

**The Relevance of Reinforcement Sensitivity Theory
to Social Anxiety and Response to Cognitive Behavioural Therapy for
Social Anxiety Disorder**

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Declaration

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Statement of Ethical Conduct

The research associated with this thesis abides by the international and Australian codes on human and animal experimentation, the guidelines by the Australian Government's Office of the Gene Technology Regulator and the rulings of the Safety, Ethics and Institutional Biosafety Committees of the University.

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Abstract

The overall aim of this thesis was to investigate the relevance of Reinforcement Sensitivity Theory (RST) to social anxiety (SA) in the community and response to cognitive behavioural therapy (CBT) outcome for social anxiety disorder (SAD). Three studies were conducted to realise this objective.

Study 1 investigated the relationships between RST traits (and similar personality variables) and observation anxiety (OA) and interaction anxiety (IA). Participants in the community ($N=200$; Age $M=26.84$) completed questionnaires. The original Behavioural Inhibition System (o-BIS), revised BIS (r-BIS), Fight-Flight-Freeze System (FFFS), Sensitivity to Punishment (SP; a measure of BIS), neuroticism, negative affectivity (NA), and a composite score of all of these personality variables, were all positive predictors of OA. Fun-Seeking (Fun-S), positive affectivity (PA) and extraversion were negative predictors. For IA, the same pattern of results was found except that FFFS was not a significant predictor.

Study 2 used an experimental mood-induction procedure to investigate the effects of RST traits on cognitive, affective and avoidance responses to induced SA with a community sample ($N = 103$; Age $M=30.22$). For affective responses, SP positively and independently predicted post-induction fear and SP interacted with Sensitivity to Reward (SR; a measure of BAS) to predict post-induction anxiety. For cognitive responses, SP positively predicted cognitions *I want to leave/exit/escape this situation* and *People can see that I feel anxious. I am being judged/evaluated negatively by these people* was positively predicted by FFFS and Fun-S, and negatively predicted by Drive. For avoidance responses, SP positively predicted *desire* to avoid but *active* avoidance was not significantly predicted by any RST trait.

Study 3 investigated how RST traits influenced responses to CBT outcome for SAD. Sixteen participants (Age $M=41.82$) attended treatment and completed various pre- and post-

treatment outcome measures. For IA: r-BIS, o-BIS and SR each moderated relationships between pre- and post-treatment IA, with high personality scores being associated with higher post-treatment IA. For OA: Reward-Responsiveness (RR), Drive, and SR each moderated the relationship between pre- and post-treatment OA with high personality scores resulting in higher post-treatment OA. For the Cognitive Checklist Anxiety (CCL Anx; general anxiety cognitions); Drive and FFFS each moderated the relationship between pre- and post-treatment CCL Anx with low personality scores being associated with higher post-treatment CCL Anx.

Overall, results suggest that RST traits and SA share dimensional relationships; that RST traits affect cognitive, affective and avoidance responses to SA; and that high BIS and BAS scores relate to higher post-CBT outcome scores for SAD.

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CHAPTER ONE

Personality and Psychopathology

The purpose of this first chapter is to provide a brief overview of the literature on the relationships between personality traits and psychopathology. This is endeavoured to afford the reader a general appreciation of the broader theoretical backdrop to the current investigations of Reinforcement Sensitivity Theory and social anxiety. The chapter will firstly present a brief history of how personality-psychopathology relationships have been previously understood. This section will demonstrate that personality and psychopathology have been historically seen as having a dimensional relationship. Following this, the concepts of personality and psychopathology as separate constructs will be defined and discussed. This section is important for the purpose of clarifying for the reader the contemporary understandings of personality and psychopathology, as there is some conceptual overlap between them. The next section brings together personality and psychopathology and considers empirical findings that suggest they share the same underlying dimensions. Finally, the last section presents theoretical models that have stemmed from this research that formally link personality traits and psychopathology.

Brief History of the Relationship between Personality and Psychopathology

The idea that there exists a strong systematic connection between personality and psychopathology is not a new one (Maher & Maher, 1994). In fact, it is relatively recently that personality and psychopathology have been explicitly defined as separate constructs (Maher & Maher, 1994; Widiger, Verheul, & van den Brink, 1999). This distinction was perhaps most formally recognised in 1965 when the *Journal of Abnormal and Social Psychology* split into separate periodicals: *Journal of Abnormal Psychology* and *Journal of Personality and Social Psychology*. Prior to this, it was implicit that personality and

psychopathology were fundamentally related. A look at the history reveals an interesting evolution of ideas.

Most personality researchers acknowledge the work of Hippocrates (400 BC) and his four humour theory as one of the earliest influences in this domain (Widiger et al., 1999). Hippocrates theorised that personality was a result of an imbalance of essential fluids in the body: blood, phlegm, yellow bile and black bile. An excess of any of these „humours’ was proposed to result in a corresponding temperament. A *sanguine* (blood) temperament referred to one that was light-hearted, easy and confident but could also be impulsive and arrogant; a *choleric* (yellow bile) personality was described as active and ambitious yet could be bad-tempered; a *melancholic* (black bile) temperament was characterised by thoughtfulness, perfectionism, and an introverted style; and a *phlegmatic* (phlegm) personality was regarded as reliable, self-content and calm. An imbalance of these humours was also believed to lead to psychopathology. Personality and psychopathology were therefore connected in the idea that both relied on a balance of these humours. Treatments of what were regarded as psychopathologies or illnesses involved strategies such as bleeding, vomiting and purging in order to restore a balance of these humours.

Since the time of Hippocrates, subsequent ideas about personality-psychopathology connections were developed that were heavily influenced by the ethos of the time (Maher & Maher, 1994). For example, during the Darwinian era, it was believed that psychopathology resulted from a „general character deficiency’, a term that referred to a collection of undesirable traits such as dishonesty, laziness, and greediness. Individuals with such a „deficiency’ were regarded as existing on the lower end of the evolutionary scale, with one of the consequences being that they were more likely to have mental health problems (as they were defined at the time) compared to individuals „higher’ on the survival chain. Another school of thought in the nineteenth century was the idea that all individuals had both a „good’

and an „evil’ personality, the existence of which were seen to be reflections of separate functions of the two brain hemispheres (Maher & Maher, 1994). Mental disorder symptoms resembling those of psychosis and mood disorders were seen to be a result of neural dysfunctions across the hemispheres.

Hans Eysenck (1947, 1952) is often regarded as the first modern theorist to have a major influence in how contemporary personality trait theories are conceptualised. His ideas were inspired by the conditioning work of Ivan Pavlov (1927), who proposed that there were four personality types (the behavioural expressions of which were similar to Hippocrates’ four humoural varieties). Pavlov attributed the causes of personality to levels of arousal (excitation) and levels of capacity to control levels of excitation (inhibition). Eysenck went on to extend these ideas with his theory that two dimensions, extraversion-introversion (degree to which one is stimulated by external activity) and neuroticism (level of emotional stability) were primary to personality. He also proposed that psychoticism (level of aggression and constraint) was the third primary dimension of personality.

Modern personality theories are clear deviations from earlier concepts in the sense that they are developed within an empirical framework. However, it is interesting to observe that there are parallels between aspects of modern and ancient theories. For example, Eysenck’s (1947) extraversion and neuroticism dimensions could be said to complement two of the four humoural types proposed by Hippocrates (e.g. high N and E – choleric type, low N and E – phlegmatic type). The fact that theories developed centuries apart have come to similar conclusions about the fundamental dimensions of personality alludes to the accuracy of such ideas. It will become evident later that these two dimensions (or variations of them) continue to be regarded as central to personality and psychopathology.

The Concepts of Personality and Psychopathology

Although personality and psychopathology are formally defined as separate constructs in current practice (APA, 2000), there is much conceptual overlap between them. This overlap can be observed even in common definitions of personality and psychopathology. Personality is defined as the characteristic ways in which individuals generally think, feel and behave and psychopathology is often described as extreme ways of experiencing the world, that is, in *thinking, feeling and behaving* (Mayer, 2006). From this point of view, personality and psychopathology appear to share a dimensional relationship, such that psychopathology symptoms can be seen as manifestations of extreme degrees of normal personality traits. This is a widely-accepted view in this field of research (Jang, 2006; Krueger & Markon, 2006; Markon, Krueger, & Watson, 2005; O'Connor, 2002) and these studies will be discussed later in the chapter. For the sake of clarity, a discussion of the two concepts as independent constructs will first be presented.

Personality

As mentioned earlier, personality refers to the characteristic ways in which individuals generally think, feel and behave. The term describes how individuals uniquely experience and interact with the world. The concept of *character* is sometimes used synonymously with personality although character more specifically refers to an individual's core values that are developed later in life (Cloninger, Svrakic, & Przybeck, 1993). Personality is a broad concept that has invited the development of personality theories from many different perspectives including cognitive (e.g. Bandura, 1963; Beck, 1979; Kelly, 1955; Mischel, 1973), humanistic (Maslow, 1937, 1971; Rogers, 1961; Seligman, 1975), learning (Miller & Dollard, 1941; Skinner, 1953), psychodynamic (Adler, 1935; Erikson, 1950; Freud, 1923; Jung, 1921), biological (Cloninger, 1987; Cloninger et al., 1993; Eysenck, 1947, 1967; Eysenck & Eysenck, 1976; Gray, 1970, 1987; Gray & McNaughton, 2000), and lexical or

trait (Allport, 1937, 1986; Cattell, 1950, 1979; Costa & McCrae, 1985) theories. It is beyond the scope of this chapter to explore each of these theories, except to note that they have some theoretical overlap but diverge with different ideas about how personality should be understood.

The trait approach to understanding personality has achieved one of the most influential places in personality theory and research (Deary, 2009; Rusten, 1993). Traits, which refer to the relatively stable characteristics of an individual's make up (Roberts & DelVecchio, 2000), have become the standard way of how individual differences are described. For example, Eysenck's work would be most accurately described as a biological theory; however, extraversion and neuroticism are viewed as „traits' that have a biological basis.

Traits theories were first inspired by early theorists, notably Gordon Allport (1937, 1986) and Raymond Cattell (1950), who adopted the lexical method to identify basic traits of personality. The lexical method was developed on the premise that key descriptors of personality could be found in natural language. This view instigated the lengthy process of first identifying the many traits words that were used in language and then using statistical methods (primarily factor analyses) to narrow the traits down to a manageable set of broad trait dimensions (Dixon, 1977). In the 1940s, Cattell (1945, 1946, 1947) proposed that there were 16 fundamental trait dimensions and went on to develop the widely-received 16PF Questionnaire (Cattell, Eber, & Tatsuoka, 1970). This 16-dimension structure was later criticised for its non-replicability and questionable psychometric properties (Eysenck, 1986; Howarth & Browne, 1971; Saville & Blinkhorn, 1981). One of the resulting outcomes of these criticisms was the subsequent identification and replication of five second-order factors: surgency, agreeableness, dependability, emotional stability, and culture (Norman, 1963; Tupes & Christal, 1961).

These five factors correspond with one of the most well-known and widely-supported personality theories today – the Five Factor Theory (Costa & McCrae, 1985; Goldberg, 1993). Dubbed the „Big Five’, there is a consensus that neuroticism, extraversion, openness (to experience), conscientiousness and agreeableness represent the fundamental dimensions of personality. Neuroticism (akin to Eysenck’s neuroticism) refers to one’s degree of emotional stability. An individual who has a high degree of neuroticism will more easily experience negative emotions, such as anxiety, sadness and anger. Extraversion is regarded as the extent to which one experiences positive emotions and seeks out social stimulation (also akin to Eysenck’s extraversion). It is reflected in traits such as talkativeness and sociability. Openness (otherwise known as intellect) is characterised by curiosity, intellectual stimulation and imagination. Agreeableness refers to the degree to which one is cooperative, non-defensive and attempts to maintain social harmony. Examples of reflecting traits include helpfulness, compassion and consideration. Finally, conscientiousness refers to how self-disciplined and achievement-orientated one is, and is reflected in traits such as dependability and organisation. These traits have had strong empirical support and have been validated multiple times since their inception (Reynolds, 2001; Trull & Sher, 1994) with openness receiving less consistent empirical support than the other four (Aluja, Garcia, & Garcia, 2002; Ferguson & Patterson, 1998).

Despite their wide utility, theories developed within the lexical paradigm have been limited in that they are unable to explain the causes of personality. Biological theories of personality have this advantage and a number of these have been developed since Eysenck’s (1947, 1967; Eysenck & Eysenck, 1975, 1976) „Big Three’ of extraversion, neuroticism and psychoticism - the first modern theory to explain personality in terms of a biological basis. The search to identify genes, neurotransmitter processes, brain structures and other biological influences that underlie personality traits (e.g. Jang, McCrae, Angleitner, Riemann, &

Livesley, 1998; Loehlin, Willerman, & Horn, 1985; Tellegen et al., 1988) have been propelled by the advent of technology that allows the study of such processes (Canli et al., 2001; Mayberg et al., 2000). Research has shown, for example, that approximately half of the variance underlying the Big Five, is genetic and this finding has been replicated across cultures (Costa & McCrae, 2006). Biological theories therefore have a significant place in current personality research.

Reinforcement Sensitivity Theory (RST; Gray, 1970, 1987; Gray & McNaughton, 2000; McNaughton & Corr, 2004) is the focus of the current investigations and can be regarded as the most influential contemporary biological personality theory. Consequently, it has been applied extensively to multiple areas of inquiry beyond the study of psychopathology (see Corr, 2008). Influenced by the work of Eysenck, RST proposes that personality can be understood in terms of three major neurobiological systems. Individual differences in these motivational systems are believed to be responsible for regulating responses to stimuli, depending on the sensitivities of the systems.

There are two versions of RST. The original theory (‘o-RST’) focused primarily on two of the systems. The first was the Behavioural Inhibition System (‘o-BIS’), which was considered to be the system that regulated avoidance of conditioned negative stimuli, including punishment, non-reward and novelty. The Behavioural Approach System (BAS) is the other system, which was proposed to regulate approach responses to conditioned appetitive stimuli. The third system in o-RST, the Fight-Flight System (FFS), was considered to be responsible for regulating responses towards innately painful stimuli (objective threat; e.g. dangerous animal).

The revised version of RST (r-RST; Gray & McNaughton, 2000; McNaughton & Corr, 2004) ascribes slightly different functions to the three systems. The Flight-Fight-Freeze System (FFFS) is still considered to be sensitive towards painful stimuli but also towards

conditioned aversive stimuli. Its primary role is to motivate the individual away from perceived danger. The function of BAS is primarily the same however is proposed to be sensitive to both conditioned and unconditioned appetitive stimuli. The revised BIS (‘r-BIS’) is responsible for goal conflict resolution, especially of goal-conflict between the FFFS and the BAS. The role of the r-BIS is to determine the risks and merits of approaching and avoiding stimuli in a situation where two conflicting goals are present. R-RST holds a number of important implications for psychopathology that will be explained in Chapter 2, where the relationship between RST and psychopathology will be discussed.

A number of other personality models have been developed that have some overlap with RST (Cloninger, 1987; Tellegen, 2000; Zuckerman, 1979). Amongst others, three models have received considerable attention. These include Tellegen’s (1982, 1985, 2000) Multidimensional Personality Model (MPM), Cloninger’s (1987; Cloninger, et al., 1993) Biopsychosocial Model and Zuckerman’s (1979, 1983, 1991, 2007; Zuckerman, Kuhlman, & Camac, 1988; Zuckerman, 2002) Alternative Five Factor Model. The MPM proposes that the fundamental dimensions of personality are negative emotionality, positive emotionality, and constraint (reflects control and inhibitory behaviours). Cloninger’s Biopsychosocial Model proposes that personality is made up of four temperament and three character dimensions. The temperament dimensions are novelty-seeking (tendency to seek new stimuli), harm avoidance (tendency to inhibit responses to avoid aversive cues), reward dependence (tendency to maintain behaviours that have been previously conditioned through reward) and persistence (tendency to persevere despite obstacles). The three character dimensions are self-directedness (self-determination), cooperation (identification and acceptance of others) and self-transcendence (spirituality and imagination). Finally, Zuckerman’s Alternative Five Factor Theory proposes that impulsive sensation seeking, neuroticism-anxiety, aggression-hostility, activity and sociability are the fundamental dimensions of personality.

Approach, avoidance and control

Major studies have demonstrated strong correlations between dimensions of these models (and others; e.g. Aluja, et al., 2002; Bagby, Marshall, & Georgiades, 2005; Elliot & Thrash, 2002). In fact, these studies suggest that there are two or three dimensions that are most fundamental to personality. There is particular support for two dimensions, which have been dubbed by some theorists as „approach’ and „avoidance’ tendencies (Carver, Sutton, & Scheier, 2000; Elliot & Thrash, 2002). The Approach dimension (e.g. BAS, reward dependence, novelty-seeking, positive emotionality, extraversion, sociability, impulsive sensation seeking) has been defined as reflecting a higher neurobiological sensitivity to *rewarding* stimuli that result in perceptions, reactions and behaviours that are oriented *towards* such stimuli. The Avoidance dimension (o-BIS, harm avoidance, neuroticism, negative emotionality, neuroticism-anxiety) is considered to reflect a higher neurobiological sensitivity to *aversive* stimuli that result in perceptions, reactions and behaviours that are oriented *away* from such stimuli (Gray, 1970; Elliot & Thrash, 2002). There is also support for the third dimension, which has been seen as reflecting „control’ tendencies (r-BIS, constraint, conscientiousness, novelty-seeking, psychoticism), although the validity of this dimension is less clear (Watson, Gamez, & Simms, 2005). Significant work in the temperament literature also supports a three-factor structure (extraversion/surgency, negative affectivity and effortful control; Rothbart, Ahadi, & Evans, 2000).

The robustness of these dimensions is particularly highlighted when one considers that aforementioned models have been developed from different backgrounds. For example, the Big Five was developed within the lexical tradition with a normal population. The MPM was also developed on normal samples while the Biopsychosocial model was developed from a combination of family, developmental, neuropharmacological and neuroanatomical studies with abnormal personality populations. RST was not even originally inspired by personality-

driven research purposes (Gray, 1970, 1987). Despite these differences in developmental trajectories, these two or three factors have emerged as primary dimensions and are regarded as broad „super-ordinate’ traits of personality (Digman, 1997; Markon et al., 2005).

Psychopathology

Psychopathologies or mental disorders refer to psychological conditions involving maladaptive symptoms that are statistically extreme in some form. The afflicted person displays behaviours that are considered to be excessive (e.g. high anxiety) or deficient (e.g. insomnia) in his or her society. The individual with a form of psychopathology also experiences some form of personal distress and/or exhibit dysfunctional behaviours. Contemporary research recognises that common aspects of mental distress include difficulties in regulating emotion and mood (Gross, 2002) and the existence of unhelpful cognitions that help maintain dysfunctional behaviours and symptoms (Beck & Dezois, 2010).

Most disorders are referred to as an „internalising’ or an „externalising’ disorder (Krueger, 1999; Krueger, Caspi, Moffit, & Silva, 1998; Krueger & Markon, 2006).

