholic drink that you specifically dislike.

Now think about how you might react in this scenario and answer the following questions:

1. To what extent would this offer of a drink you dislike like cause you to walk away from this person?
   Definitely not  1  2  3  4  5  6  7  Definitely yes

2. To what extent would this offer of a drink you dislike cause you to confront this person, but do so in a rational and assertive manner?
   Definitely not  1  2  3  4  5  6  7  Definitely yes

3. To what extent would this offer of a drink you dislike upset you to the point that you would become aggressive towards this person (either verbally or physically)?
   Definitely not  1  2  3  4  5  6  7  Definitely yes

4. To what extent would this offer of a drink you dislike cause you to panic and not know what to say or do?
   Definitely not  1  2  3  4  5  6  7  Definitely yes

Please rate the extent to which you would find this offer of a drink you dislike worrying?
Not at all  1  2  3  4  5  6  7  Extremely
**Substance Use Vignette 2: High Threat**

Please read the following carefully and imagine yourself in this situation:

You're unexpectedly been laid off from a job that you value greatly, immediately after moving into a more expensive home and obtaining a car loan.

Taken aback by the news you feel depressed, worried, vulnerable and concerned about what future holds. Upon leaving the office after receiving this news, you bump into a co-worker that you've occasionally run into in the office lift. Noticing your distress, the co-worker asks what's wrong. Upon you telling them, the offer you a pill and tell you that if you take this pill, you'll stop worrying and feel better.

Now think about how you might react in this scenario and answer the following questions:

1. To what extent would this offer of a pill cause you to walk away from this person?
   - Definitely not 1 2 3 4 5 6 7 Definitely yes

2. To what extent would this offer of a pill cause you to confront this person, but do so in a rational and assertive manner?
   - Definitely not 1 2 3 4 5 6 7 Definitely yes

3. To what extent would this offer of a pill upset you to the point that you would become aggressive towards this person (either verbally or physically)?
   - Definitely not 1 2 3 4 5 6 7 Definitely yes

4. To what extent would this offer of a pill cause you to panic and not know what to say or do?
   - Definitely not 1 2 3 4 5 6 7 Definitely yes

Please rate the extent to which you would find this offer of a pill worrying?

- Not at all 1 2 3 4 5 6 7 Extremely
Appendix D

Plain Language Statements
Appendix D.1

Study 1 Plain Language Statement

DEAKIN UNIVERSITY

PLAIN LANGUAGE STATEMENT AND CONSENT FORM

TO: Participant

Plain Language Statement

Date:

Full Project Title: An examination of appetitive and aversive motivational systems. An integration of attachment theory and reinforcement sensitivity theory perspectives.

Principal Researcher: Dr. Gery Karantzas

Student Researcher: Kimberley Ure

Associate Researcher(s): Dr. Nicolas Kambouropoulos

This Plain Language Statement and Consent Form is 6 pages long. Please make sure you have all the pages.

1. Your Consent

You are invited to take part in this research project.

This Plain Language Statement contains detailed information about the research project. Its purpose is to explain to you as openly and clearly as possible all the procedures involved in this project so that you can make a fully informed decision whether you are going to participate.

Please read this Plain Language Statement carefully. Feel free to ask questions about any information in the document. You may also wish to discuss the project with a relative or friend or your local health worker. Feel free to do this.

Once you understand what the project is about and if you agree to take part in it, you will be asked to sign the Consent Form. By signing the Consent Form, you indicate that you understand the information and that you give your consent to participate in the research project.

You will be given a copy of the Plain Language Statement and Consent Form to keep as a record.
2. Purpose and Background
The purpose of this project is to better understand the reasons that motivate people to either avoid or confront difficult and stressful situations associated with relationships and substance use. This is a student project to be conducted as part of a Doctoral (Health Psychology) degree.

A total of 100 people will participate in this project.

You are invited to participate in this research project because we are interested in hearing from a large number of individuals with diverse relationship and substance use experiences.

The results of this research may be used to help researcher Kimberley Ure to obtain a Doctoral (Health Psychology) degree.