Internalising and externalising disorders are distinguished primarily by how distress/dysfunction is manifested. Internalising disorders are characterised by „inward’ symptoms, (e.g. anxiety, depression). Symptoms of externalising disorders, on the other hand, are characterised by „outward’ symptoms (e.g. behavioural and impulse-control disorders). Much like the personality literature where approach and avoidance traits are considered to be higher-order dimensions, internalising and externalising profiles have also been conceptualised as „higher-order’ or „first-order’ dimensions in the psychopathology literature (Krueger, 1999; Krueger et al., 1998). This conceptualisation was developed on research that found that most disorders loaded onto either one of these factors. Further, internalising disorders were found to load onto one of two second-order dimensions, labelled „fear’ and „distress’ disorders. „Fear’ disorders included panic disorder, specific phobias, social phobia

(social anxiety disorder), and agoraphobia. „Distress’ disorders included depression, dysthymic disorders and generalised anxiety disorder. Later research (Watson, 2005) extended this model to propose that bipolar disorders fall under a separate section in the internalising disorders, that post-traumatic stress disorder falls under distress disorders, and that obsessive-compulsive disorder fall under fear disorders. This structure of psychopathology has been replicated in large-scale studies (Kendler et al., 2003; Vollebergh et al., 2001) and is presented in Figure 1.

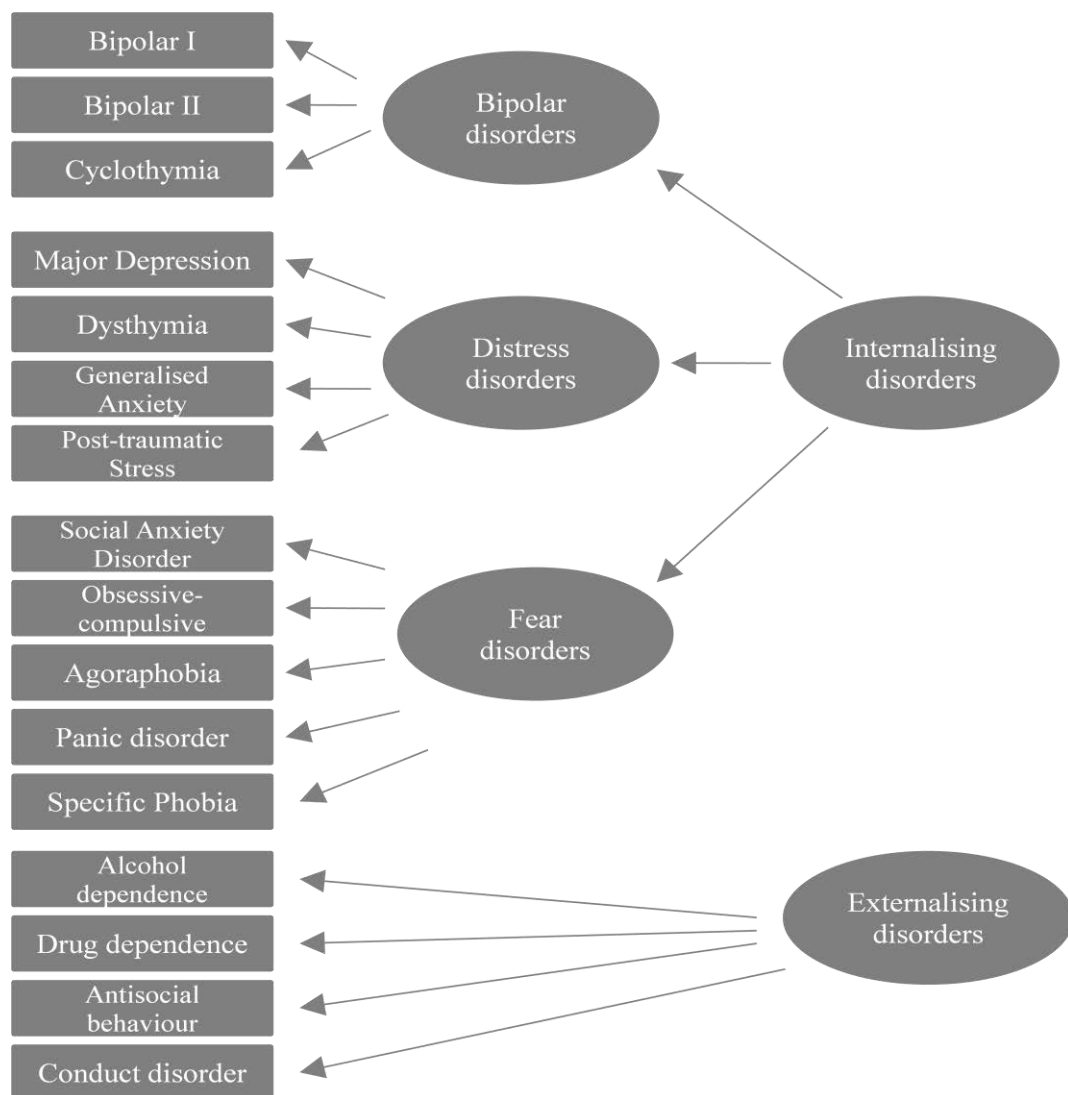


Figure 1. An integrated representation of Krueger's (1999) structure of common mental disorders and Watson's (2005) quantitative hierarchical model.

These models are consistent with the view that disorders share a dimensional relationship. However, in clinical practice, psychological disorders are defined as discrete categories and are formally outlined as such in the Diagnostic and Statistical Manual of Mental Disorder, 4th edition (DSM-IV-TR; APA, 2000) and/or the International Classification of Diseases (ICD-10; World Health Organisation, 1992). The DSM is primarily a medical diagnostic guide which currently classifies mental disorders into 16 different groups, according to apparent similarities in symptoms. These disorders including those usually first diagnosed in infancy, childhood or adolescence; delirium, dementia, amnestic and other cognitive disorders; mental disorders due to a medical condition; substance-related disorders; schizophrenia and other psychotic disorders; mood disorders; anxiety disorders; somatoform disorders (disorders involving physical complaints that have no apparent medical explanation); factitious disorders (characterised by feigning of symptoms); dissociative disorders (symptoms reflecting disturbance of consciousness, identity or memory); sexual and gender identity disorders, eating disorders; sleep disorders; impulse-control disorders not elsewhere classified; adjustment disorders and personality disorders (PDs). The ten PDs are further clustered into three groups. Cluster A PDs (Paranoid, Schizoid, Schizotypal) are characterised by odd and eccentric features, Cluster B (Borderline, Histrionic, Narcissistic, Antisocial) by erratic, or emotional or dramatic features and Cluster C (Avoidant, Dependent, Obsessive-Compulsive) by fearful or anxious behaviours.

PDs and intellectual disabilities are subsumed under Axis II while the other mental disorders are placed on Axis I. The rationale for classifying PDs in a separate section is to ensure that PDs are not overlooked in the diagnostic process (Nathan & Lagenbucher, 1999). As disorders of „enduring patterns of inner experiences and behaviour” (APA, 2000, p. 685), they are considered to be more enduring, inflexible and resistant to change (Lamont, Lamont,

& Brunero, 2009). As such, the presence of a co-morbid PD(s) is often acknowledged in research and practice as a factor that affects treatment outcome (Lamont & Brunero, 2009). It is important to note that the validity of conceptualising PDs as unique from the Axis I disorders remains questionable (see Mayer, 2006) and in fact, there is increasing discourse that identifying personality traits may be just as (if not, more) beneficial than PDs in informing treatment outcomes (Bagby et al., 2008; Ben-Porath, 1997; Harkness & Lilienfeld, 1997; Kotov, Gamez, Schmidt, & Watson, 2010; Quilty, De Fruyt, Rolland, Kennedy, Rouillon, & Bagby, 2008; Widiger et al., 1999). Formally assessing personality traits is not standard clinical practice and researchers have argued that there are a number of benefits to using an „individual differences’ approach in clinical assessment. These include matching treatment to personalities of patients, knowing where to target in treatment and recognising the limitations of change (Harkness & Lilienfeld, 1997). This is a growing area of research that highlights the need to more formally recognise the durable relationships between normal personality traits and psychopathology in clinical practice.

The Relationship between Personality and Psychopathology

The most obvious support for the claim that personality and psychopathology share a dimensional relationship comes from the robust and specific correlations that have been found between certain personality traits and disorders (Kotov et al., 2010). For example, studies have found that high scores of traits proposed in all of the models presented earlier, correlate highly with psychopathology symptoms (e.g. Bagby et al., 2005; Ball, Carroll, & Rounsaville, 1994; Krueger et al., 1996). Krueger et al. conducted a multitrait-multidiagnosis study using a representative birth cohort of 897 adolescents who were followed up from ages 15 to 21. The Multidimensional Personality Questionnaire (MPQ) and measures of affective, anxiety, substance abuse and conduct disorders were administered. The study found that

MPQ dimensions, particularly negative emotionality, were strongly related to various disorders. In another study, Bagby et al. (2005) investigated the relationships between a few personality models (including the Biopsychosocial model) and PD disorder symptoms. It was found that all three character dimensions of the Biopsychosocial model (self-directedness, cooperativeness, self-transcendence) correlated significantly with symptoms for all PDs, and that particularly harm avoidance and novelty-seeking were related to most PDs. Studies have also found that the factors of Zuckerman's model relate with psychopathology symptoms (e.g. Ball et al., 1994).

Both qualitative and quantitative reviews have been conducted to further clarify these personality-psychopathology relationships. Qualitative reviews of Axis I disorders and personality dimensions have produced largely consistent findings (Bagby et al., 2005; Bienvenu & Stein, 2003; Clark, Watson, & Mineka, 1994; Enns & Coz, 1997). With regards to specific relationships, depression has been found to be related with high neuroticism and low extraversion (Clark et al., 1994; Enns & Cox, 1997); that social phobia and agoraphobia are often related to low extraversion (Bienvenu & Stein, Clark et al., 1994); and that substance abuse is related to high neuroticism, high disinhibition, low conscientiousness and low agreeableness (Ball, 2005).

Quantitative reviews have also reached similar conclusions (Kotov et al., 2010; Malouff, Thorsteinsson, & Schutte, 2005; Ruiz, Pincus, & Schinka, 2008). For example, Malouff et al. conducted a meta-analysis of 33 studies examining the relationships between the Big Five and a range of Axis I disorders. The authors reported that the „typical’ constellation of personality factors associated with clinical disorders was high neuroticism ($d=0.92$), low conscientiousness ($d=0.66$), low agreeableness ($d=-0.38$) and low extraversion ($d=-0.41$). Similar findings were found in the most recent and comprehensive quantitative review to date on the relationships between Axis I disorders and personality (Kotov et al.,

2010). Including 175 studies from 1980 to 2007, this meta-analysis investigated Big Five and Big Three traits with depression, anxiety and substance use disorders in adults. As expected, all diagnostic groups were high for neuroticism (mean $d = 1.65$) as well as low for conscientiousness (mean $d = -1.01$). Further, the majority of disorders correlated with low extraversion, particularly social phobia and dysthymia (social phobia, $d = -1.3$; dysthymia, $d = -1.47$). Disinhibition was related to only a few conditions (including substance use disorders; $d = 1.47$).

These findings are not specific to Axis I disorders but also extend to investigations of PDs and personality (O'Connor, 2002; Samuel & Widiger, 2008; Saulsman & Page, 2004; Selbom, Ben-Porath, & Bagby, 2008; Warner et al., 2004; Widiger & Costa, 2002). In a meta-analysis including 12 studies and 15 independent samples, Saulsman and Page investigated the relationships between the Big Five and PDs. The authors reported that PDs were generally related to neuroticism and agreeableness while extraversion and conscientiousness (to a lesser extent) uniquely related to certain PDs. Specifically, Saulsman and Page also noted that neuroticism was notably and positively related to „distress’ PDs (e.g. Borderline, Avoidant), extraversion was particularly positively related with „gregarious’ PDs (e.g. Histrionic), agreeableness negatively related with PDs involving interpersonal difficulties (e.g. Paranoid PD) while conscientiousness positively related with OCPD and negatively with „reckless’ PDs (e.g. Antisocial PD). Samuel and Widiger replicated the Saulsman and Page study results in a subsequent meta-analysis and found strongest support for Borderline, Antisocial and Avoidant PDs, which all produced correlations greater than .75 with meta-analytic results. Correlations were higher than .50 for all other PDs, except histrionic disorder (.42).

Studies that have compared the factor structures of personality measures (developed on normal populations) and psychopathology measures (developed on clinical populations)

have also found results consistent with the aforementioned studies. The rationale for conducting these studies is that if measures developed on normal and clinical populations have the same underlying factor structures, this is supporting evidence that normal and abnormal personality share a dimensional relationship (e.g. DiLalla, Gottesman, Carey, & Vogler, 1993). The most comprehensive study to date of this kind was conducted by O'Connor (2002) who compared 37 contemporary, widely-used personality and psychopathology measures. Clinical and non-clinical samples completed all scales and it was found that the number and structure of dimensions was essentially the same across measures and populations. These results are also consistent with the findings of a large two-year longitudinal investigation involving 376 PD patients (Warner et al., 2004). Results showed that changes in personality traits lead to changes in three of the four PDs investigated (Avoidant, Borderline, Schizotypal).

According to the results of the aforementioned studies, the view that personality dimensions are fundamentally related to various psychopathologies is quite robust. In fact, this line of argument has been used to explain the high levels of co-morbidity that are frequently found across mental disorders both within and across axes (Brieger et al., 2003; Dyck et al., 2001; Skodol, 2005). For example, in clinical samples, half of individuals who are diagnosed with a PD are diagnosed with another PD (Skodol, 2005), a quarter of individuals with an anxiety disorder and half of individuals with a mood disorder are also diagnosed with a PD (Brieger Ehrt & Marneros, 2003; Dyck et al., 2001). The prevalent explanation for these significant levels of co-morbidity is that mental disorders share common variance in the fundamental personality dimensions discussed, and this has spurred the development of a series of models that link personality and psychopathology.

Models Linking Personality and Psychopathology

The Tripartite Model (Clark & Watson, 1991; Watson, Clark & Carey, 1988) of anxiety and depression has played a very influential role in this field of research, and was the first model to formally link negative personality dimensions to psychopathology. The development of the model drew on research by Watson and colleagues who identified two principal dimensions of affect: Negative affectivity (NA), which refers to the tendency to experience negative emotions (akin to neuroticism) and positive affectivity (PA), which describes the tendency to experience positive emotions (akin to extraversion) (Watson et al., 1988). According to the Tripartite Model, NA represents a non-specific dimension that is found in mood and anxiety disorders, and it is this shared variance that is proposed to be responsible for co-morbidity. This is consistent with the idea that neuroticism is the most robust personality risk factor underlying many forms of psychopathology (Barlow, 1991; Brown & Barlow, 1992; Clark & Watson, 1991; Mineka, Watson, & Clark, 1998; Watson, et al., 1988; Zinbarg & Barlow, 1996). The Tripartite Model also proposes that low PA represents a dimension specific to depression and that a third dimension physiological arousal (PHY), is specific to anxiety disorders. The model was widely received however criticisms were levelled against the model that it was at odds with certain previous findings: the fact that anxiety disorders are heterogeneous; that PHY is a characteristic more specific to panic disorders than other anxiety disorders (Brown, Chorpita, & Barlow, 1998) and that PA is not specific to depression (e.g. research has replicated links between PA and social anxiety disorder; Brown et al., 1998; Watson, 2005; Watson et al., 2005).

Barlow and colleagues developed a similar two-level hierarchical model to explain the co-occurrence of anxiety disorders: the Hierarchical Model of Anxiety Disorders (Barlow, 1991; Brown & Barlow, 1992; Zinbarg & Barlow, 1996). The results of factor analyses showed that all of the anxiety disorders firstly, shared a common factor (which the authors

attributed to NA) and secondly, each contained a dimension unique to the disorder. In 1998, Mineka et al. integrated elements of this model with the Tripartite Model. This integrative model specified that low PA was specific to depression (and other disorders, such as social anxiety disorder) and that arousal (PHY) was specific to panic. The authors also emphasise that the uniqueness of each disorder is relative, that is, each disorder contains different amounts of variance of each of the common and specific dimensions (e.g. depression would have higher NA than other disorders and panic disorder would have higher arousal relative to other disorders).

Recently, Krueger et al. (2005) conducted a large investigation that demonstrated that normal and abnormal personality share a common structure. The factor structures of a variety of common personality and clinical scales were examined in a meta-analysis and discovered factors were replicated across samples and a second set of measures in an empirical study. The authors subsequently modelled a common structure for normal and abnormal personality that was hierarchical in nature, and consistent with much of the previous findings in this field of research. This model is presented in Figure 2.

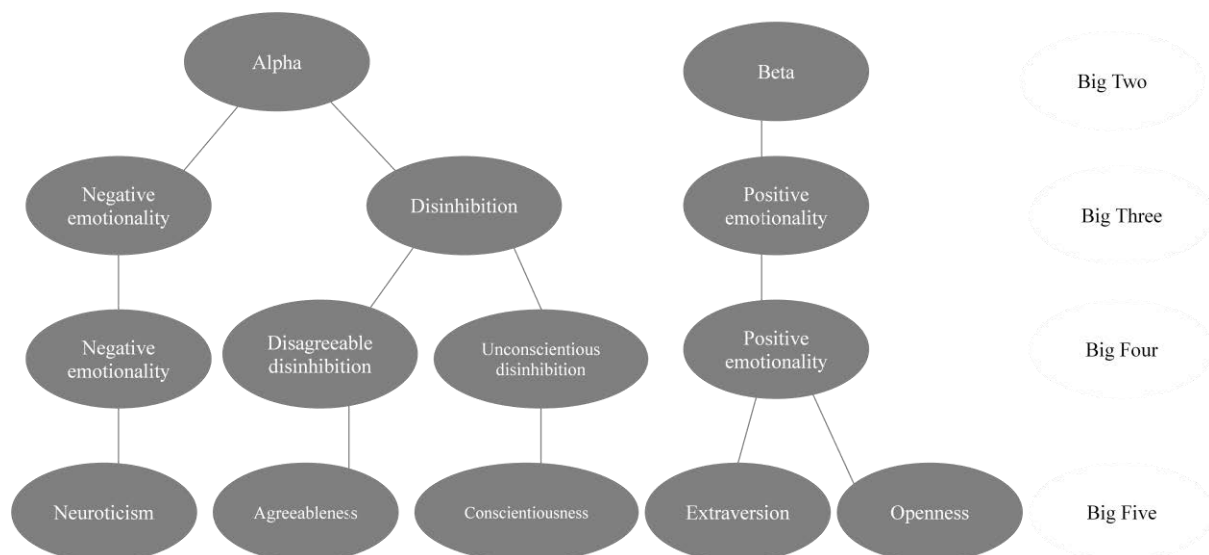


Figure 2. Markon et al.,’s (2005) integrative hierarchical structure of normal and abnormal personality.

The top of the hierarchy is characterised by a two-factor structure which are dubbed Alpha and Beta (Digman, 1997). These are identified as the super-ordinate personality factors („Big Two’) and correspond to negative emotionality and positive emotionality respectively. These super-ordinate factors are also consistent with o-BIS and BAS (Gray, 1970, 1987), the „Avoidance-Approach’ factor structure (Carver et al., 2004; Elliot & Thrash, 2002; Elliot & Thrash, 2010), and also the internalising-externalising psychopathology structure (Krueger, 1999; Krueger & Markon, 2006).

At the next level of the hierarchy, a three-factor solution („Big Three’) is identified whereby Alpha splits up into negative emotionality and disinhibition, and positive emotionality continues on from Beta. As disinhibition reflects „Control’ tendencies, this level corresponds with the three-factor structure of personality models discussed earlier, including the revised RST (FFFS, r-BIS and BAS; Gray & McNaughton, 2000; McNaughton & Corr, 2004).

Finally, the two bottom levels are represented by four- and five-factor solutions. The four-factor solution level („Big Four’) is essentially the same as the three-factor solution, except that disinhibition splits into disagreeable disinhibition and unconscientious disinhibition. Disagreeable disinhibition reflects traits such as callousness, aggression and anti-social problems (negatively related with agreeableness) and unconscientious disinhibition refers to traits that reflect low conscientiousness, achievement and persistence. At the bottom of the hierarchy, a five-factor solution („Big Five’) that resembles Costa and McCrae’s Five Factor model emerges; neuroticism (negative emotionality), agreeableness (disagreeable disinhibition reversed), conscientiousness (unconscientious disinhibition reversed) and extraversion and openness (positive emotionality diverged).

Markon et al. (2005) emphasise that the importance of any given trait does not necessarily depend on the factor level in which it is placed. Factors in a super-ordinate

hierarchical position (i.e. alpha and beta) merely indicate dimensions in which individuals may be more broadly placed, and are not necessarily more ‚meaningful’ than factors in more subordinate levels. For example, ‚openness’, at the bottom level of the hierarchy, may be more relevant in normal populations than in clinical populations. Related to this, is also the fact that some factors do not strictly ‚belong’ to any one level. Negative emotionality is the most obvious example of this and continues throughout every level, which is consistent with the consensus that neuroticism is a common dimension in many disorders, as discussed above (Barlow, 1991; Brown and Barlow, 1992; Clark & Watson, 1991; Mineka et al., 1998; Watson, et al., 1988; Zinbarg & Barlow, 1996).

Chapter Summary and Conclusion

This chapter has provided an overview of the literature that suggests that personality traits and psychopathology share similar structural dimensions. Contrary to the current diagnostic system that views psychopathology as categorically distinct from normal personality, research suggests that personality and psychopathology sit on a spectrum with psychopathology symptoms being manifestations of extremes of normal personality traits. The overlap between personality and psychopathology is particularly highlighted by the fact that neuroticism/NA is “an almost ubiquitously elevated trait within clinical populations” (Widiger & Costa, 1994, p. 81).

While any distinction between personality and psychopathology continues to be debated, the following is plain: Individuals differ in their tendencies to experience certain personality traits and that high levels of specific tendencies are a risk factor for developing and maintaining conditions in which psychological functioning is compromised. The tendency to which individuals are motivated to avoid pain (o-BIS/FFFS), approach pleasure

(BAS) and likely, also the degree to which they exhibit control (r-BIS), are important for understanding how individuals pursue well-being.

Overview of the Thesis

The purpose of this thesis is to extend the personality and psychopathology literature by investigating the question: What is the relevance of Jeffrey Gray's Reinforcement Sensitivity Theory to understanding social anxiety and treatment outcome for social anxiety disorder? It will be seen in the next chapter that social anxiety, the concern about being negatively evaluated by others and/or embarrassing oneself (APA, 2000), has received little empirical attention in the RST-psychopathology literature. This is surprising given that RST, (particularly the BIS) is intuitively expected to be relevant to RST. The theoretical links underpinning these assumptions will be fully delineated in this thesis.

It will also be shown that social anxiety is associated with a range of negative life outcomes, including unemployment, poor or non-existent interpersonal relationships and compromised education/career opportunities (Heimberg & Becker, 2002). It has long been recognised that being comfortable interacting with people (and indeed having sufficient quality human contact) is essential to health and well-being. The social support and acceptance literature show that these constructs remain as robust predictors of one's quality of life (Baumeister & Leary, 1995). Ironically, the natural desire to connect with others may also help explain the high prevalence rates of social anxiety - both in the general community and in the clinical population. Social anxiety disorder (otherwise known as social phobia) represents social anxiety at a clinical level and remains one of the most common psychological disorders to date (Kessler et al., 2005).

Fortunately, effective treatments have been established for social anxiety disorder, with cognitive behavioural therapies (CBTs) being at the forefront of these (Rodebaugh,

Holaway, & Heimberg, 2004). In clinical investigations of social anxiety, personality has been proposed as an important factor that can inform understanding of treatment issues, such as response to treatment outcome (Mörtberg, Bejerot, & Wistedt, 2007; Reich, 2003). The current thesis investigates not only if/how an individual's tendencies to experience certain RST traits relates to one's tendencies to experience social anxiety but also if RST traits affect response to CBT outcome for clinical levels of social anxiety. The RST Cognitive Model of Psychopathology is a recently developed theory that proposes that RST is relevant in understanding the cognitive biases that characterise psychopathology (Gomez & Cooper, 2008). This model provides a theoretical foundation for undertaking the current investigation, which will be presented in the following progression.

Chapter 2 will provide a discussion of RST and psychopathology. This will include a brief history of the development of RST and the revisions that it has undergone over the years. A review of its application to psychopathology will then follow, including how RST is associated with general optimal functioning and how RST traits relate to the various psychopathologies.

Chapter 3 will discuss the relevance of RST to social anxiety. The first half of the chapter will review the social anxiety literature including its conceptual, etiology and treatment issues. The second half will discuss the theoretical and empirical links between RST and social anxiety.

Chapter 4 reports and discusses the findings of Study 1, which investigates the relationships between social anxiety and RST traits in a survey enquiry. The main purpose of this study is to establish the relationships between RST traits and social anxiety in a community sample.

Chapter 5 follows with the findings of Study 2 and its experimental investigation of how individual differences in RST traits impact on affective, cognitive, and avoidance

responses to induced social anxiety. This study provides a rationale for investigating whether RST traits affect social anxiety responses relevant to treatment for social anxiety disorder.

Chapter 6 offers perhaps the most exciting results of the thesis, and discusses the findings of Study 3, which investigates the impact of RST traits on CBT outcome for social anxiety disorder. It is intended that the findings of this study will have implications for how personality can inform predictions of treatment response.

And finally, Chapter 7 will provide the general discussion, overall conclusions and implications of the thesis.

CHAPTER 2

Reinforcement Sensitivity Theory and Psychopathology

Chapter 1 discussed the broad relationships between personality and psychopathology. This chapter reviews the specific relevance of Reinforcement Sensitivity Theory (RST) to psychopathology. The first part of the chapter will present the development of RST to its current status. As mentioned in Chapter 1, RST has undergone a number of revisions that need to be understood in order to appreciate its relevance to psychopathology. This section of the chapter will include a fuller description of Eysenck's personality theory, and the main changes made from the original RST (o-RST) to the revised version (r-RST). The second part of the chapter will discuss how the Behavioural Inhibition System (BIS), the Behavioural Approach System (BAS) and the Fight-Flight-Freeze System (FFFS) would be expected to relate to optimal functioning in light of current theory. The important role of cognitive processes in the relationship between RST systems and psychopathology is also discussed. The final section will provide a review of the findings to date about the relationships between RST and the individual psychopathologies.

Development of Reinforcement Sensitivity Theory

RST, as it stands today, has spawned an impressive literature from different areas of enquiry (Corr, 2009). RST conceptualises personality as result of systems that regulate complex learning processes, motivation systems and emotions. It attempts to explain the process by which personality moves from its development at a neural level to a complex patterning of behaviour, affect and cognitions. As a result, attempts to validate the theory have come from researchers in various fields, including in neuroimaging, genetics, emotion, psychophysiology, performance, conditioning, psychopathology and more recently, cognition (Corr, 2009). Neuroimaging studies for example, have utilised various methods (primarily

EEG, fMRI and PET techniques) to measure whether relevant brain regions underlie measures of RST tendencies (Canli et al., 2001; Reuter et al., 2004). Genetics studies have attempted to identify the relevant genes that underlie RST traits (Reuter, 2008). Laboratory experimental studies have attempted to link BIS and BAS to learning and performance tasks (Avila & Torrubia, 2008). Psychophysiological studies have attempted to establish indicators of BIS and BAS with heart rate and skin conductance procedures (De Pascalis, 2008). And of course, self-report scales have been developed to measure the RST traits (Carver & White, 1994; Torrubia, Avila, Molto, & Caseras, 2001). This current state of RST knowledge was predated by a series of theoretical developments, which are outlined below.

Eysenck's Arousal Theory

As mentioned in Chapter 1, RST was originally inspired by the work of Eysenck (1947, 1967; Eysenck & Eysenck, 1975; Eysenck & Eysenck, 1976) and his arousal theory of personality. The central argument of Eysenck's arousal theory was that individual differences in levels of cortical arousal affect how individuals respond to their environments. These individual differences were proposed to depend primarily on the ascending reticular activating system (ARAS) of the brain, which is responsible for regulating levels of stimulation from the environment such that an optimal level of stimulation is achieved. Therefore, individuals who have higher levels of natural arousal tend to have more introverted personalities as they require less external stimulation than their more extraverted counterparts. By contrast, individuals characterised by more extraverted personalities seek out more external stimulation to counterweigh their lower levels of arousal. Introversion-extraversion is considered to be on a personality trait spectrum, with most individuals sitting somewhere in the middle of the range.

Individuals high on introversion condition to stimuli more easily and consequently are more neurotic than individuals who are less introverted (Eysenck, 1967). Highly neurotic

individuals are considered to be emotionally unstable and have a low activation threshold. Neuroticism levels are determined by activation thresholds in the sympathetic nervous system or the visceral brain/limbic system. Eysenck theorised that activity levels in the visceral brain (made up of the septum, hippocampus, cingulum, amygdala and hypothalamus) determines one's level of neuroticism. Psychoticism was later added to the original extraversion-neuroticism model (Eysenck & Eysenck, 1976) and refers to levels of aggression and lack of constraint or impulse control. Eysenck proposed that psychoticism can be explained in terms of gonadal hormones such as testosterone and enzymes such as monoamine oxide (MAO). MAO has been found to be negatively correlated with impulsivity and aggression and plays a role in the degradation of the monoamines norepinephrine, dopamine and serotonin (Eysenck, 1990).

Despite being widely received, a number of theoretical and empirical limitations of the theory came to light. Eysenck's methodological approach was limited in that he never was able to provide specific neurological explanations for extraversion, neuroticism and psychoticism (Corr, 2009). His theory was limited to the proposition that arousal levels in primarily the ascending reticular activating system (ARAS) and visceral system dictated the expression of personality. Consequently, he failed to consider the likely roles of interacting, underlying systems. Further, there were more specific empirical limitations of the theory including that he never provided a causal explanation of emotion; that the relationship between arousal and conditioning changed depending on the time of day; and that introverts did not condition better than extraverts on a consistent basis (i.e. at high levels of stimulation, extraverts appeared to condition better than introverts; Eysenck & Levy, 1972; Gray, 1970). If this last observation were true, more extraverts would be found amongst the neurotic disorder population, which they are not.

Original RST

In developing RST, Gray's (1970, 1976, 1977) response to resolving the shortcomings inherent in Eysenck's theory took the form of a „bottom-up' approach instead of Eysenck's „top-down' method (i.e. first identifying personality trait factors and then attempting to find biological explanations for them). Gray undertook the reverse process by relying on neurological and pharmacological findings to eventually identify the RST traits/systems proposed to be responsible for personality. Gray's research involved a range of experimental techniques including observing the effects of brain lesions on behaviour; however his hallmark findings centred on his analyses of the effects of anxiolytics. Gray argued that personality could be understood from observations of individual variations in responses to drugs known to be effective for treating pathological anxiety. He undertook an extensive review on these effects that concluded that these drugs suppressed behavioural responses to conditioned punishment stimuli, frustrative non-reward and novel stimuli. This led to his proposal that a specific neurological system, the BIS, was responsible for responses to such stimuli, and this is where anxiolytic drugs have their effects. Gray noted that anxiolytic drugs did not have an effect on *unconditioned* punishing stimuli (stimuli that induce fear) and subsequently proposed an alternative system (the FFS) to be responsible for fear responses.

Gray proposed that the BIS (i.e. punishment sensitivity) was a fundamental system of personality with introversion and neuroticism being more secondary dimensions (high punishment sensitivity was considered equivalent to high introversion and neuroticism combined). This helped explain why introverts were more cortically aroused (of which Eysenck was never able to elucidate), that is, introverts were more sensitive to punishment, which is more arousing than reward stimuli. The proposal of an alternative system (the BAS) which is reflective of reward sensitivity and corresponding to the trait impulsivity, was partly inspired by learning theory of the time, particularly Mowrer's (1960) two-factor theory. In

brief, Mowrer's ideas concluded that firstly, learning involved two separate processes - punishment and drive reduction (not just reward as earlier behaviourists advocated; e.g., Hull, 1952) and secondly, that the relationship between stimuli and responses must have a mediator. This was also not recognised by earlier behaviourists. Internal states of emotions were argued to be this mediator. RST consequently represented the fundamental idea that emotions are not the result of merely conditioning but of the activation of innate motivation systems that are responsible for emotions. These motivation systems are activated by reinforcing stimuli (e.g. reward or punishment), and came to be known as the BIS and the BAS (and the FFS). As these systems have a neural basis, RST is proposed to comprise two components. The first is the central nervous system (CNS) – the physical parts of the nervous system that underlie the systems - and the conceptual nervous system (cns) – the theory that describes the behavioural outputs, functions and processes of these systems. This thesis primarily focuses on the cns.

RST encountered an assortment of inconsistent findings that suggested the theory required revisions (Corr, 2001, 2004; Jackson, 2003; Pickering, Corr, Powell, Kumari, Thornton, & Gray, 1997). These findings led to questions regarding whether anxiety and impulsivity were compatible with BIS and BAS neuropsychology systems (e.g. Depue & Collins, 1999; Pickering & Gray, 2001); the lack of emphasis of the likely role of cognitive mediators (e.g. Corr, 2002b); the extent to which BIS and BAS activity were independent of each other (Corr 2002a; Pickering, 1997), along with other criticisms (Smillie, Pickering & Jackson, 2006).

These critiques invited ongoing evaluations of RST and the proposal of the Joint Subsystems Hypothesis (JSH; Corr, 2002a) was one result of these appraisals. When Gray proposed the original theory in 1970, he viewed the BIS and BAS as systems that functioned independently of one another, thereby known as the Separate Subsystems Hypothesis (SSH).

Although behavioural outcomes of the BIS and BAS were not considered independent (Gray & Smith, 1969), the SSH proposed that the two systems responded to environmental stimuli primarily without interfering with the activity of the other system. However, in response to some experimental studies finding that BIS and BAS could have interactive effects on behaviour (e.g. Zinbarg & Mohlman, 1998), Corr proposed that the two systems can exert *joint* effects on responses, such that they interact under certain conditions. The JSH advocates that the BIS and BAS each have dual roles: one that is facilitatory and one that is antagonistic. The BIS therefore has the potential to not only facilitate responses to aversive cues, but to also *antagonise* responses to *appetitive* stimuli. Conversely, the BAS can facilitate responses to appetitive cues and *antagonise* responses to *aversive* ones.

Both the SSH and JSH have been investigated in a number of studies (e.g. Avila, 2001), with the majority finding support for the SSH (see Gomez & Cooper, 2008), that is, more often studies have not found an interaction between the BIS and the BAS. However, it has been proposed that the applicability of the JSH and SSH is dependent on certain environmental conditions (Corr, 2004). Support for the JSH is more likely to be found when weak levels of appetitive/aversive stimuli are present, when individuals do not have high levels of BIS or BAS, in situations that have both appetitive and aversive stimuli present, and when there is a need for rapid attentional and behavioural shifts between aversive and appetitive stimuli (Avila, 2001). In other words, when studies are using community samples of „normal’ individuals when less extreme levels of BIS/BAS and/or environmental stimuli are involved, the JSH is expected to be observed. On the other hand, the SSH is expected to be relevant when investigating individuals with problems in the clinical range, whose BIS or BAS levels are often strong enough to suppress the activity of the less dominant system. Some studies, however, have found that BIS and BAS can interact in clinical samples (Bijttebier, Beck, Claes, & Vandereycken, 2009).

Revised RST: The Relevant Changes for Psychopathology

The revised version of RST (r-RST; Gray & McNaughton, 2000; McNaughton & Corr, 2004) transpired primarily from animal research on the neuropsychology of anxiety (Blanchard & Blanchard, 1988, 1990; Blanchard, Griebel, Henrie, & Blanchard, 1997). R-RST makes a number of changes to the original theory and the purpose here is not to present all of these changes, but rather to highlight the main alterations and empirical findings relevant to its connection with psychopathology. This entails firstly, the proposed changes to the functions of the BIS, BAS and FFFS and the implications for how they may differently apply to psychopathologies from the original RST. Secondly, defensive direction and defensive distance - constructs that summarise some of the developments made in r-RST - will be discussed.

The changes to BIS, BAS and FFFS functions.

As mentioned in Chapter 1, the original FFS was considered to be sensitive to solely unconditioned punishment stimuli. The FFFS (expanded to include fight-flight-freeze reactions) is now considered to be sensitive to ALL aversive stimuli, including conditioned stimuli. The main emotion that is proposed to reflect this system is fear and its associated disorders, such as panic disorder and the phobias. The function of the FFFS is to motivate individuals away from perceived danger and therefore the corresponding behaviour results in avoidance. The neural substrates of the FFFS include the periaqueductal gray, medial hypothalamus, amygdala, anterior cingulate, and prefrontal ventral stream (McNaughton & Corr, 2004).

The function of the BAS theoretically remains much the same, however it is now proposed to be sensitive to all reward stimuli, including unconditioned reward stimuli. It is involved with the systems that regulate unconditioned biological rewards, such as eating and sex (McNaughton & Corr, 2004). The BAS reflects traits such as optimism and related

positive emotions and at high levels, are linked to impulse control-related disorders, such as the addictions and behavioural disorders. The major neural substrates of the BAS include the ventral tegmental area, the nucleus accumbens and the striatum, which are all part of the mesolimbic dopamine pathway (Gray & McNaughton, 2000).

Out of all the systems, the BIS has been most revised in terms of its proposed function. Instead of being responsible for conditioned aversive stimuli (which is now primarily the role of the FFFS), it is responsible for goal-conflict resolution. This applies to conflicts between competing goals of the FFFS and the BAS (avoiding pain and approaching reward) but can also be between FFFS-FFFS goals or BAS-BAS goals (e.g. making a choice between two potential rewards). According to r-RST, r-BIS operates in either one of two modes. When in „checking’ mode, its role is to be a risk-assessor, meaning that it monitors the environment and scans memory of previous aversive events in order to detect potential danger. When in „control’ mode, r-BIS becomes activated and attention to the environment increases. In the case of a FFFS-BAS conflict, this is when it would assess the merits of avoiding versus approaching the stimulus in making a decision about how to best respond.

As a decision-making system, the corresponding emotions are feelings of anxiety and worry in the face of unfamiliar stimuli or frustration when faced with the absence of reward. Clinically, it maps onto disorders characterised by anxiety and rumination, such as generalised anxiety disorder (GAD) and obsessive compulsive disorder (OCD). The r-BIS is often co-activated with the FFFS as it has a negative valence bias in detecting stimuli and at a neural level, feeds back through the FFFS through recursive loops. Some of the key neural components of the r-BIS overlap with those of the FFFS, including the periaqueductal gray, medial hypothalamus, and the amygdala. Other components include the septo-hippocampal system, posterior cingulate, and the prefrontal dorsal stream (McNaughton & Corr, 2004).