3. Funding
This project will be funded by Deakin University.

4. Procedures
Participation in this project will require that you attend a computer laboratory at Deakin University in order to complete three tasks. The tasks will take approximately 30 - 40 minutes to complete (in total) and may require some sustained attention. You will be asked to respond to a variety of words presented on a computer screen in which your reaction times will be recorded. After your reaction times to the first set of words has been recorded, you will be asked to complete a series of questionnaires regarding your thoughts and experiences in close relationships and the ways in which you tend to respond to threatening and positive stimuli in your environment. Questionnaire items will ask you rate such things as the extent to which you generally feel “excited” or “nervous”, the extent to which you agree or disagree with statements such as “If I think something unpleasant is going to happen I usually get pretty "worked up"”, or “I am confident that my partner(s) love me as just as much as I love them”. Upon completion of these questionnaires you will be presented with a second set of words. Your response times to these words will again be recorded.

5. Possible Benefits
Possible benefits include the provision of valuable information contributing to a more comprehensive understanding of underlying appetitive and aversive motivations of behaviour. This may have significant future clinical and practical utility for the wider community. The development of a more unified theoretical framework will enhance our understanding of interpersonal and substance abuse issues in clinical settings and contribute to the development of more appropriately tailored prevention programs that target the needs of vulnerable individuals. We cannot guarantee or promise that you will receive any benefits from this project.

6. Possible Risks
It is not expected that you will be exposed to any physical risk or psychological distress by participating in this project beyond the feelings which may be aroused due to consciously evaluating the motivations that drive your healthy or unhealthy behaviours across the relationship and substance use contexts. The questionnaires used in this study are unlikely to cause participants to experience any physical or psychological distress, inconvenience or discomfort beyond the normal experience of everyday life, in either the short term or long term. However, it is possible that questions directed at substance use experiences or your relationships may elicit some
anxiety and distress. Participants are directed to contact the appropriate services, such as Direct Line (which is a free, anonymous alcohol misuse line with trained counselors) on 1800 888 236 or Lifeline on 13 11 14, if they experience any anxiety or distress. Should anxiety or distress occur at any stage participants are advised to withdraw from participating in the project. Participants will not incur any risk from withdrawing from the study.

Participants are free to withdraw from the study at anytime and there are no foreseeable risks in doing so. Any data that withdrawing participants provide will be deleted.

7. Privacy, Confidentiality and Disclosure of Information

All information gathered from participants will be kept securely. Paper-based information will be kept in securely locked filing cabinets in the principal researchers' offices. Electronic data will be password protected and stored on a secure server within the School of Psychology at Deakin University. Informed consent forms will be kept separate from the data and will not be linked in any way to any individual data. Hard copies of the primary data and consent forms will be separated immediately after data collection and stored in separate filing cabinets in the principal research investigators' offices. None of the electronic files will include any identifying information. Only the research staff directly linked with the project will have access to the data. After the completion of the project, the data collected will be securely stored for six years at Deakin University, as set out in the University regulations, after which all data will be destroyed.

In any publication, information will be provided in such a way that you cannot be identified. Only group data will be disseminated. As a result no one person's data will be presented, nor will any identifiable information be relevant or disclosed in the reporting of results.

8. Results of Project

Upon completion of this research, feedback regarding the results of the project will be accessible to you via the school of psychology website. As the data will contain no identifying personal information only group results will be available to report. The results of the project will be reported as a part of doctoral thesis. It is also likely that the group findings will be disseminated in peer-reviewed journals and conference presentations.

9. Participation is Voluntary

Participation in any research project is voluntary. If you do not wish to take part you are not obliged to. If you decide to take part and later change your mind, you are free to withdraw from the project at any stage. However, it will not be possible to withdraw your data once submitted due to the anonymous nature of the data collected. The questionnaires will be immediately separated from your consent forms when the data is collected. The consent forms will then be randomly shuffled thereby ensuring the data is permanently de-identified.

Your decision whether to take part or not to take part, or to take part and then withdraw, will not affect your relationship with Deakin University.

Before you make your decision, a member of the research team will be available to answer any questions you have about the research project. You can ask for any information you want.
Sign the Consent Form only after you have had a chance to ask your questions and have received satisfactory answers.

If you decide to withdraw from this project, please notify a member of the research team or complete and return the Revocation of Consent Form attached. There are no health risks or special requirements linked to withdrawing.

10. Ethical Guidelines
This project will be carried out according to the National Statement on Ethical Conduct in Human Research (2007) produced by the National Health and Medical Research Council of Australia. This statement has been developed to protect the interests of people who agree to participate in human research studies.

The ethics aspects of this research project have been approved by the Human Research Ethics Committee of Deakin University.