Defensive direction and defensive distance.

The two most significant concepts that summarise the changes in r-RST, as applied to psychopathology, are referred to as *defensive direction* and *defensive distance* (McNaughton & Corr, 2004). These two constructs were developed as a result of a series of studies that investigated the behavioural defensive responses to psychiatric drugs in rodents and have been partially supported by subsequent research (Blanchard & Blanchard, 1988, 1990; Blanchard et al., 1997). According to r-RST, defensive direction and defensive distance are proposed to be the determinants of defensive behaviours when threat is perceived in the environment.

Defensive direction refers to whether the individual chooses to *avoid* or cautiously *approach* the threat. This concept was developed on the basis of the observation that rodents exhibited either of these behaviours when faced with threat in the Blanchard studies. This is how the fear-anxiety distinction between the FFFS and r-BIS was developed. The proposed function of fear is to motivate behaviour *away* from danger and the function of anxiety is to cautiously *approach* perceived threat (i.e. threat that is tied with potential reward). Studies have found support for this distinction (e.g. Perkins, Kemp, & Corr, 2007; Perkins, Cooper, Abelall, Smillie, & Corr, 2010).

Defensive distance, on the other hand, refers to the perceived distance between an individual and a threatening stimulus. Neurotic (high-defensive) individuals perceive their defensive distances to be *shorter* than the actual distance, and low-defensive individuals perceive them to be *further* than the actual defensive distance. Normal-defensive individuals have defensive distances that match the actual defensive distances (objective level of threat) and are therefore more likely to respond to the threat appropriately. As defensive distance is a cognitive construct, individuals may have different defensive distances for the same stimuli and would therefore respond differently. For example, a highly defensive individual (short

defensive distance) would be expected to react more strongly (e.g. panic) to a weak aversive stimuli than a low defensive individual (long defensive distance) who would require a stronger aversive stimuli to elicit the same response.

Defensive direction and defensive distance directly reflect the strength of the FFFS. An individual's defensive direction and distance determines their emotions/psychopathologies through the defensive behaviours that result. For example, in the case of avoidance behaviour, an individual would experience panic symptoms (e.g. panic disorder) at small defensive distances but at a longer defensive distance, less intense reactions would be expected, such as phobic avoidance (e.g. phobia). In the case of approach behaviour, at a small defensive distance, the individual might freeze in response to the threat and at an intermediate defensive distance risk assessment might occur (e.g. generalised anxiety disorder). At large defensive distances, defensive behaviours are not required. These symptoms (and corresponding defensive distances) are proposed to be localised in specific neural modules, such that certain emotions/psychopathologies are linked to specific parts of the brain. These modules are arranged in a hierarchical fashion such that the appropriate reactions are elicited when certain stimulus are present. The incorporation of defensive direction and defensive distance into r-RST and the corresponding distinction between the FFFS and r-BIS functions considers emotions and psychopathologies as a result of cognitive processes. This will be explored further in the second half of the chapter.

R-RST has been credited for improving the original version by providing a more detailed explanation of the neuropsychological structures of emotion and psychopathology; for incorporating the important role of cognitive intermediaries (these were never made explicit in o-RST); and most eminently for making more precise the distinctions between the behavioural, functional and pharmacological properties of fear and anxiety (Corr, 2004; Gray & McNaughton, 1996; Hamme & Weike, 2005; McNaughton & Gray, 1983). Unfortunately,

these so-called improvements have not lessened the uncertainties surrounding o-RST for a variety of reasons. These include the fact that many researchers continue to be guided by o-RST alone; that the development of measures of r-RST have lagged behind the theory (Jackson, 2009), and the undeniable observation that fear and anxiety continue to exhibit substantial overlap (largely because panic often conditions anxiety and elevated anxiety can prompt panic symptoms; Gray & McNaughton, 2000). The result is that currently, o-RST and r-RST continue to exist alongside one another with no clear guidance in the literature as to which version is more applicable to various areas of inquiry, including psychopathology.

RST and Optimal Functioning

Inherent to understanding how RST relates to psychopathology is a discussion of how RST systems would be expected to relate to general functioning. This section will discuss some of the research findings to date about the concepts of the BIS, BAS and the FFFS and their implications for optimal functioning. It should be noted that the predictions that RST makes with relation to psychological functioning depends on which version of RST is taken as a frame of reference.

The majority of studies investigating RST-psychopathology relations have used o-RST as a guiding framework (Bijttebier et al., 2009). This is partly because measures based on the r-RST framework are lacking although at least one scale has been recently developed that appears to be promising (Jackson, 2009) and some studies have used selected items of the BIS scale in the BIS/BAS Scale (Carver & White, 1994) to measure fear (FFFS) and anxiety (r-BIS) separately (Heym et al., 2008). If o-RST is used as a framework, consistent with predictions at the two-factor level of personality discussed in Chapter 1 (e.g. Markon et al., 2005), BIS is expected to be positively associated with negative emotions and BAS to be positively associated with positive emotions. Studies investigating these hypotheses have

produced relatively consistent findings (Campbell-Sills, Liverant, & Brown, 2004; Gomez & Cooper, 2008; Jorm et al., 1999). Lucas and Baird (2004), for example, conducted a large investigation of the extraversion-pleasant affect relationship, involving six separate mood-induction studies. Results supported hypotheses that extraversion would predict pleasant affect. The authors also conducted a meta-analysis of previous mood-induction studies, the findings of which suggested that extraverts experience pleasantness more than introverts in all mood conditions. This suggests that extraverts (positively correlates with BAS) have a higher basal tendency to experience positive emotions in general, regardless of circumstances.

In another mood-induction study, Gomez, Cooper and Gomez (2000) used a laboratory performance task to achieve the same objective. Ninety-eight undergraduates participated in a go/no-go computer number task where they were randomly assigned to either a positive mood induction condition (rewarded with money for correct responses) or a negative mood induction condition (money taken away for incorrect responses). Results showed that trait impulsivity (BAS; as measured by the Barratt Impulsiveness Scale; Patton, Stanford & Barratt, 1995) positively predicted positive mood and trait anxiety (o-BIS, as measured by the State-Trait Anxiety Inventory; Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983) positively predicted negative mood. A major review of RST mood-induction studies (Gomez & Cooper, 2008) concluded that with a couple of exceptions (e.g. Carver, 2004), individuals with high BAS and BIS traits generally experience higher levels of basal positive and negative mood respectively.

If r-RST is taken as a frame of reference, many of these predictions still apply, however the most important difference is the distinction between fear and anxiety. It will be recalled that r-RST corresponds with the three-factor level of personality and psychopathology, which consist of dimensions broadly reflecting negative emotionality

(FFFS), disinhibition (r-BIS) and positive emotionality (BAS) (Markon et al., 2005). As discussed previously, the FFFS is proposed to regulate the emotion of fear as a response to perceived threat and the BIS is proposed to regulate distress/anxiety as a response to conflict between competing stimuli.

As the system that is sensitive to threat, the relationship between the FFFS and psychological functioning is simple: it is expected that more moderate levels of FFFS would correlate with optimal functioning as an individual with a lower FFFS would be less fearful and avoidant. The relevance of r-BIS to functioning, however, is less clear. As a risk-assessment system, it considers the merits of both avoiding and approaching stimuli and therefore its relationship with psychopathology is more ambiguous. However, given that the BIS is proposed to have a negative bias valence and operates on a feedback system with the FFFS (Gray & McNaughton, 2000), the consensus is that a moderate level of BIS is still expected to be associated with optimal functioning. Indeed, despite some studies finding support for the fear-anxiety distinction (e.g. Perkins et al., 2007), the extent to which fear is uniquely related to the FFFS and anxiety being uniquely related to the BIS, is yet to be elucidated. For now, both a moderate BIS and a moderate FFFS would theoretically be expected for optimal psychological functioning.

With regards to the BAS, although it has not changed much since the o-RST, research does suggest that its function may be more complex than originally thought (Corr, 2008; Depue & Collins, 1999; Smillie et al., 2006). The concept of the BAS is much less developed compared to the BIS/FFFS (Gray, 1970; Gray & McNaughton, 2000) and this means that its relevance to psychopathology is more difficult to understand. In fact, researchers have mentioned that there is limited agreement as to what actually constitutes the BAS (Pickering & Smillie, 2008). It is unclear whether the BAS is a uni-dimensional or a multi-dimensional construct. According to factor analyses that lead to the development of the BIS/BAS scale

(Carver & White, 2004), the BAS is made up of three factors: reward-responsiveness, drive and fun-seeking. These factors tap into different aspects of approach behaviour (Carver, 2004).

Smillie et al. (2006) investigated this issue with a subsequent confirmatory factor analysis on the BIS/BAS Scale (Carver & White, 1994) and found that reward-responsiveness and drive reflected a distinct dimension (dubbed „reward-reactivity’) from fun-seeking (impulsivity). Based on this finding, the authors concluded that reward-responsiveness and drive are more “key concepts of the BAS” (p. 1039) and that impulsivity may not be the most appropriate trait reflecting the BAS. However, this statement was followed up by reference to the fact that all three subscales strongly correlated with extraversion and that the internal consistency of composite BAS was found to be .81. These results indicate that although fun-seeking may be distinct from the other two subscales, it still belongs to the composite BAS.

Depue and Collins (1999) concluded in a detailed review of the neurobiology of personality, that the underlying dopaminergic substrates of the BAS are most strongly related to measures of extraversion, but that the BAS is likely to sit somewhere in between extraversion and psychoticism (related to impulsivity). Similarly, Corr (2008) proposed a theory that conceptualises all three dimensions as essential to the BAS. According to the „sub-goal scaffolding theory’, the role of the BAS is to move individuals towards attaining reinforcing incentives through a series of „scaffolds’ whereby an individual must engage in a number of different processes or sub-goals before they can reach their reward. Processes that involve planning and other executive functions are proposed to be related to drive and reward-responsiveness and occur in the early stages of the attainment process. Fun-seeking, being an impulsivity-related trait, is proposed to be important in the final stages of goal attainment when impulse-related behaviours may be required to succeed in achieving the goal

(e.g. taking advantage of presented opportunities). This theory therefore considers that fun-seeking may measure a functional form of impulsivity and relevant to the BAS construct.

It is clear that future research is required to more fully clarify the processes that the BAS entails. For now, as a system that is sensitive to reward, it generally continues to be linked with positive emotionality, and at high levels, poor impulse control. Interestingly, it has also been found to *positively* relate with negative mood in at least one study (Carver, 2004). In this multi-experiment study, fun-seeking was found to predict frustration and sadness after expected rewards on a performance task was not obtained. Further, the second study found that reward-responsiveness predicted anger in response to anger-inducing guided imagery scenarios presented to 466 undergraduate participants. A „velocity’ hypothesis was proposed to explain these unexpected findings. The velocity hypothesis proposes that individuals have feedback loops that help them monitor approach and avoidance behaviour. These feedback signals provide a reference rate for which the individual is expected to perform. Discrepancies between an expected level of performance and the actual level of performance results in either positive affect (performance exceeds reference rate) or negative affect (performance falls short of reference rate). Consequently, if individuals have a high BAS, they are more likely to have high expectations for high performance, and if these expectations are not met, they will experience frustration and anger. This suggests that the relationship between BAS and emotions may be mediated by the expectations of the individual, or more specifically, how realistic such expectations are.

Overall, the current research suggests that individually, a moderate r-BIS, a moderate FFFS and a moderate BAS is optimal for functioning (Knyazev, Wilson, & Slobodskaya, 2008). In combining the sensitivities of these systems, however, a different picture may be presented, where the systems may antagonise each other as proposed by the JSH (Corr, 2002) or balance each other out. Researchers have acknowledged that combinations of extremes on

these systems are likely to be the most at risk of dysfunctional behaviour (e.g. Knyazev et al., 2008; Revelle, 2008). For example, having a high r-BIS on its own is less likely to be a problem for an individual with social anxiety than the combination of a high r-BIS AND a low BAS (Kimbrel, 2008).

The Role of Cognitive Processes

Several researchers have highlighted that cognitive processes are likely to be an important mediator of the relationship between RST traits and the development of psychopathology (Bijttebier et al., 2009; Gomez & Cooper, 2008; Kimbrel, Nelson-Gray, & Mitchell, 2007; Revelle, 2008). The application of cognitions to psychopathology has traditionally been studied separately from the role of personality in psychopathology and it is only recently that researchers have identified that they may have interacting roles (Bijtteber et al., 2009; Gomez & Cooper, 2008). Cognitive processes are fundamental to the development and maintenance of psychopathology (Beck, 1979) and their role are key to r-RST as the theory frames emotional responses as a result of defensive distance (Gray & McNaughton, 2000).

The r-BIS is the most relevant RST construct in this respect. As a risk-assessment mechanism, it is a system that engages in detecting threat and individuals with a high r-BIS sensitivity are prone to attending to, processing, and recalling negative stimuli in the environment (Gray & McNaughton, 2000; McNaughton & Corr, 2004). When in control mode, it has been shown to lead to behavioural inhibition, an increase in attention, arousal and processing of the stimulus (Avila & Torrubia, 2008). As these r-BIS outputs are shared by many of the mood and anxiety disorders (Zinbarg & Yoon, 2008), it is proposed that r-BIS may underlie the cognitive biases that characterise these and other disorders (Gomez & Cooper, 2008).

Further, it has also been shown that not only do high r-BIS individuals better detect negative stimuli but that low r-BIS individuals are better able to *disengage* from aversive

stimuli after it has been detected (Avila & Torrubia, 2008). Consequently, such individuals are less likely to engage in ruminative thinking styles that characterise mood and anxiety psychopathology and are more equipped to develop BAS-mediated positive expectations. These findings are also consistent with theory and research suggesting that individuals naturally process stimuli that is congruent with their emotions, whether these are trait-based (trait –congruency hypothesis; Rusting, 1998) or mood-based (mood-congruency hypothesis; Bower, 1981, 1991). These theories are based on Bower’s ‘network theory of affect’ that individuals cognitively process information that is consistent with their current emotions because emotions represent interconnected nodes of information in memory. When nodes are activated, connected associations are brought to mind. As such, when individuals experience strong levels of emotions, they are more likely to be biased in their cognitive processes, that is, in their attention, recall and interpretation.

Research demonstrating that BIS traits relate positively with unpleasant emotional information processing and that BAS traits relate positively with pleasant emotional information processing (e.g. Amin et al., 2004; Gomez & Gomez, 2002) also provide support for examining the role of cognitive processes in RST-psychopathology relationships. For example, Gomez and Gomez examined trait anxiety and impulsivity, and BIS and BAS relationships with cognitive processing of emotional information. Participants ($N = 163$) completed measures of current mood (PANAS), personality scales and, three word tasks (word fragmentation, word recognition, and free word recall) to measure processing of pleasant, unpleasant and neutral information. Results showed that impulsivity and BAS sensitivity were associated with the processing of pleasant information, while TA and BIS sensitivity were associated with the processing of unpleasant information. Other studies have found similar results (e.g. Gomez, Cooper, McOrmond, & Tatlow, 2004).

In response to the above findings, Gomez and Cooper developed the Reinforcement Sensitivity Cognitive Model of Psychopathology (see Figure 3) to explain how RST systems, particularly the BIS, help activate the cognitive biases that characterise anxiety and mood psychopathology. It combines Beck's (1979; Beck, Emery, & Greenberg, 1985; Beck & Dozois, 2010) Cognitive Theory (that problematic emotions and behaviours are a result of negative thoughts and schemas) with RST. It suggests that particularly when there are strong negative stimuli present, the r-BIS is over-activated to affect psychopathology via two pathways, which can happen independently or simultaneously. In the first pathway, an over-reactive r-BIS directly enhances BIS-congruent beliefs and schemas, which lead to a cycle of biased thoughts, emotions and behaviours that maintain the symptoms. In the second pathway, an over-active r-BIS can stimulate activated unpleasant mood, depending on certain neurological activations, which also lead to the cycle of biased emotions, thoughts and behaviours. The BAS is also included as a possible pathway in the model, however, its place is only tentatively proposed. Overall, the model identifies the r-BIS (and possibly BAS) as distal factors that contribute to the aversive emotional and behavioural responses of mood and anxiety disorders, which may serve to help understand how personality can affect cognitive treatment response.

The Relationships between RST and the Psychopathologies

It has been discussed how r-BIS, BAS and the FFFS would be expected to relate to general functioning. This final section reviews the findings of studies investigating the specific relationships between RST traits and the individual disorders. BIS-BAS constellations, issues and inconsistent findings unique to specific disorders are highlighted with the aim of presenting a picture of how RST relates to various disorder types.

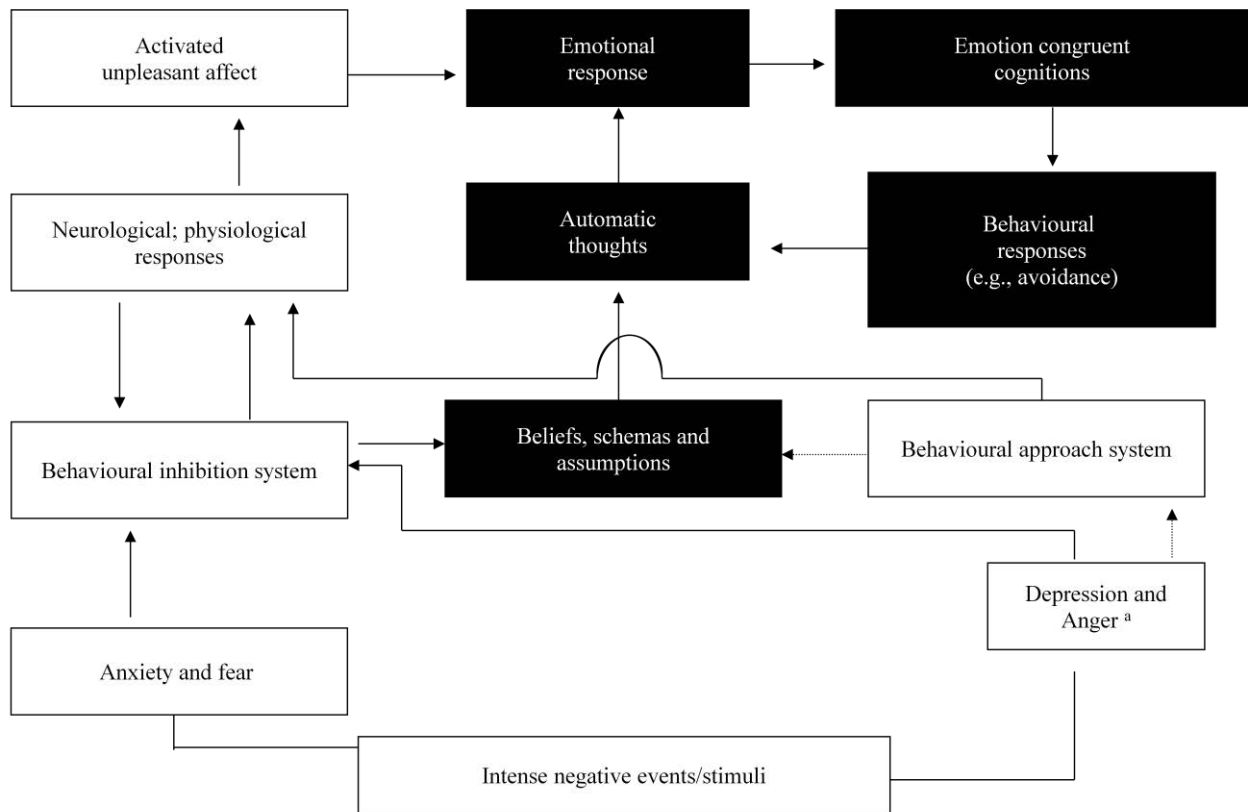


Figure 3. Reinforcement Sensitivity Theory cognitive model of psychopathology.

Note: ^aDepression is related to decreased BAS activity and anger is related to increased BAS activity.

Anxiety Disorders

Given that the BIS is considered to regulate anxiety, it is not surprising that many studies have produced consistent findings that BIS is positively related with both normal and clinical anxiety (Bijttebier et al., 2009; Johnson, Turner, & Iwata, 2003). BIS-anxiety relationships are relatively straightforward. The role of the BAS in the experience of anxiety is less clear. Given that the outputs of BAS are not anxiety-related, it is also not unexpected that most studies have found it to be generally unrelated or to share only weak relationships with anxiety (Bijttebier et al., 2009). Campbell –Sills et al. (2004) for example, conducted a study with a sample of 1825 mood and anxiety-disorder outpatients, and found that each of the BAS subscales were generally not related to various anxiety disorders. These results have

been relatively consistent across the anxiety disorders, including social anxiety disorder (Kashdan & Roberts, 2006; Kimbrel, Cobb, Mitchell, Hundt, & Nelson-Gray, 2008; Vervoot et al., 2010), obsessive compulsive disorder (Fullana et al., 2004), and other anxiety disorders (Johnson et al., 2003).

Some researchers have pointed out that while anxiety disorders may not be largely related to the BAS, it has been found to be more consistently associated with similar personality constructs, such as extraversion (e.g. Bienvenu, 2004; Bienvenu et al., 2001) and positive affectivity (e.g. Watson et al., 2005). For example, Gomez and Francis (2003) conducted a study with 40 individuals who had been diagnosed with generalised anxiety disorder (GAD) and 40 non-clinical controls. Participants completed measures of trait anxiety, GAD, neuroticism, and extraversion. GAD individuals reported having significantly higher neuroticism and trait anxiety scores and lower extraversion scores compared with controls. GAD severity levels also positively correlated with trait anxiety and neuroticism, and negatively with extraversion. Social anxiety particularly has been found to consistently correlate negatively with positive affectivity (Brown et al., 1998; Watson et al., 2005) and extraversion (Bienvenu et al., 2001; Trull & Sher, 1994) but not with BAS (Kashdan & Roberts, 2006; Kimbrel et al., 2008; Vervoot et al., 2010).

Depression

Most studies have found that BAS negatively predicts the onset, course and severity of depression in both community and clinical samples (Campbell-Sills et al., 2004; Coplan, Wilson, Frohlick, & Zelenski, 2006; Kasch, Rottenberg, Arnow, & Gotlib, 2002; Kimbrel et al., 2007; Pinto-Meza et al., 2006). However, some studies have found that the BAS is not related to depression (Johnson et al., 2003), which is surprising given that the outputs of BAS (and its individual subscales) would be expected to negatively predict depression symptoms. The common explanation put forward for these inconsistent results is that the subtype of

depression may impact this relationship. It has been more often found that mixed depression (with anxiety) is not related to BAS, which appears to have a more consistent relationship with anhedonic („pure’) depression (Johnson et al., 2003). For example, Kimbrel et al., in a study investigating the effect of reinforcement sensitivity and maternal rearing styles in a sample of 181 undergraduates, found that low BAS predicted only anhedonic depression while higher BIS predicted both anxiety and anhedonic depression. This suggests that the nature of anhedonic and mixed depression are fundamentally different and possibly that the anxiety component of mixed depression may interfere with the BAS-depression relationship.

The BIS has traditionally been considered to relate to primarily the anxiety disorders however some research also indicates that it can be positively related with depression (e.g. Kimbrel et al., 2007; Meyer, Johnson, & Carver, 1999, Meyer, Johnson, & Winters, 2001). The role of BIS has particularly been described as a state-dependent characteristic of depression, that is, it is more relevant in leading to temporary states of depression rather than long-term depression. In two short-term prospective studies, BIS levels did not predict the course or severity of depressive symptoms, whereas BAS levels did (McFarland, Shankman, Tenke, Bruder, & Klein, 2006; Pinto-Meza et al., 2006). Research has also found that both BIS and BAS levels differentiated patients with depression from controls but only BAS levels differentiated recovered patients from controls (Pinto-Meza et al., 2006). It appears that BIS can be seen as a more relevant risk-factor for temporary depression and BAS as a trait-vulnerability factor for longer term depression (Campbell-Sills et al., 2004). This is also consistent with the findings discussed above that BAS is uniquely related to anhedonic depression but not mixed depression.

Bipolar Disorder

The BAS hypersensitivity model for bipolar disorder proposes that the condition is a reflection of extreme hypersensitivity of the BAS (Depue, Krauss, & Spoont, 1987), such that

individuals with bipolar disorder are extremely responsive to reward cues. As a result, they vacillate between manic and depressive states more easily. Alloy et al. (2008) conducted the most influential study in this area, involving the follow-up of 136 individuals diagnosed with bipolar II or cyclothymia and 157 clinical controls over a period of 33 months. Participants completed BIS/BAS scales and were assessed every four months. Results showed that bipolar individuals had higher BAS total, drive and fun seeking scores than controls, however, there were no BIS differences. Other research has found that high BAS predicted manic symptoms but that low BAS as well as high BIS was related to depressive symptoms (Meyer et al., 1999). The authors concluded that BIS functions as a state-dependent vulnerability factor for depressive symptoms, similar to the conclusions made about the function of BIS in unipolar depression.

Attention Deficit Hyperactivity Disorder

A few different pathways have been proposed about how BIS and BAS may relate to ADHD symptoms. Hyperactive-impulsive (HI) symptoms have been proposed to be a result of either a low BIS, (poor response inhibition; Quay, 1997); of a high BAS (high impulsive motivation to reward; Newman & Wallace, 1993) or of an interaction between BIS and BAS (Patterson & Wallace, 1993). Poor response modulation is expected to occur when reward stimuli are present and BAS activity then over-dominates BIS activity (Patterson & Wallace, 1993). Inattention symptoms have primarily been positively associated with a high BIS (Gomez & Corr, 2010). However, studies have found inconsistent results (Hundt, Kimbrel, Mitchell, & Nelson-Gray, 2008). Hundt et al., for example, with a community sample of 273 undergraduates, reported that LOW BIS predicted inattention symptoms while high BAS AND low BIS was found to predict HI symptoms. Mitchell and Nelson-Gray (2006), with another undergraduate sample ($N = 184$) found that both the BIS and BAS were positively associated with both HI and inattention symptoms. These inconsistent results may be

explained by how the constructs were measured across the studies. Gomez and Corr (2010) conducted a study of 214 adult participants in the community and utilised multiple measures of the BIS as well as the MPQ (Tellegen, 2000). The authors reported that overall the BIS positively correlated positively with inattention symptoms, and that the BAS was positively correlated with HI symptoms while poor control was positively associated with both HI (impulsivity) and inattention (response inhibition) symptoms.

Psychopathy

As with the ADHD literature, alternative pathways have been proposed for how RST traits relate to psychopathy (Corr, 2010). It was originally proposed that psychopathic personality symptoms were the result of a low BIS (Gray, 1970; Fowles, 1980) and possibly a high BAS. This hypothesis was developed on the basis of findings of early experimental and clinical studies (Fowles, 1980) but has also been supported by more recent self-report studies that found that psychopaths had higher BAS and lower BIS scores than controls (e.g. Book & Quinsey, 2004).

Lykken (1995) suggested that different subtypes of psychopathy (Cleckley, 1976; Karpman, 1941) may relate to RST systems differently. Primary psychopathy („true psychopaths’ characterised by core symptoms of innate fearlessness personality and emotional deficits) is proposed to relate primarily with a low BIS sensitivity and average BAS sensitivity and secondary psychopathy (similar presentation to primary psychopaths but with less fearlessness, increased impulsivity and more reactive to stress) are related more to a high BAS and average BIS. In a study of 517 male prisoners, Newman, MacCoon, Vaughn, and Sadeh (2005) compared primary psychopaths, secondary psychopaths and non-psychopaths and found that primary psychopaths had lower BIS scores than other groups. Secondary psychopaths had higher BAS scores than other prisoners. Unexpectedly, secondary psychopaths did NOT have BIS differences with other groups (as measured by the

BIS/BAS scales) but did have sensitivity to punishment differences (as measured by the SPSRQ). Overall, the evidence proposes that high BAS is related with both sub-types while low BIS is more unique to primary psychopathy.

It should be noted, however, that researchers (Wallace & Newman, 2008) have cautioned against assuming that psychopaths have a global deficit in responding to punishment cues. In their review of psychopathy and RST associations, Wallace and Newman noted experimental evidence (e.g. Newman & Kosson, 1986) that does suggest that primary psychopaths display such deficits in response to inhibition primarily in the presence of strong reward cues. This is attributed to a reduced ability to cognitively attend to stimuli that are peripheral to reward cues, that is, a lower capacity to exercise effortful control. The activity of the BIS is proposed to be suppressed by the more dominant BAS in such situations. This implies that when reward cues are not present, psychopaths are able to respond appropriately to punishment cues.

Other Personality Disorders

Considerably less RST research has been conducted on other personality disorders, however findings thus far have been consistent in that RST systems have correlated in theoretically consistent ways with the symptom profiles of the personality disorders. Caseras, Torrubia, and Farre (2001) examined these relationships in a clinical sample of 77 outpatients who completed various personality measures and were diagnosed with the Structured Interview for DSM-III-R Personality Disorders (SCID-II). Cluster C personality disordered patients (characterised by high anxiety) had significantly higher BIS scores than other PD and non-PD participants, and high BAS was positively related with Cluster B (characterised by dramatic/erratic symptoms) disorder scores. In addition, high BIS was positively related with Borderline Personality Disorder (BPD), which makes sense given that BPD is characterised by a combination of internalising and externalising symptoms.

Pastor et al. (2007) examined MMPI-2 constructs with relation to BIS and BAS in a community sample of 193 Spanish college students. Similar results were found with BIS and Cluster C personality disorders being positively correlated, and Cluster B personality disorders correlating positively with BAS. A mixture of high BIS and BAS relationships were found across the Cluster A personality disorders (characterised by eccentric/odd behaviour) with Paranoid Personality Disorder being positively correlated with BIS and Schizoid Personality Disorder being negatively correlated with BAS. Similar results have been obtained in another clinical study (Claes, Vertommen, Smits, & Bijttebier, 2009) and a community study (Taylor, Reeves, James, & Bobadilla, 2006).

Substance Abuse

A number of studies have investigated RST-substance abuse associations (Bijttebier et al., 2009; Johnson et al., 2003). Evidence has accrued that a high BAS is positively associated with substance use problems, which is expected given that the addictions are often associated with reward sensitivity and reduced ability to delay gratification (Franken, Muris, & Georgieva, 2006). This has been found to be relatively consistent in both community and clinical samples, as well as in other addictions (e.g. Loxton, Nguyen, Casey & Dawe, 2008). Fun-Seeking has been found to be the most relevant sub-scale in this respect, although Drive has also been found to be uniquely related to substance abuse problems (Franken, 2002). In this study, Drive was found to predict desire and the negative reinforcement of craving (i.e. withdrawal of negative states). This is consistent with Carver's (2004) velocity theory the BAS can be positively relate to negative emotions.

The relevance of BIS to substance abuse problems is less transparent with some studies finding significant associations (e.g. Franken & Muris, 2006; Kambouropoulos & Staiger, 2007; Kimbrel et al., 2007) and others finding no relationships (e.g. Loxton & Dawe, 2007; O'Connor, Stewart, & Watt, 2009). Researchers have attributed these inconsistent

results to two apparently distinct personality profiles related to substance use. With a sample of 617 undergraduates, Taylor et al. (2006) conducted cluster analyses to observe whether groups could be established on personality traits that may be linked to substance use and personality disorder traits. It was found that groups could be divided into two personality profiles – a „disinhibited’ (high BAS and low BIS) profile and a „high affectivity’ profile (high BIS and low BAS). This is consistent with Johnston et al.’s (2003) claim, from their own community study (1803 young adults) of RST-psychopathology relations, that high BAS was only associated with alcohol problems with NO co-morbid anxiety. It appears that substance abuse may stem from different personality constellations and associated motivations (emotional escape versus impulsive reward). Although there is much less research on other addictions, such as gambling (O’Connor, Stewart & Watt, 2009), research indirectly suggests that similar relationships would be expected (Slutske, Caspi, Moffitt, & Poulton, 2005).

Eating Disorders

Compared to the other disorders, considerably less research has been conducted on the relevance of RST to the eating disorders, however the findings thus far have been relatively consistent (Dawe & Loxton, 2004; Pallister & Waller, 2008). Kane, Loxton, Staiger, and Dawe (2004) examined RST traits and bulimia in a sample of adult women with three subgroups: bulimic women (n = 22), bulimic with comorbid alcohol problems (n = 23), and clinical controls (n = 21). Results showed that both clinical groups had higher BAS fun-seeking (self-reported) and impulsivity scores (behavioural card-sorting task) with the comorbid group having higher scores than the bulimic group. The bulimic group also had higher BIS scores than controls with both clinical groups having higher state anxiety scores than controls.

Other studies have compared RST traits across anorexic and bulimic patients. Claes et al. (2006) reported that anorexic patients had lower BAS scores than bulimic patients and controls and that BIS scores were higher amongst restrictive anorexic patients than both purging anorexic patients and controls. More recently, Beck, Smits, Claes, Vandereycken and Bijttebier (2009) also found that BAS scores were higher amongst patients with binge and purge eating patients than restrictive anorexic patients but that there were no BIS differences across groups. Studies using community samples have found a similar pattern of results (e.g. Franken & Muris, 2005; Loxton & Dawe, 2001; Loxton & Dawe, 2007). Overall, it seems that a high BIS relates to both eating disorders and that binge eating/purging symptoms are associated with a higher BAS (particularly fun-seeking). These results are not surprising given that both eating disorders are associated with anxiety and that impulsivity is a characteristic feature of bingeing/purging.

R-RST and Psychopathology

These previous RST-psychopathology studies have been guided primarily by o-RST. It would be useful for future studies to consider how r-RST may apply to the various psychopathologies. For anxiety disorders, it would be expected that fear disorders would be strongly and positively correlated with the FFFS and that generalised anxiety would be strongly and positively correlated with r-BIS. Depression would be expected to correlate positively with r-BIS and have little relationship with FFFS. The depression component of bipolar disorders would be expected to correlate positively with r-BIS although bipolar disorders are more traditionally related with the BAS alone. ADHD HI symptoms might be expected to be negatively correlated with FFFS, given that hyperactive individuals exhibit low fear, and inattention symptoms would be expected to positively correlate with r-BIS. Primary psychopathy would be expected to exhibit low FFFS and secondary psychopathy would be expected to correlate positively with r-BIS. Borderline Personality Disorder would

be expected to correlate positively with r-BIS and possibly a low FFFS, given that BPD is characterised by high impulsivity. The anxious personality disorders would be expected to exhibit high FFFS and r-BIS correlations. The anxious subtype of substance abusers would exhibit high r-BIS. Finally, anorexia nervosa would be expected to correlate positively with both r-BIS and FFFS, and bulimia nervosa would be expected to correlate positively with r-BIS.

Summary

According to studies that have been guided by o-BIS, extremes of o-BIS and BAS traits relate to various forms of psychopathology, and that specific constellations relate to specific forms of psychopathology. Further, the research on most disorders suggests that it is important to consider the subtype of the disorder as these can relate to BIS and BAS differently. This applies to ADHD, psychopathy, depression, and substance abuse. For other disorders (e.g. anxiety disorders, eating disorders) the findings were relatively consistent. In general, o-BIS was found to positively relate with the anxiety disorders, depression, ADHD (inattentive subtype), Cluster C Personality disorders, eating disorders and negatively related to primary psychopathy. BAS was found to positively relate with bipolar disorder, ADHD (HI subtype), psychopathy, substance abuse and bingeing/purging eating disorder symptoms and Cluster B personality disorders, and to negatively correlate with anhedonic depression. The significant majority of studies reviewed have looked at BIS and BAS as risk factors for the development of psychopathology while very few have investigated the relevance of BIS and BAS to other clinically important variables, such as response to treatment outcome.

Chapter Summary and Conclusion

This chapter discussed the relevance of RST to psychopathology. The main theoretical developments that RST has undergone were presented prior to discussing how RST

traits/systems would be expected to relate to general functioning and to various individual psychopathologies. Traditionally, high o-BIS sensitivity has been associated with negative emotionality and internalising disorders while high BAS has been associated with positive emotionality and externalising disorders. In light of r-RST, the same relationships would be expected to apply, although r-RST predicts that fear-based internalising disorders (e.g. specific phobias) are based on the FFFS while distress-based disorders depend on r-BIS (e.g. depression). Recent research indicates confusions about the nature of the BAS construct and the validity of its corresponding trait (i.e. impulsivity), therefore it could be argued that its relationship with psychopathologies are less understood than BIS/FFFS-psychopathology relationships. As it stands, BAS continues to be associated with positive emotions and at extreme levels, to the externalising or impulse-control symptoms including ADHD (HI subtype), psychopathy, substance abuse and bingeing/purging eating disorder symptoms and Cluster B personality disorder. BIS has been found to positively relate with the anxiety disorders, depression, ADHD (inattentive subtype), Cluster C Personality disorders, and eating disorders.

It is evident that there are a few gaps in the literature worth pursuing. As mentioned, few studies have applied r-RST to personality-psychopathology relationships. Future research would do well to focus efforts on r-RST to determine whether it provides a more valid framework for the understanding of the various psychopathologies discussed above. The fact that there are a current lack of established r-RST scales have been one of the obstacles to extending this area of research. Secondly, the majority of RST-psychopathology studies have focused on RST traits as risk factors for psychopathologies but few studies have focused on investigating their relevance to the processes/responses involved in emotional states. Mood induction studies have provided a starting point. Further, few studies have looked at the impact of RST traits on treatment outcome for psychopathologies. It is important this field of

research extends beyond investigating RST traits as risk factors to how they affect management of mental illness. Finally, it has been raised that likely mediators and moderators of RST traits and psychopathology need to be considered. Specific environmental factors (e.g. low care parenting styles) and cognitive processes play a strong role in psychopathology. It would do well to observe how they may link RST traits and psychopathology, especially considering the significant role that cognitive biases play in RST.

CHAPTER 3

Reinforcement Sensitivity Theory and Social Anxiety

Chapter 2 demonstrated how RST is applicable to the study of psychopathology. The purpose of Chapter 3 is to discuss the specific relevance of RST to social anxiety (disorder). This task will be undertaken in the following sequence. To provide an overview of social anxiety, the first half of the chapter will review the social anxiety literature including its conceptual, etiology and treatment issues. The second half will discuss the theoretical and empirical links between RST and social anxiety. This will entail an examination of the relevance of the o-BIS to social anxiety via the study of a temperament characterised by fear of unfamiliar stimuli (behavioural inhibition), followed by a discussion on the potential role of the FFFS and the BAS. A chapter summary will follow.