11. Complaints
If you have any complaints about any aspect of the project, the way it is being conducted or any questions about your rights as a research participant, then you may contact:

Secretary HEAG-H, Dean’s Office, Faculty of Health, Medicine, Nursing, & Behavioural Sciences, 221 Burwood Hwy, Burwood, VIC 3125, Telephone: (03) 9251 7174, Email: hbs.research@deakin.edu.au

Please quote project number HEAG-H 103_08.

12. Reimbursement for your costs
You will not be paid for your participation in this project.

13. Further Information, Queries or Any Problems
If you require further information, wish to withdraw your participation or if you have any problems concerning this project (for example, any side effects), you can contact the principal researcher, Dr. Gery Karantzas, Dr. Nicolas Kambouropoulos, or Kimberley Ure.

The researchers responsible for this project are:

Dr. Gery Karantzas

School of Psychology

221 Burwood Hwy, Burwood, 3125

Business hours: (03) 9244 6959

Email: gery.karantzas@deakin.edu.au

Dr. Nicolas Kambouropoulos

School of Psychology

221 Burwood Hwy, Burwood, 3125

Business Hours: (03) 9244 6956
Email: nic.kambouropoulos@deakin.edu.au

Kimberley Ure
School of Psychology
221 Burwood Hwy, Burwood, 3125
Email: kaur@deakin.edu.au
Fax: (03) 9244 6858
TO: Participants

Consent Form

Date:

Full Project Title: An examination of appetitive and aversive motivational systems. An integration of attachment theory and reinforcement sensitivity theory perspectives.

I have read and I understand the attached Plain Language Statement.

I freely agree to participate in this project according to the conditions in the Plain Language Statement.

I have been given a copy of the Plain Language Statement and Consent Form to keep.

The researcher has agreed not to reveal my identity and personal details, including where information about this project is published, or presented in any public form.

Participant’s Name (printed) …………………………………………………………………………

Signature ……………………………………………………… Date ……………………………
TO: Participants

Revocation of Consent Form

(To be used for participants who wish to withdraw from the project)

Date;

Full Project Title: An examination of appetitive and aversive motivational systems. An integration of attachment theory and reinforcement sensitivity theory perspectives.

I hereby wish to WITHDRAW my consent to participate in the above research project and understand that such withdrawal WILL NOT jeopardise my relationship with Deakin University.

Participant’s Name (printed) .................................................................

Signature............................................................... Date ......................

Please mail or fax this form to:

Kimberley Ure
School of Psychology
221 Burwood Hwy, Burwood, 3125
Fax: (03) 9244 6858
Appendix D.2

Study 2 Plain Language Statement

Full Project Title: An examination of appetitive and aversive motivational systems: An integration of attachment theory and reinforcement sensitivity theory perspectives.

Principal Researchers: Dr. Gery Karantzas & Dr. Nicolas Kambouropoulos
Student Researcher: Kimberley Ure

This Plain Language Statement and Consent Form is 3 pages long. Please make sure you have read all the pages.

1. Your Consent
You are invited to take part in this research project. This Plain Language Statement contains detailed information about the research project. Its purpose is to explain to you as openly and clearly as possible all the procedures involved in this project so that you can make a fully informed decision whether you are going to participate. Please read this Plain Language Statement carefully. Feel free to ask questions about any information in the document. You may also wish to discuss the project with a relative or friend or your local health worker. Feel free to do this.

Once you understand what the project is about and if you agree to take part in it, you can continue with the study. By responding to the scenario, completing questionnaire and submitting it online you are consenting to take part in the research. You should print off a copy of the online Plain Language Statement to keep as a record.

2. Purpose and Background
The purpose of this project is to better understand the reasons that motivate people to either avoid or confront difficult and stressful situations that arise in relationships. This is a student project to be conducted as part of a Doctoral (Health Psychology) degree.

A total of 200 people will participate in this project. You are invited to participate in this research project because we are interested in hearing from a large number of individuals with diverse relationship experiences. The results of this research may be used to help researcher Kimberley Ure to obtain a Doctoral (Health Psychology) degree.

3. Funding
This project will be funded by Deakin University.

4. Procedures
Participation in this project will involve the presentation of a hypothetical scenario about a romantic relationship and a battery of questionnaires online. Completion of these tasks should take approximately 20-30 minutes. You will be asked to rate how you would feel and react to a hypothetical relationships scenario. In addition you will then be asked to complete some questionnaires regarding your thoughts and experiences in close relationships and the ways in which you tend to respond to threatening and positive stimuli in your environment. Questionnaire items will ask you to rate such things as the extent to which you generally feel “excited” or “nervous”, the extent to which you agree or disagree with statements such as “If I think something unpleasant is going to happen I usually get pretty “worked up””, or “I am confident that my partner(s) love me as just as much as I love them”.