Conceptual Issues in Social Anxiety (Disorder) Research

What is Social Anxiety and Social Anxiety Disorder?

The defining characteristic of social anxiety is a concern that the individual will say or do something embarrassing and/or will be negatively evaluated by others. Accordingly, the experience always involves some degree of self-consciousness and a preoccupation with whether the individual is performing effectively in the social situation. Some people experience social anxiety more frequently and/or at more severe levels than others. Individuals with clinical levels of social anxiety, known as *social anxiety disorder*, experience marked levels of social discomfort that are severe and persistent enough to interfere with their social and occupational/educational functioning (Turk, Heimberg, & Hope, 2008). Individuals with social anxiety disorder often avoid feared social situations or else undergo them with excessive discomfort (Rodebaugh et al., 2004). The DSM-IV-TR (APA, 2000) requires that the individual meets certain criteria to formally qualify for the

disorder, which is presented in Table 1. The DSM also specifies that social anxiety disorder (rather than social phobia) is now the term formally adopted to describe the condition. As such, social anxiety disorder will be the primary term used to refer to the condition throughout this chapter, unless otherwise specified that „social phobia’ is the more appropriate term in the context of the discussion.

Prevalence and Effects of Social Anxiety Disorder

Social anxiety disorder is highly prevalent. Lifetime prevalence estimates range from 2.4% (Schneier, Johnson, Hornig, Liebowitz, & Weissman, 1992) to 12.1% (Kessler et al., 1994). Narrow, Rae, Robins, and Regier (2002) addressed this considerable discrepancy in prevalence rates by re-examining the data from both studies and using more stringent criteria for clinical significance. The authors concluded that the general prevalence rate of social anxiety disorder was 4%. Ranking only after major depression, alcohol dependence and specific phobias, the condition also appears to be a global condition with prevalence rates being relatively consistent across nations (Wittchen & Fehm, 2001). It is also a highly co-morbid condition (approximately 70% of cases; Schneier et al., 1992) with the most common Axis 1 co-morbid conditions being other anxiety disorders, mood disorders and alcohol dependence disorders. Further, approximately a quarter of individuals with social anxiety disorder meet criteria for avoidant personality disorder (APD; Rettew, 2000). It is not unusual for individuals with social anxiety to be unemployed, working in positions below their levels of qualification (Bruch, Rae, Robins, & Regier, 2003), and to experience isolation and loneliness. Such individuals are less likely to be married, even compared to individuals with other anxiety disorders (Sanderson, Di Nardo, Rapee, & Barlow, 1990). Not

Table 1

Diagnostic and Statistical Manual for Mental Disorders Criteria for 300.23 Social Anxiety Disorder.

-
- A. A marked and persistent fear of one or more social or performance situations in which the person is exposed to unfamiliar people or to possible scrutiny by others. The individual fears that he or she will act in a way (or who anxiety symptoms) that will be humiliating or embarrassing.
 - B. Exposure to the feared social situation almost invariably provokes anxiety, which may take the form of a situationally bound or situationally predisposed Panic Attack.
 - C. The person recognises that the fear is excessive or unreasonable.
 - D. The feared social or performance situations are avoided or else are endured with intense anxiety or distress.
 - E. The avoidance, anxious anticipation, or distress in the feared social performance situation(s) interferes significantly with the person's normal routine, occupational (academic) functioning, or social activities or relationships, or there is marked distress about having the phobia.
 - F. In individuals under age 18 years, the duration is at least 6 months.
 - G. The fear or avoidance is not due to the direct physiological effects of a substance or a general medical condition and is not better accounted for by another mental disorder.
 - H. If a general medical condition or another mental disorder is present, the fear in Criterion A is unrelated to it.
-

surprisingly, the quality of life for these individuals is often compromised by their social fears (Hambrick, Turk, Heimberg, Schneier, & Liebowitz, 2003; Safren, Heimberg, Brown, & Holle, 1997).

Subtypes: Generalised Social Phobia and Specific Social Phobia

The DSM-IV-TR acknowledges a distinction between two subtypes of social anxiety disorder. Individuals who fear multiple types of social situations have *generalised social*

phobia (GSP). These people usually experience interaction anxiety (e.g. making small talk), in addition to observation anxiety (e.g. being watched while eating). Individuals who have *specific social phobia* (SSP), sometimes referred to as circumscribed or non-generalised social phobia, experience anxiety that is restricted to one or a few social domains. It is not unusual for individuals with SSP to have problems with OA without significant IA problems (Hofmann, 2000b). The specific number of feared situations required to qualify for either subtype has not been established.

Social anxiety researchers have taken an interest in delineating whether there are fundamental differences in the nature of GSP and SSP (Hofmann, 2000b). The average onset of GSP is much earlier at typically before the age of 10 years (Mannuzza, Schneier, Chapman, Liebowitz, Klein, 1995), compared with the average onset age of 16 years for SSP. The onset of SSP is also more often described as being sudden (possibly related to a conditioning event) rather than gradual, which is more typical of GSP. This would suggest that GSP has a more familial cause (Mannuzza et al., 1995; Stein et al., 1998). Personality variables are more closely related with GSP including low self-esteem, neuroticism, trait anxiety and shyness (Herbert, Hope, & Bellack, 1992; Hofmann & Roth, 1996; Holt, Heimberg, & Hope, 1992; Norton, Hewitt, & McLeod, 1997; Turner, Beidel, & Townsley, 1992).

The most documented difference, and perhaps the most clinically important one, is the level of severity observed across the subtypes. There is consensus in the literature (Clark & Beck, 2010; Herbert et al., 1992; Holt et al., 1992; Kessler, Stein, & Berglund, 1998; Tran & Chambless, 1995; Wittchen, Stein, & Kessler, 1999) that individuals with SSP have less severe levels of anxiety compared to individuals with GSP and this is the main argument made by theorists (e.g. Hoffman, 2000) who believe that the subtype distinction is primarily a quantitative one. Caution should be practiced, however, in not confusing severity with

impairment. Individuals with GSP are found to be more functionally impaired largely because GSP is a more pervasive condition than SSP (Hoffman, 2000). The severity levels of anxiety are subsequently considered to be higher in GSP individuals, however there is in fact evidence to indicate that the symptoms amongst SSP individuals are comparably severe. Studies have shown that participants with SSP have stronger elevation rates than GSP participants in responses to social situations (Boone et al., 1999; Heimberg, Hope, Dodge, & Becker, 1990; Hofmann, Newman, Ehlers, & Roth, 1996; Levin et al., 1993) and demonstrate more anxiety sensitivity (Norton et al., 1997). In fact, these symptoms suggest that observation anxiety is more closely associated with the symptom profiles of fear disorders (i.e. specific phobias, panic disorders than general anxiety/distress disorders, which are more closely aligned with interaction anxiety (Craske, 1991; Hofmann, 2000b; Lundh & Ost, 1997).

Subclinical Social Anxiety

Another significant definitional issue that warrants clinical attention, yet has only recently emerged in the literature, relates to subclinical levels of social anxiety disorder (Davidson, Hughes, George, and Blazer, 1994; Dell’Osso et al., 2003; Fehm, Beesdo, Jacobi, & Fiedler, 2008). It has been recognised that many people in the community have significant levels of social anxiety, yet do not formally meet diagnostic criteria. Symptoms, however, are often severe enough to cause concern for the individual and/or limit them from pursuing life opportunities. Such individuals may not meet diagnostic criteria if they lead lives characterised by „safe’ habits and environments that protect them from their anxieties. For example, these people may limit friendships to those with old friends or may stay in occupations that do not involve extensive social interactions, even if they are not personally fulfilling. It would be safe to presume that if these individuals were placed in unfamiliar environments, they would struggle to adapt to the social challenges such situations would

bring. Further, research has shown that the experiences of sub-clinical participants were more closely related with those of clinical participants than community controls in the way of romantic relationships, work problems, academic problems, conduct problem, impaired subjective social support, less self-confidence, increased use of medication, medical problems, utilisation of mental health services (Davidson et al., 1994), co-morbid conditions and quality of life (Del’Osso et al., 2003; Fehm et al., 2008). As such, it is important that the social anxiety experiences of sub-clinical individuals are not overlooked in research and practice.

Etiology of Problem Social Anxiety

There is less research investigating the causes of severe social anxiety compared to the literature on maintenance and treatment factors (Hudson & Rapee, 2000; Neal & Edelman, 2003; Ollendick & Hirshfeld-Becker, 2002; Stein, Chavira, & Jang, 2001). It is encouraging to see, however, that there is a consensus on the main contributing factors that lead to the development of the condition. Evidence suggests that both biological and environmental factors are relevant with genetic inheritance, parenting styles and personality factors emerging as the most significant (Coles & Horng, 2006).

Genetic Inheritance

The proposition that social anxiety disorder is genetically inherited (particularly of the serotonin transporter *5-HTT* promoter polymorphism; Hariri et al., 2005; Lesch et al., 1996) has been supported by a line of family and twin studies (Fyer, Mannuzza, Chapman, Liebowitz, & Klein, 1993; Fyer, Mannuzza, Chapman, Martin, & Klein, 1995; Mannuzza et al., 1995; Reich & Yates, 1988; Stein et al., 1998). Fyer et al. (1993) conducted a structured diagnostic interview study involving the first-degree relatives of 30 probands with social anxiety disorder and 77 non-clinical controls. Results showed that the risk of developing

social anxiety disorder amongst relatives of social anxiety disorder probands was three times that of relatives of non-clinical controls. Moreover, there was no increased risk for other anxiety disorders amongst relatives of probands with social anxiety disorder. In another study, the same research group investigated whether genetic contributions were specific to social anxiety disorder or generalised anxiety by comparing relatives of probands with social anxiety disorder to those of probands with diagnosed with panic disorder with agoraphobia and simple phobias (Fyer et al., 1995). Results showed relatives of social anxiety disorder probands had an increased risk of social anxiety disorder, however, this result was not found for the relatives of probands with the other anxiety disorders.

Mannuzza et al. (1995) conducted a commonly-cited family study that compared the risk of development of social anxiety disorder amongst probands with GSP, SSP and non-clinical controls. Results showed that the relatives of GSP probands were significantly at higher risk (16%) of developing social anxiety disorder than the relatives of SSP probands (6%) and controls (6%). Stein et al. (1998) also conducted a GSP and SSP comparison by conducting interviews with 106 first-degree relatives of 23 GSP probands and 74 relatives of 24 non-clinical controls. Probands with SSP were not utilised, however, questions were asked about SSP symptoms, as well as APD symptoms. The study found that GSP proband relatives had a ten-fold risk (26.4%) of developing GSP compared to relatives of controls (2.7%), and 19.8% of GSP proband relatives had met criteria for APD compared to no relatives of control participants. There were no significant differences in the frequencies of SSP in the relatives of GSP probands and controls.

Twin studies demonstrate stronger support for a genetic contribution as findings derived from family studies may be influenced by contributing environmental factors. Only a few twin studies have been conducted (Andrews, Stewart, Allen, & Henderson, 1990; Kendler, Neale, Kessler, Heath, & Eaves, 1992; Torgersen, 1979) with two finding no genetic

support (Andrews et al., 1990; Torersen, 1979). It should be noted that both of these studies used small sample sizes, thereby having reduced power in detecting any existing significant relationships. Kendler et al. (1992) conducted a large study involving structured diagnostic interviews with 2000 female twins. Clinicians diagnosed twins while being blind to the diagnosis of the corresponding twin. The concordance rate was higher for same-sex twins (24%) than with different sex twins (15%). The authors concluded, from further analyses, that 21% of the variance was due to genetic factors specific to social anxiety disorder and a further 10% of variance was due to non-specific genetic factors. Overall, it seems that genetic factors (both specific and non-specific to social anxiety disorder) play a role in the development of social anxiety but that it is a minority one, with the general consensus that approximately a third of the variance is due to genetic factors.

Parenting Styles

Parental rearing practices have received the most attention in the way of environmental contributions to the development of social anxiety (Clark & Beck, 2010). Parenting styles that are characterised by excessive control combined with lack of care or warmth have been shown to be common amongst those with social anxiety disorder in retrospective studies (Bruch, Heimberg, Berger, & Collins, 1989; Bruch & Heimberg, 1994; Lieb et al., 2000; Parker, 1979). This observation has been shown to be more prevalent for individuals with social anxiety disorder compared with individuals diagnosed with other anxiety disorders (Arrindell et al., 1989). It has been established that cold, rejecting parenting styles is a risk for the development of general psychopathology (Bowlby, 1969), however, the over-control element is regarded to place the child at an additional risk of developing social anxiety via limited exposure to normal social experiences that are important in acquiring social independence.

Social isolation as a result of limited family socialising in the community, discouragement of social interactions and the emphasis on the importance of other's opinions have also reported to be influential factors (Neal & Edelmann, 2003). Bruch et al. (1989) compared the responses of 21 GSP participants with 22 participants with agoraphobia and found that GSP participants reported their mothers to be more avoidant of social situations, to have experienced more social isolation, recalled more concern about the opinions of others, and experienced less family socialising than their agoraphobia counterparts. Bruch and Heimberg (1994) also compared childhood experiences of GSP participants ($n = 34$) and SSP participants ($n = 36$) to controls ($n = 39$). Both GSP and SSP groups reported frequent use of shame tactics as a form of discipline, lack of family socialising and the emphasis of the importance of others opinions while growing up. With regards to family socialising, GSP participants reported more extreme isolation than SSP participants, who did not differ from controls on these variables. The authors reported that "it is tempting to speculate that what parents say to children may predispose them to social phobia and that what they prevent their children from doing may contribute to the spread of fear across a range of social interactions" (p. 24). It should be noted however, that support for these findings have been acquired mainly from studies utilising retrospective reports of childhood experiences, which have a high potential of being biased in recall and interpretation.

Personality Factors

Many personality traits have been found to be associated with social anxiety (Bienvenu & Stein, 2003; Coles & Horng, 2006). Following on from discussions in Chapters 1 and 2, social anxiety has been found to correlate positively with many traits characterised by avoidance behaviour (as discussed in Chapter 1), including harm avoidance (Bienvenu & Stein, 2003; Chatterjee, Sunitha, Velayudhan, & Khanna, 1997; Faytout et al., 2007; Hofmann & Loh, 2006; Mortberg et al., 2007; Pelissolo, André, Pujol, & Yao, 2002), shyness

(Beidel & Turner, 2007; Chavira, Stein & Malcarne, 2002), neuroticism (Bienvenu et al., 2001; Trull & Sher, 1994), negative affectivity (Watson et al., 1988a) behavioural inhibition (Beiderman, 1990; Mick & Telch, 1998; Schwartz, Snidman, & Kagan, 1999) and the BIS (Coplan et al., 2006; Kashdan & Roberts, 2006; Kimbrel et al., 2008; Vervoot et al., 2010). Similarly, social anxiety tends to correlate negatively with approach/reward sensitivity traits including extraversion (Bienvenu et al., 2001; Trull & Sher, 1994), positive affectivity (Watson et al., 1988a) novelty-seeking (Chatterjee et al., 1997; Mortberg et al., 2007), as well as traits such as self-direction (Chatterjee et al., 1997; Mortberg et al., 2007; Pelissolo et al., 2002), and cooperation (Chatterjee et al., 1997; Marteinsdottir, Tillfors, Furmark, Anderberg, & Ekselius, 2003; Mortberg et al., 2007).

Behavioural inhibition.

In the way of temperament and personality, behavioural inhibition (BI) has been most strongly associated with social anxiety. Pioneered by the work of Jerome Kagan and his colleagues in the 1980s (Garcia-Coll, Kagan, & Reznick, 1984; Kagan, Reznick, Clarke, & Snidman, 1984; Kagan, Reznick, & Snidman, 1986; Resnick et al., 1986), a great deal of empirical research has been conducted in this area (see review by Hirshfeld et al., 2003). Kagan et al. (1986) defined BI as the “tendency to display or not to display an initial period of inhibition of speech and play, associated with a retreat to a target of attachment, when the child encounters an unfamiliar or challenging event” (p. 54). BI is found in 10-15% of children (Kagan, Reznick, & Snidman, 1988) and considered to be a largely heritable construct, with genetic factors estimated to account for between 41-70% of the variance (DiLalla, Gottesman, Carey, & Vogler, 1994; Robinson, Kagan, Reznick, & Corley, 1992).

Longitudinal research has demonstrated that BI is relatively stable throughout the lifespan and can have effects on later years of life (Garcia-Coll, Kagan, & Reznick, 1984; Kagan et al., 1984; Kagan, Reznick, & Snidman, 1986; Resnick et al., 1986; Schwartz, et al.,

1999; Ollendick & Hirshfeld-Becker, 2002). In the seminal, original study by Garcia-Coll et al. (1984), 21-month-old infants ($N = 117$) were classified as either behaviourally inhibited ($n = 33$) or behaviourally uninhibited ($n = 38$) based on observations of responses to various novel stimuli (e.g. toys, strangers), psychophysiological indexes, and parent interviews. A second experiment ten months later demonstrated stability from 21 to 31 months. These children were followed up at various ages including at age four years (Kagan et al., 1984), five and a half years (Resnick et al., 1986), six years (Kagan et al., 1987), and thirteen years (Schwartz et al., 1999). It should be noted at the outset that these children were all American Caucasian, middle- to upper class infants, therefore findings should be generalised with caution, although at least two studies have shown cross-cultural applicability (Asendorpf, 1990, 1993; Broberg, 1990).

The expression of BI is considered to manifest itself differently as children develop. During toddler years, BI is seen in fretting, clinginess to attachment figures and withdrawal from unfamiliar stimuli. In preschool years, restrained affect in the presence of strange adults and children are seen as indicators, and in later school years, a pattern of reservation and reticence, especially with unfamiliar peers (Kagan et al., 1984). Evidence for the enduring effects of BI into adolescence and adulthood is taken to be seen in its proposed relationship with shyness and anxiety in later life (Hirshfeld-Becker et al., 2003). BI is considered to be a risk factor for the development of pathological anxiety and likely also for depression and other forms of psychopathology (see Hirshfeld-Becker et al., for review). This view has emerged from family studies suggesting that BI in offspring of parents with anxiety disorders is more frequent (e.g. Rosenbaum et al., 1988) and that BI children are more likely to have an anxiety disorder (Beiderman et al., 1993), as well as their siblings (Rosenbaum et al., 1991).

These early studies concluded that reported anxieties were most commonly of a social-evaluative nature (e.g. Biederman, 1990). These studies also showed that amongst

children who did not have an anxiety disorder, parents of BI children were more likely to be diagnosed with social anxiety disorder compared with parents of non-BI children (Rosenbaum et al., 1992). Subsequent research supporting a link between social anxiety and BI has been extensive to the point that BI is now considered to be a precursor of the condition. Schwartz et al. (1999), for example, conducted structured diagnostic interviews with the children from the Kagan and colleagues studies, at age 13, and found that 61% of BI children met criteria for GSP compared to 27% of non-BI children. Four years later, a functional MRI study was conducted with the same cohort, involving 13 BI young adults and 9 behaviourally uninhibited adults (Schwartz, Wright, Shin, Kagan, & Rauch, 2003). Comparisons were made in their amygdala responses to presented familiar and novel stimuli and as predicted, BI participants showed more arousal when presented with unfamiliar stimuli.

Mick and Telch (1998) conducted a retrospective study of 76 undergraduates and compared four separate groups: social anxiety disorder individuals ($n = 10$), generalised anxiety disorder individuals (GAD; $n = 13$), combined GAD and social anxiety disorder individuals ($n = 15$), and non-anxious controls ($n = 38$). Results showed that GAD participants were no more likely to report childhood BI than non-anxious controls and that social anxiety disorder participants (alone and combined group) were more likely to report BI compared with GAD and non-anxious control groups. Another study utilising a larger sample size ($N = 2242$), followed-up adolescents over a four year period (Hayward, Killen, Kraemer, & Taylor, 1998). Results drawn from self-reports (Retrospective Self-Report of Inhibition; Reznick, Hegeman, Kaufman, Woods, & Jacobs, 1992), structured clinical interviews and heart rate monitoring, indicated that childhood BI elevated risk for developing social anxiety disorder.

A more recent study using an alternative measure of BI reported similar results (Gladstone, Parker, Mitchell, Wilhelm, & Malhi, 2005). One hundred and eighty nine depressed adults completed the retrospective measure of behavioural inhibition (RMBI; Gladstone & Parker, 2005) and the adult measure of behavioural inhibition (AMBI; Gladstone & Parker, 2005) after participating in structured diagnostic interviews. The AMBI was developed for the purpose of measuring current levels of „trait’ BI, and has been shown to be correlated with social anxiety (Gladstone & Parker, 2005). Individuals who reported high levels of childhood BI were more likely to have a diagnosis of social anxiety disorder and this relationship was independent of both AMBI scores and depression severity. Results also showed that there was no significant relationship between depression and BI, suggesting a unique relationship between BI and social anxiety. Although this study utilised depressed patients whose reports may have been subjected to recall bias, the results do support the hypothesis that there is a unique link between social anxiety and BI.

However, a word of caution should be noted in not overstating the role of BI in developing anxiety. Many BI children become less inhibited as they develop (Kagan et al., 1984) and do not go on to develop social anxiety disorder (e.g. Schwartz et al., 2003). Likewise, many uninhibited children also develop anxiety disorders (e.g. Schwartz et al., 1999). Turner et al. (1996) concluded in their review of the relationship between BI and anxiety disorders that the familial pattern of anxiety is more critical than BI and that “BI is the basis for the development of anxiety disorders by fostering a behavioural style that is not conducive to adaptive social functioning *but the full emergence of a disorder is dependent on environmental factors*” (p. 169). This is supported by the fact that the variance of BI accounted for by genetic factors is estimated to be higher (41-70%; Robinson Kagan, Reznick, & Corley, 1992) than the genetic variance in social anxiety disorder (approximately 30%, Kendler et al., 1992). As such, it appears that BI is an important risk factor for the

development of social anxiety disorder but is neither sufficient nor necessary, and must be considered in the context of other variables.

Treatment for Problem Social Anxiety

Fortunately, social anxiety disorder is a condition that is highly responsive to treatment (Clark & Beck, 2010). The majority of treatment efficacy studies have focused on cognitive behavioural therapy (CBT), which has been established as the most effective psychosocial treatment for social anxiety (Butler et al., 1984; Chambless et al., 1998; Chambless & Ollendick, 2001; Clarke & Beck, 2010; Hofmann & Barlow, 2002; Rodebaugh et al., 2004; Stein, 2008; Taylor, 1996; Turk et al., 2008). Moderate to large effect sizes have been reported by most reviews and meta-analyses (e.g. Rodebaugh et al., 2004; Turk et al., 2008) with one known exception which concluded that these figures are more applicable to SSP individuals, whose response rates (7-79%) were found to be higher than that of GSP individuals (18-44%) (Beidel & Turner, 2007).

CBT

CBT is based on the premise that psychopathology occurs as a result of unhelpful fundamental beliefs about the self, the world and the future (Beck, 1979). Automatic cognitions, which stem from these core beliefs, influence emotions and behaviours. Cognitions, emotions and behaviours are believed to maintain symptoms in a cyclic fashion. Since its inception, various therapy approaches have been developed that are subsumed under the umbrella term „CBT’. All CBT approaches for social anxiety disorder include cognitive restructuring (CR) and/or exposure.

CR involves, as the name suggests, the restructuring of cognitions or thoughts. CR is used to challenge thinking errors or assumptions that the individual often has about the feared stimulus. According to CBT theory, socially anxious individuals often have inaccurate or

unhelpful ways of perceiving and interpreting social situations that stem from core doubts about their abilities to perform adequately and/or be accepted in social contexts (Rapee & Heimberg, 1997). CR helps individuals to identify unhelpful thoughts and belief in order to challenge them with rational, disputing questions.

Exposure involves „putting yourself out there’ and is based on the premise that individuals must face their fears in order to overcome them. Exposures can be equated to behavioural experiments where hypotheses (e.g. negative assumptions) are tested to provide „evidence’ as to whether their thoughts and assumptions are in fact accurate. Exposure is particularly important when the individual has engaged in long-term avoidance of feared social situations as a coping mechanism. Effective exposures allow the individual to undergo the process of habituation, which refers to the natural process whereby anxiety subsides over time. The individual is often exposed to increasingly anxiety-provoking situations in a structured, step-by-step fashion. Exposures are often conducted as practice in sessions, for later *in vivo* (real-life) social situations.

CBT for Social Anxiety Disorder

A few CBT programs have been designed specifically for social anxiety disorder including Clark and Well’s (1995) individual cognitive therapy (CT) and cognitive behavioural group therapy (CBGT; Heimberg et al., 1985; Heimberg et al., 1993; Heimberg & Becker, 2002). Both programs have been shown to be effective, although CBGT has received the most attention to date (Chambless et al., 1997; Gould, Buckminster, Pollack, Otto, & Yap, 1997; Heimberg et al., 1993; McEvoy, 2006; Scholing & Emmelkamp, 1999; see Rodebaugh et al., 2004 for review of CT). CBGT is a 12-week program consisting of psychoeducation, cognitive restructuring, weekly exposures, as well as homework tasks in between sessions. It is regarded as a treatment of choice due to its cost- and time-effectiveness (Heimberg, 2001).

Pharmacotherapy

Studies indicate that a variety of drug classes are effective for reducing social anxiety including benzodiazepines, monoamine oxidase inhibitors (MAOIs) and the reversible inhibitors of monoamine oxidase-A (RIMAs) (Davidson et al., 1993; Gelernter et al., 1991; Humble, Fahlen, Koczkas, Nilsson, 1992; Versiani et al., 1992). However, selective serotonergic reuptake inhibitors (SSRIs), such as sertraline and paroxetine, are considered the treatment of choice, largely because they are effective (Blanco et al., 2003; Davidson, 2003) with few side effects, have high tolerance levels and have low risk of overdose (Altamura, Piolo, Vitto, & Mannu, 1999).

Heimberg et al. (1998) conducted a large multisite study comparing CBT to medication, an alternative form of therapy, and pill placebo. The authors found that CBGT and medication produced comparable results and were both superior to the alternative treatment and pill placebo. Not surprisingly, patients responded more quickly to medication, however the CBGT participants were less likely to relapse at six month follow-up. Clark et al. (2003) compared CT to fluoxetine and pill placebo and found that CT produced better outcomes than two other interventions. Generally, meta-analyses have concluded that CBT and pharmacotherapy produce comparable results (Federoff & Taylor, 2001; Gould et al., 1997).

Studies have also investigated whether combined CBT and medication are superior to each treatment alone (Davidson et al., 2004; Foa, Franklin, & Moser, 2002; Heimberg et al., 1998). Findings have been inconsistent with some studies (e.g. Heimberg et al., 1998) concluding that combined treatment is more effective and others (e.g. Davidson et al., 2004) finding that individual treatments can be more effective. The current consensus is that both therapies are effective in reducing social anxiety symptoms, with medication producing more

rapid effects and CBT having less potential for relapse. It could be argued then that CBT is more effective in permanently treating social anxiety.

Factors that Affect CBT Outcome for Social Anxiety Disorder

Researchers have been interested in the factors that affect treatment outcome. Although, 75-80% of treatment completers respond to CBT (Ledley & Heimberg, 2005), it remains to be determined what makes treatment ineffective for the remaining individuals. Furthermore, relapse is not uncommon (Clark & Beck, 2010) and quality of life is generally still poorer for treatment responders compared to non-anxious individuals (Eng et al., 2001). It is therefore important that researchers not only evaluate treatments for effectiveness but also for how they can be maximised for individuals. With the „one size does not fit all’ mindset, it is essential to understand the best conditions in which an individual will interact with an intervention so that they will benefit most from treatment. This has implications particularly for the cost-effectiveness of programs. The main factors that been found to affect CBT outcome for social anxiety disorder are discussed here.

Generalised social phobia subtype.

Individuals with GSP are generally found to be more symptomatic at the end of treatment than those suffering from SSP (e.g. Brown et al., 1995; Hope, Herbert, & White, 1995). Rates of improvement, however, have been found to be comparable (Brown et al., 1995; Hope et al., 1995b) and poorer post-treatment functioning is likely to be a reflection of higher baseline levels of anxiety for GSP individuals. Those with GSP may require longer treatments or extra booster sessions to effectively reach comparable levels of post-treatment anxiety. The pervasiveness of GSP makes such individuals more resistant to treatment, along with the associated life stressors that also make it difficult to disentangle the nature of how GSP may affect treatment outcome.

Co-morbid Avoidant Personality Disorder and depression.

Co-morbidity is regarded to also influence CBT outcome for social anxiety disorder. As mentioned previously, individuals with co-morbid APD have been reported to constitute at least a quarter of individuals with social anxiety disorder (Rettew, 2000), with some studies reporting rates up to 89% (see Heimberg et al., 1993). Some studies have concluded that APD predicts poorer response to treatment (e.g. Chambless et al., 1997; Feske et al., 1996) whilst others have found no effect (e.g. Brown et al., 1995; Hope et al., 1995b). Brown et al. noted that comparison of such studies is hindered by the fact that studies have varied extensively in how diagnoses are formed, subtype definition, sample sizes, assessment devices and perhaps most significantly, in whether they have specified subtypes and/or disentangled them from APD.

Co-morbid depression has also been shown to be a strong predictor of treatment outcome (Chambless et al., 1997; Scholing & Emmelkamp, 1999). Individuals with pre-treatment depression are generally less responsive than their non-depressed counterparts although rates of improvement have been reported to be comparable in one study (Erwin Heimberg, Juster, & Mindlin, 2002). However, depressed individuals were also found to be more symptomatic at post-treatment. This is consistent with findings that GSP people (who have high rates of depression; Kessler et al., 2005) are more likely to be less responsive compared to SSP individuals. Depressive symptoms clearly impact on the degree to which individuals are able to engage in therapy. Depressed individuals characteristically have more resistant cognitions that are more difficult to alter and such individuals may require other treatments to address depressive symptoms prior to treating their social anxieties. This is particularly relevant to CBT as its effectiveness heavily relies on homework compliance, which has been shown to be another factor that predicts treatment outcome (Edelman &

Chambless; Leung & Heimberg, 1996), as well as treatment expectancy (Chambless et al., 1997; Safren, Heimberg, & Juster, 1997).

The Role of Harm Avoidance in CBT Outcome for Social Anxiety Disorder

Research on the potential influences of GSP, pre-treatment depression and APD traits on treatment outcome suggest that the role of personality might have a significant influence on treatment outcome. In fact, personality has been raised as a more important factor than personality disorders per se in affecting treatment outcome for a range of psychopathologies (Reich, 2003). Reich, who has conducted extensive work on the effects of personality disorders on treatment outcome for anxiety and depression, concluded in his review, “that the distinction to be examined in looking at outcome of treatment of Axis 1 disorders was not so much the presence or absence of a personality disorder but rather the presence or absence of personality traits” (p. 388). For social anxiety disorder however, few studies, have investigated the relevance of personality traits to treatment outcome. These few studies have focused exclusively on Cloninger’s (1987) HA trait.

Three known published studies have investigated whether HA is related to treatment outcome for social anxiety disorder. In the first study, Hofman and Loh (2006) randomly assigned 39 individuals with social anxiety disorder to either a 12-week group exposure therapy program (Hofmann, 2000a) or Heimberg’s (1985) CBGT. Pre- and post-measures showed that both treatments led to a significant improvement in social anxiety, depression and HA but that only reductions in HA were related to reductions in social anxiety post-treatment. Other personality variables (ie. novelty seeking and reward-dependence) showed no changes.

Mortberg et al. (2007) had similar study objectives however, broadened their study to investigate Cloninger’s (1993, 1997) updated model (see Chapter 2). Fifty-nine individuals with social anxiety disorder were assigned to one of three treatment conditions: intensive

cognitive behavioural group therapy (16 sessions undertaken intensively over three weeks; Mortberg et al., 2005), Clark et al.,'s (2003) individual CT, and pharmacotherapy.

Consistent with Hofmann and Loh's (2006) findings, HA was reported to decrease with social anxiety symptoms (independent of treatment), however, self-directedness was also shown to increase for individuals who completed the two psychotherapies. Depression was also observed to reduce along with an increase in self-directedness, reward-dependence and novelty-seeking. Interestingly, non-responder's rates of improvement in self-transcendence were comparable to that of responders, however, HA showed no improvement for non-responders. High baseline HA therefore may be a predictor of poor outcome.

Finally, Faytout et al. (2007) conducted a naturalistic, prospective study involving observation of 157 French university clinic outpatients diagnosed with social anxiety disorder who received treatment in one of four conditions: medication, individual CBT, group CBT, and psychodynamic therapy. Participants were followed up at 6 ($n = 104$) and 24 months ($n = 66$). Independent of treatment, increases in HA correlated with improvements in social anxiety symptoms at six month follow-up, and HA significantly predicted social anxiety at 24-month follow-up. Although this study was subject to the limitations of a naturalistic study methodology, these results are consistent with findings that HA is a significant predictor of treatment outcome for social anxiety disorder. Results also support cross-cultural applicability of these relationships.

It is clear that there is a relationship between HA and social anxiety symptoms and in the way of treatment outcome, HA appears to be associated with a reduction in social anxiety symptom levels. More studies are required to replicate these findings to determine if baseline HA predicts treatment outcome as it appears that those with high HA show comparable rates of improvement with individuals with low HA, despite being more symptomatic at post-treatment. As discussed in Chapter 1, HA is very conceptually similar to the BIS and their

parallels can be seen in the definition of HA: “a heritable tendency to respond intensely to signals of aversive stimuli, thereby learning to inhibit behaviour to avoid punishment, novelty, and frustrative nonreward” (Cloninger, 1987; p. 55). Given that correlational studies and factor analyses have established strong relationships between the two constructs (Carver & White, 1994; Caseras, Avila, & Torrubia, 2003; Mardaga & Hansenne, 2007; Zelenski & Larsen, 1999), this suggests that findings of studies investigating HA may be applicable to the BIS. In this case, it would appear that BIS may also affect CBT outcome for social anxiety disorder.

Summary of Social Anxiety

The first half of this chapter reviewed the general literature on social anxiety. Social anxiety, at both community and clinical levels, is highly prevalent and is associated with a host of negative life outcomes. Individuals can experience social anxiety about interacting with others (interaction anxiety) or being observed by others (observation anxiety). GSP tends to involve both observation and interaction anxiety while those with SSP can involve observation anxiety alone. Etiological research indicates that approximately a third of the variance in social anxiety is genetically determined and parenting styles characterised by excessive control and lack of warmth, as well as a lack of socialising outside of the family were identified as common psychosocial risk factors. With regards to personality, traits characterised by avoidance behaviour, particularly BI, have been found to be positively associated with social anxiety and traits characterised by approach/reward-sensitivity behaviour have been found to be negatively associated with social anxiety. In the treatment literature, CBT is regarded as the most effective treatment to date, although pharmacotherapy can also be effective. Factors that can affect CBT response for social anxiety include social anxiety disorder subtype, co-morbid depression and APD. Elevated levels of the personality trait HA have also been shown to affect CBT outcome.

RST and Social Anxiety

This section discusses the theoretical and empirical support for the idea that RST is highly relevant to the understanding of social anxiety. Gray and McNaughton (2000) do not address this relationship in detail and although researchers have recently begun to propose models in this domain (e.g. Kimbrel, 2008), very few studies have explored these relationships (Coplan et al., 2006; Kashdan & Roberts, 2006; Kimbrel et al., 2007; Kimbrel, 2008; Vervoot et al., 2010). The fact that the BIS (original and revised) and the FFFS are positively associated with general anxiety and that personality traits characterised by avoidance behaviour are linked with social anxiety (Bienvenu & Stein, 2003; Coles & Horng, 2006) provides indirect support that the BIS and FFFS would also be positively related with social anxiety. The construct that is of most relevance however is BI, which as discussed earlier, is strongly associated with social anxiety and has also been proposed as the behavioural expression of the BIS (Kimbrel, 2008).

Behavioural Inhibition

Although the specificity of the link between BI and social anxiety disorder requires further investigation (as it has also been linked with other anxiety disorders and general psychopathology; e.g. Battaglia et al., 1997; Muris et al., 1999; Rosenbaum et al., 2000; Turner et al., 1994), BI has been identified as a precursor of social anxiety disorder (Hirshfeld-Becker et al., 2003). The unique nature of the relationship, that is, how a fear of novel stimuli eventually channels itself into social anxiety specifically, has yet to be elucidated. The variable nature of social interactions may explain this connection. Social interactions are a unique form of anxiety-provoking stimuli that have the potential for both incentives (connection) and threat (rejection). Unlike other feared stimuli (e.g. in specific phobias), where perceptions of danger are localised and predictable, social situations are always unpredictable and novel depending on context and person. In evolutionary terms,

group protection (social connection) is essential to the survival of human and other animal species and as Gray and McNaughton (2000) put it, “stimuli that arise in the course of social interaction are among the most important innate threats in many animal species” (p. 321). Social interactions are therefore sources of strong desire and threat simultaneously. As applied to modern social interactions, this may explain the high prevalence of social anxiety (Kessler et al., 2005).

Gray and McNaughton (2000) specify that given that social situations involve conflict between defensive avoidance (of perceived social threats) and defensive approach (towards desirable social connections), individuals with high social anxiety would be expected to have high levels of BIS sensitivity. Accordingly, social anxiety disorder should be considered as an ‘anxiety’ rather than a phobia or fear. However, high FFS sensitivity would also be expected to relate to social anxiety given that, in evolutionary terms, social interactions are conceptualised as sources of unconditioned threat (fear), and characterised by avoidance behaviour. In this sense, neural activity of social anxiety disorder would span both the amygdala and the septo-hippocampal system.

Empirical research also suggests that the neurological substrates of the BIS line up with the physiological circuits proposed to underlie BI tendencies, specifically with regards to how high BI individuals are considered to have comparably lower thresholds of reactivity in limbic and hypothalamic structures to novelty (Kagan et al., 1984; Schwartz et al., 2003). Further, BI characteristics of increased arousal, attention and anxiety in response to novel and stimuli are also the proposed outputs of the r-BIS (Fox, Henderson, Marshall, Nichols, & Ghera, 2005; Gray & McNaughton, 2000). Given these findings, it appears that BI is the behavioural expression of the BIS. If BI is taken to be a precursor of social anxiety, it is therefore expected that a high r-BIS would be a risk factor for developing social anxiety disorder. This is consistent with the fact that the cognitive output of the r-BIS, that is,

attending to, processing, and recalling negative stimuli in the environment (Gray & McNaughton, 2000; McNaughton & Corr, 2004) is consistent with the cognitive biases that characterise and maintain social anxiety (Clark & Wells, 1995; Rapee & Heimberg, 1997).