5. Possible Benefits
Possible benefits include the provision of valuable information contributing to a more comprehensive understanding of underlying appetitive and aversive motivations of behaviour. This may have significant future clinical and practical utility for the wider community. The development of a more unified theoretical framework will enhance our understanding of interpersonal and substance abuse issues in clinical settings and contribute to the development of more appropriately tailored prevention programs that target the needs of vulnerable individuals. We cannot guarantee or promise that you will receive any benefits from this project.

6. Possible Risks
It is not expected that you will be exposed to any physical risk or psychological distress by participating in this project beyond the feelings which may be aroused due to consciously evaluating the motivations that drive your healthy or unhealthy behaviours across the relationship and substance use contexts. However, it is possible that questions directed at substance use experiences or your relationships may elicit some anxiety and distress. Participants are directed to contact the appropriate services, such as Direct Line (which is a free, anonymous alcohol misuse line with trained counselors) on 1800 888 236 or Lifeline on 13 11 14, if they experience any anxiety or distress. Should anxiety or distress occur at any stage participants are advised to withdraw from participating in the project. Participants will not incur any risk from withdrawing from the study.

Participants are free to withdraw from the study at anytime and there are no foreseeable risks in doing so. Any data that withdrawing participants provide will be deleted. In the unlikely event that your participation results in distress, the contact numbers of the researchers involved have been provided. Feel free to contact them at any time.

7. Privacy, Confidentiality and Disclosure of Information
All information gathered from participants will be kept securely. Electronic data will be password protected and stored on a secure server within the School of Psychology at Deakin University. None of the electronic files will include any identifying information. Only the research staff directly linked with the project will have access to the data. After the completion of the project, the data collected will be securely stored for six years at Deakin University, as set out in the University regulations, after which all data will be destroyed.

In any publication, information will be provided in such a way that you cannot be identified. Only group data will be disseminated. As a result no one person’s data will be presented, nor will any identifiable information be relevant or disclosed in the reporting of results.

8. Results of Project
Upon completion of this research, feedback regarding the results of the project will be accessible to you via the school of psychology website http://www.deakin.edu.au/psychology/research/karantzas/. As the data will contain no identifying personal information only group results will be available to report. The results of the project will be reported as a part of doctoral thesis. It is also likely that the group findings will be disseminated in peer-reviewed journals and conference presentations.

9. Participation is Voluntary
Participation in any research project is voluntary. IF YOU DO NOT WISH TO TAKE PART YOU ARE NOT OBLIGED TO. If you decide to take part and later change your mind, you are free to withdraw from the project at any stage prior to submitting the online data. However, it will not be possible to withdraw your data once submitted due to the anonymous nature of the data collected.
Your decision whether to take part or not to take part, or to take part and then withdraw, will not affect your relationship with Deakin University.

Before you make your decision, a member of the research team will be available to answer any questions you have about the research project. You can ask for any information you want. Proceed to the online questionnaire only after you have had a chance to ask your questions and have received satisfactory answers.

10. Ethical Guidelines
This project will be carried out according to the National Statement on Ethical Conduct in Human Research (2007) produced by the National Health and Medical Research Council of Australia. This statement has been developed to protect the interests of people who agree to participate in human research studies. The ethics aspects of this research project have been approved by the Human Research Ethics Committee of Deakin University.

11. Complaints
If you have any complaints about any aspect of the project, the way it is being conducted or any questions about your rights as a research participant, then you may contact:

Secretary HEAG-H, Dean’s Office, Faculty of Health, Medicine, Nursing, & Behavioural Sciences, 221 Burwood Hwy, Burwood, VIC 3125, Telephone: (03) 9251 7174, Email: hbs.research@deakin.edu.au
Please quote project number HEAG-H 103_08.

12. Reimbursement for your costs
You will not be paid for your participation in this project.

13. Further Information, Queries or Any Problems
If you require further information or if you have any problems concerning this project (for example, any side effects), you can contact the principal researcher Dr. Gery Karantzas, or Kimberley Ure, or Dr. Nicolas Kambouropoulos.

The researchers responsible for this project are:

Dr. Gery Karantzas
School of Psychology
221 Burwood Hwy, Burwood, 3125
Business hours: (03) 9244 6959
Email: gery.karantzas@deakin.edu.au

Dr. Nicolas Kambouropoulos
School of Psychology
221 Burwood Hwy, Burwood, 3125
Business Hours: (03) 9244 6956
Email: nic.kambouropoulos@deakin.edu.au

Kimberley Ure
School of Psychology
221 Burwood Hwy, Burwood, 3125
Email: kaur@deakin.edu.au
Fax: (03) 9244 6858
Appendix D.3

Study 3 Plain Language Statement

Full Project Title: An examination of appetitive and aversive motivational systems: An integration of attachment theory and reinforcement sensitivity theory perspectives.

Principal Researchers: Dr. Gery Karantzas & Dr. Nicolas Kambouropoulos
Student Researcher: Kimberley Ure

This Plain Language Statement and Consent Form is 3 pages long. Please make sure you have read all the pages.

1. Your Consent
You are invited to take part in this research project. This Plain Language Statement contains detailed information about the research project. Its purpose is to explain to you as openly and clearly as possible all the procedures involved in this project so that you can make a fully informed decision whether you are going to participate. Please read this Plain Language Statement carefully. Feel free to ask questions about any information in the document. You may also wish to discuss the project with a relative or friend or your local health worker. Feel free to do this.

Once you understand what the project is about and if you agree to take part in it, you can continue with this study. By responding to the scenario, completing questionnaires and submitting it online you are consenting to take part in the research. You should print off a copy of the online Plain Language Statement to keep as a record.

2. Purpose and Background
The purpose of this project is to better understand the reasons that motivate people to either avoid or confront difficult and stressful situations associated with substance use. This is a student project to be conducted as part of a Doctoral (Health Psychology) degree.

A total of 180 people will participate in this project. You are invited to participate in this research project because we are interested in hearing from a large number of individuals with diverse substance use experiences. The results of this research may be used to help researcher Kimberley Ure to obtain a Doctoral (Health Psychology) degree.

3. Funding
This project will be funded by Deakin University

4. Procedures
Participation in this project will involve the presentation of a hypothetical scenario related to substance use and a battery of questionnaires online. Completion of these tasks should take approximately 20-30 minutes. You will be randomly assigned to one of two conditions. You will be asked to rate how you would feel and react to a hypothetical substance use scenario. In addition you will then be asked to complete some questionnaires regarding your thoughts and experiences in close relationships and the ways in which you tend to respond to threatening and positive stimuli in your environment. Questionnaire items will ask you to rate such things as the extent to which you generally feel “excited” or “nervous”, the extent to which you agree or disagree with statements such as “If I think something unpleasant is going to happen I usually get pretty “worked up””, or “I am confident that my partner(s) love me as just as much as I love them”.
5. Possible Benefits
Possible benefits include the provision of valuable information contributing to a more comprehensive understanding of underlying appetitive and aversive motivations of behaviour. This may have significant future clinical and practical utility for the wider community. The development of a more unified theoretical framework will enhance our understanding of interpersonal and substance abuse issues in clinical settings and contribute to the development of more appropriately tailored prevention programs that target the needs of vulnerable individuals. We cannot guarantee or promise that you will receive any benefits from this project.

6. Possible Risks
It is not expected that you will be exposed to any physical risk or psychological distress by participating in this project beyond the feelings which may be aroused due to consciously evaluating the motivations that drive your healthy or unhealthy behaviours across the relationship and substance use contexts. However, it is possible that questions directed at substance use experiences or your relationships may elicit some anxiety and distress. Participants are directed to contact the appropriate services, such as Direct Line (which is a free, anonymous alcohol misuse line with trained counselors) on 1800 888 236 or Lifeline on 13 11 14, if they experience any anxiety or distress. Should anxiety or distress occur at any stage participants are advised to withdraw from participating in the project. Participants will not incur any risk from withdrawing from the study.

Participants are free to withdraw from the study at anytime and there are no foreseeable risks in doing so. Any data that withdrawing participants provide will be deleted. In the unlikely event that your participation results in distress, the contact numbers of the researchers involved have been provided. Feel free to contact them at any time.

7. Privacy, Confidentiality and Disclosure of Information
All information gathered from participants will be kept securely. Electronic data will be password protected and stored on a secure server within the School of Psychology at Deakin University. None of the electronic files will include any identifying information. Only the research staff directly linked with the project will have access to the data. After the completion of the project, the data collected will be securely stored for six years at Deakin University, as set out in the University regulations, after which all data will be destroyed.

In any publication, information will be provided in such a way that you cannot be identified. Only group data will be disseminated. As a result no one person's data will be presented, nor will any identifiable information be relevant or disclosed in the reporting of results.

8. Results of Project
Upon completion of this research, feedback regarding the results of the project will be accessible to you via the school of psychology website http://www.deakin.edu.au/psychology/research/karantzas/. As the data will contain no identifying personal information only group results will be available to report. The results of the project will be reported as a part of doctoral thesis. It is also likely that the group findings will be disseminated in peer-reviewed journals and conference presentations.

9. Participation is Voluntary
Participation in any research project is voluntary. IF YOU DO NOT WISH TO TAKE PART YOU ARE NOT OBLIGED TO. If you decide to take part and later change your mind, you are free to withdraw from the project at any stage prior to submitting the online data. However, it will not be possible to withdraw your data once submitted due to the anonymous nature of the data collected.
Your decision whether to take part or not to take part, or to take part and then withdraw, will not affect your relationship with Deakin University.

Before you make your decision, a member of the research team will be available to answer any questions you have about the research project. You can ask for any information you want. Proceed to the online questionnaire only after you have had a chance to ask your questions and have received satisfactory answers.

10. Ethical Guidelines
This project will be carried out according to the National Statement on Ethical Conduct in Human Research (2007) produced by the National Health and Medical Research Council of Australia. This statement has been developed to protect the interests of people who agree to participate in human research studies. The ethics aspects of this research project have been approved by the Human Research Ethics Committee of Deakin University.

11. Complaints
If you have any complaints about any aspect of the project, the way it is being conducted or any questions about your rights as a research participant, then you may contact:

Secretary HEAG-H, Dean’s Office, Faculty of Health, Medicine, Nursing, & Behavioural Sciences, 221 Burwood Hwy, Burwood, VIC 3125, Telephone: (03) 9251 7174, Email: hbs.research@deakin.edu.au. Please quote project number HEAG-H 103_08.

12. Reimbursement for your costs
You will not be paid for your participation in this project.

13. Further Information, Queries or Any Problems
If you require further information or if you have any problems concerning this project (for example, any side effects), you can contact the principal researcher Dr. Gery Karantzas, or Kimberley Ure, or Dr. Nicolas Kambouropoulos.

The researchers responsible for this project are:

Dr. Gery Karantzas
School of Psychology
221 Burwood Hwy, Burwood, 3125
Business hours: (03) 9244 6959
Email: gery.karantzas@deakin.edu.au

Dr. Nicolas Kambouropoulos
School of Psychology
221 Burwood Hwy, Burwood, 3125
Business Hours: (03) 9244 6956
Email: nic.kambouropoulos@deakin.edu.au

Kimberley Ure
School of Psychology
221 Burwood Hwy, Burwood, 3125
Email: kaur@deakin.edu.au
Fax: (03) 9244 6858
Appendix E

Recruitment materials
Appendix E. 1

Study 1 Flyer

-RELATIONSHIPS AND SUBSTANCE ABUSE STUDY-

My name is Kimberley Ure. I would like to invite you to take part in a study conducted by myself, Dr. Gery Karantzas, and Dr. Nicolas Kamboroupoulous as part of my Doctorate of Psychology (Health) Degree at Deakin University. As part of my research thesis, I am investigating the reasons that motivate people to either confront or avoid difficult situations associated with relationships and substance use. In order to do this, we are interested in hearing from a large number of people with diverse experiences.

Participation in this project will involve coming into the Social Psychology Laboratory in building R in order to complete three tasks that will take approximately 15-25 minutes of your time. You will be asked to complete a brief reaction time computer task followed by completing a series of questionnaires. Once you have completed these questionnaires you will repeat the computer task again.

If you are interested in participating in this study and would like to generously donate some of your time please write your name and either your email address or phone number on the sign-up sheet provided. I will contact you as soon as possible to arrange a time that suits you. I have also included my contact details if you have any questions or further queries.

Thank-you,

Kimberley Ure

Email: kaur@deakin.edu.au Ph: (03) 92517791
Appendix E.2

Facebook Website Advertisement

Relationships and Drugs

Participate in an anonymous personality research survey conducted by Deakin University. This only takes 15 minutes.