The BIS/FFFS and Social Anxiety

Three published studies have directly examined the relationship between o-BIS and social anxiety (Coplan et al., 2006; Kashdan & Roberts, 2006; Kimbrel et al., 2008). In the first study, Coplan et al. (2006) investigated emotional difficulties in a children sample. Ninety-five normal children in the community (mean age 9.6 years, *SD* 1.90) completed the BIS/BAS Scale and measures of social anxiety, depression, negative affectivity (NA) and subjective well being. As expected, o-BIS sensitivity was positively related with all social anxiety subscales and depression, and negatively correlated with subjective well being. BAS was negatively correlated with two of the three social anxiety subscales (fear of negative evaluation -0.25 and general social avoidance and distress -0.21 , but not social anxiety related to new situations and people).

Kashdan and Roberts (2006) found similar results when comparing socially anxious with non-socially anxious adults in the community. The authors investigated whether self-reported trait curiosity and social anxiety (conceptualised as lower-order manifestations of o-BIS and BAS) and o-BIS and BAS, predicted state NA and state positive affectivity (PA) while participating in social interactions. As expected, positive correlations were found between o-BIS and social anxiety, and social anxiety uniquely predicted state NA, even after trait NA was statistically taken into account. Correlations between BAS and social anxiety were not significant.

The final study investigated whether o-BIS and BAS and parenting factors predicted social anxiety and bulimic symptoms (Kimbrel et al., 2008). Female undergraduates ($N=128$) completed a measure of o-BIS and BAS (Sensitivity to Punishment and Sensitivity to Reward

Scale, Torrubia et al., 2001) and measures of social anxiety, bulimia, and parental care and parental overprotection. Results showed that not only did o-BIS positively predict social anxiety but that it also moderated the effect of low maternal care on social anxiety. That is, low maternal care had an effect on social anxiety symptoms only for individuals with high o-BIS.

Foregoing studies discussed have examined only o-BIS (and BAS) relations to social anxiety. Recently, Vervoot et al. (2010) investigated the role of the FFFS in clinically anxious and non-anxious children and adolescents. One hundred and seventy-five participants completed a child version of the BIS/BAS Scale (Muris et al., 2005) and the short version of the Revised Child Anxiety and Depression Scale (Muris et al., 2002). Regression analyses showed that social anxiety disorder was significantly predicted by both BIS ($r = .73$) AND FFFS ($r = .53$) scores. Compared with other anxiety disorders, FFFS scores correlated most strongly with social anxiety disorder and panic disorder. This supports the idea that social anxiety incorporates fear as well as anxiety (Gray & McNaughton, 2000).

The BAS and Social Anxiety

The role of the BAS in social anxiety is less transparent. Three of the four studies discussed above (e.g. Kashdan & Roberts, 2006; Kimbrel et al., 2008; Vervoot et al., 2010) have found that BAS is not related with social anxiety. Coplan et al. (2006) found that social anxiety correlated negatively with fear of negative evaluation and general social avoidance and distress although these were relatively weak correlations ($-.21$ to $-.25$). Combined with studies finding that BAS is generally not related with general anxiety (Bijttebier et al., 2009; Campbell –Sills et al., 2004), the common consensus to date is that the BAS is not relevant to social anxiety.

Notwithstanding this consensus, the JSH (Corr, 2002), theorises that high levels of BAS may protect individuals against social anxiety, particularly if they have high levels of

BIS (Kimbrel, 2008). Research has shown that social anxiety negatively relates with PA and extraversion (Brown et al., 1998; Watson et al., 2005), which correlate positively with the BAS (Depue & Collins, 1999; Smillie et al., 2006), as discussed in Chapter 2. Interestingly, other theorists also advocate that BAS might *positively* correlate with social anxiety. In their review of the roles of o-BIS and BAS in social adjustment, Knyazev et al. (2008) concluded that having a high BIS and high BAS is not optimal for social functioning in that a high BIS leads to social withdrawal and emotional confusion and that a high BAS leads to risky, antisocial behaviour. This view is consistent with the result of a study which investigated the role of novelty-seeking impulsive behaviours in social anxiety disorder (Kashdan & Hofmann, 2008). Cluster analyses of data of 82 GSP outpatients (completed the Tridimensional Personality Questionnaire; Cloninger, 1998, 1993) revealed two personality groups: the prototypical avoidant, submissive type of social anxiety and a group characterised by high novelty-seeking tendencies. There were no differences in social anxiety severity across the groups and the novelty-seeking group were found to be more impaired. Given that novelty-seeking is related to disinhibition, the authors concluded that there may be a subgroup of socially anxious individuals who may use impulsive behaviours (e.g. rapid speech) to curtail anxiety and heightened self-consciousness. This study raises interesting, largely unexplored questions about the potential relevance of approach-based personality traits to social anxiety.

Overall, it appears that high levels of BIS (original and revised) and the FFFS would be expected to positively correlate with social anxiety. The role of the BAS is less clear. Kimbrel (2008) summarises much of the empirical research on RST-social anxiety relationships in an RST model for the development and maintenance of GSP (see Figure 4). The model proposes specific pathways for how having high levels of BIS and FFFS sensitivities can both predispose and maintain social anxiety symptoms. It also assumes that

the development and maintenance of social anxiety occurs as a result of distal causes, proximal causes and maintenance factors and depending on the individual's particular circumstances, a combination of these factors can culminate in the experience of social anxiety.

Genetics, temperament and early environmental experiences are proposed as distal causes of GSP. Kimbrel (2008) argued that high r-BIS and FFFS sensitivity result from genes that lead to increased levels of *5-HTT* (McNaughton & Corr, 2004). These genes may be a result of a family history of GSP or other internalising difficulties. Such individuals are likely to have BI temperament as children. Specifically, this claim is based on observations discussed foregoing: that the same brain structures are involved in r-BIS/FFFS sensitivity and BI (Gray & McNaughton, 2000; Kagan et al., 1987); that BI characteristics of increased arousal, attention and anxiety in response to novel and social stimuli are also the proposed outputs of r-BIS/FFFS (Fox et al., 2005; Gray & McNaughton, 2000) as well as characteristics of neuroticism (Lesch et al., 1996) and social anxiety (Furmark et al., 2004), and that both BI and neuroticism are related to increased risk of GSP (Schwartz et al., 1999).

These genetic vulnerabilities are also considered to moderate the effects of environmental experiences, such as habituating social experiences (e.g. school bullying) and early stressful experiences (e.g. low maternal care). There is evidence that neural structures also change as a result of these experiences, particularly in the amygdala (Gray & McNaughton, 2000; Rosen & Schulkin, 1998). In other words, BIS and FFFS sensitivity is not only inherited but that can also increase as a direct result of exposures to these environmental experiences. This is consistent with studies showing that BIS moderates/mediates the effect of parenting factors on anxiety (Kimbrel, 2007; Kimbrel et al., 2008).

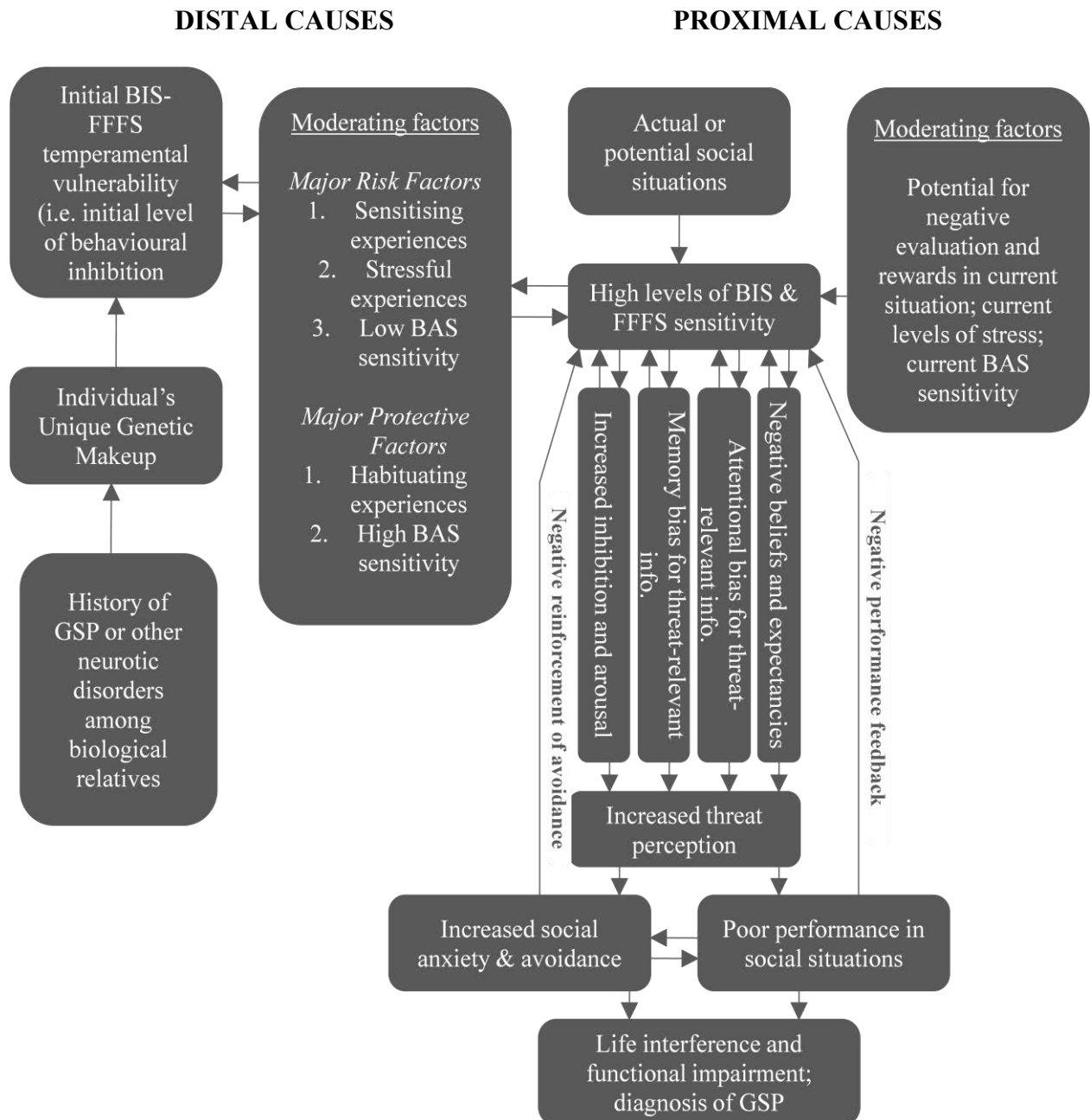


Figure 4. A model of the development and maintenance of generalised social phobia

(Kimbrel, 2008).

Note: GSP = Generalised social phobia, BIS = Behavioural Inhibition System, FFFS = Fight-Flight-Freeze-System, BAS = Behavioural Approach System

In terms of proximal causes, biases in information processing, current stressors and situational variables are proposed to be relevant. Kimbrel argues that information-processing biases that are characteristic of GSP are a function of increased BIS and FFFS sensitivity,

which is consistent with Gomez and Cooper's (2008) RST Model of Psychopathology discussed in Chapter 2. While environmental variables influence the expression of content of social anxiety, BIS and FFFS sensitivity determines the *degree* of an individual's response (or avoidance) to a social stressor. This is consistent with the idea that such individuals will perceive social situations as more threatening due to the BIS entering control mode as a result of the conflict between potential threat and reward in social situations. These cognitive biases are proposed to lead to the dysfunctional cycles that characterise social anxiety.

Further, r-BIS and FFFS sensitivity is proposed to interact with the environment to produce social anxiety. When individuals are under general stress, individuals are more likely to perceive social situations as more threatening because of changes in BIS neural structures (i.e. the amygdala) that increase in sensitivity to threat as a result of previous exposure to stress (Korte, 2001; Rosen & Schulkin, 1998). The model also includes the tentative idea that having high levels of the BAS may play a role in protecting individuals against developing GSP. Finally, consistent with CBT theory, the model proposes that biased cognitions, avoidant behaviours and subsequent social skills deficits maintain the cycle of social anxiety.

This focus on cognitive cycles is consistent with Kimbrel's model, Gomez and Cooper's (2009) RST Model of Psychopathology, and findings that Cloninger's (1987, 1993) HA influences CBT outcome for social anxiety disorder (Faytout et al., 2007; Hofman & Loh, 2006; Mortberg et al., 2007), provides a rationale for investigating BIS (and potentially FFFS and BAS) as an influencing factor of CBT outcome for social anxiety disorder. To date, this has never been investigated.

Chapter Summary and Conclusion

This chapter has reviewed the literature on social anxiety and its relationships with RST traits. Given the high prevalence and the negative life outcomes associated with social

anxiety, it is important that the relevant risk factors are investigated. Although this area of research is in its infancy, theory and research indicate that high levels of BIS and FFFS sensitivity are relevant to the development and treatment of social anxiety (disorder). R-BIS and FFFS are also proposed to contribute to the maintenance of social anxiety symptoms via cognitive processing biases that are characteristic of the r-BIS. The role of the BAS in social anxiety is currently unclear, although most studies have found no significant relationships.

Given that there are currently only a handful of studies that have investigated RST-social anxiety relationships, there is much room for extending this field of research. The few studies that have been conducted in this area have been primarily survey studies that have focused on establishing relationships between trait measures of social anxiety and RST traits. More studies are needed to replicate these relationships; however, it is also important that studies extend beyond survey investigations to look at how RST traits affect responses to states of social anxiety. There have been some studies that have looked at these effects with other forms of psychopathology and RST. Given that cognitive, affective and avoidance responses appears to underlie the maintenance of social anxiety, it would be useful to observe if RST traits are relevant to these processes, especially given that the r-BIS is proposed to be regulated by negative biases in cognitive processing. Most importantly, this suggests that examining whether RST traits affect treatment outcome for social anxiety disorder would be of clinical significance. To date, no studies of this kind have been conducted for social anxiety disorder.

CHAPTER 4: STUDY 1

Investigating the Relationships between Social Anxiety and Reinforcement Sensitivity

Theory Traits in a Community Sample

Social Anxiety

As discussed in Chapter 3, social anxiety is highly prevalent in both the community (Fehm et al., 2008) and clinical populations (Narrow et al., 2003; Kessler et al., 2005; Schneier et al., 2002). It is also a highly co-morbid condition (Schneier et al., 1992) that is associated with negative life outcomes including unemployment, occupation problems, social isolation and compromised quality of life (Bruch et al., 2003; Hambrick et al., 2003; Safren et al., 1997). Individuals can experience observation anxiety (e.g. anxiety about eating in public) and/or interaction anxiety (anxiety about conversing with individuals). Generalised social phobia (GSP) often involves both interaction anxiety and observation anxiety while specific social phobia (SSP) can predominantly involve observation anxiety (Hook & Valentiner, 2002; Hook et al., 2000; Stemmerger, Turner, Beidel, & Calhoun, 1995). The presentation of observation anxiety is often compared with panic and the specific phobias in the way of physiological symptoms and reactions to external cues (Craske, 1991; Lundh & Ost, 1997) while interaction anxiety is more associated with general distress symptoms and neurotic personality traits (Herbert et al., 1992; Hofmann & Roth, 1996; Holt et al., 1992; Norton et al., 1997; Turner, Beidel, & Townsley, 1992).

The Influence of Personality on Social Anxiety

It was also discussed in Chapter 3 that social anxiety has been found to be strongly and positively associated with a range of personality traits characterised by avoidance including neuroticism (Bienvenu et al., 2001; Eysenck, 1947; Trull & Sher, 1994), negative affectivity

(Watson et al., 1988), harm avoidance (Bienvenu & Stein, 2003; Cloninger, 1987; Chatterjee et al., 1997; Faytout et al., 2007; Hofmann & Loh, 2006; Mortberg et al., 2007; Pelissolo et al., 2002), shyness (Beidel & Turner, 2007; Chavira et al., 2002), and behavioural inhibition (BI; Beiderman, 1990; Kagan et al., 1984; Mick & Telch, 1998; Schwartz et al., 1999). BI is a temperament characterised by fear of unfamiliar stimuli and people (Garcia-Coll et al., 1984; Kagan et al., 1984; Kagan et al., 1986; Resnick et al., 1986) that has been considered as a possible pre-cursor of social anxiety (Hirshfeld et al., 2003) and also the behavioural expression of Gray's (1970, 1982; Gray & McNaughton, 2000; McNaughton & Corr, 2004) Behavioural Inhibition System (BIS; Fox et al., 2005; Gray & McNaughton, 2000; Kimbrel, 2008).

BIS, BAS and FFFS

As discussed in Chapter 2, the BIS is a reinforcement system that regulates responses to stimuli. The function of the BIS depends on the version of RST. The original BIS („o-BIS”; Gray, 1970, 1982) is considered to regulate responses to threat stimuli while the primary function of the revised BIS („r-BIS”; Gray & McNaughton, 2000; McNaughton & Corr, 2004) is to resolve conflict between competing goals, often between those of the Fight-Flight-Freeze System (FFFS) and the Behavioural Approach System (BAS). Revised RST (r-RST) considers the FFFS to be sensitive to all threat stimuli and the BAS remains responsible for regulating responses to reward stimuli. Therefore, the corresponding emotions of the three systems are fear/panic for the FFFS, worry and rumination for the BIS and positive affect and impulsivity for the BAS.

The systems can work together. The Joint Subsystems Hypothesis (JSH) advocates that the systems can facilitate or antagonise behaviour. For example, the BIS has the potential to not only facilitate responses to aversive cues, but to *antagonise* responses to *appetitive* stimuli. Conversely, the BAS can facilitate responses to appetitive cues and *antagonise*

responses to *aversive* ones. This is in contrast to the original proposal by Gray (1970) that the BIS and BAS regulate responses to stimuli independent of one other (Separate Subsystems Hypothesis; SSH). Generally, there has been more empirical support for the SSH (e.g. Avila, 2001; Gomez & Cooper, 2008).

RST and Social Anxiety

Given that research has been shown that the BIS and the FFFS are positively associated with general anxiety (e.g. Campbell –Sills et al., 2004); that personality traits characterised by avoidance behaviour are linked with social anxiety (Bienvenu & Stein, 2003; Coles & Horng, 2006) and that BI is likely a pre-cursor of social anxiety (Hirshfeld et al., 2003), this provides indirect support that the BIS and FFFS would also be positively related with social anxiety. However, only a handful of studies (Coplan et al., 2006; Kashdan & Roberts, 2006; Kimbrel et al., 2008; Vervoot et al., 2010) have investigated the relationships between RST traits and social anxiety. These community studies have found that BIS positively relates to social anxiety (Coplan et al., 2006; Kashdan & Roberts, 2006; Kimbrel et al., 2008; Vervoot et al., 2010). One clinical study found that FFFS also positively relates to social anxiety (Vervoot et al., 2010), which is also expected as social anxiety is proposed to involve fear as well as anxiety, particularly for observation anxiety (Hook & Valentiner, 2002). BAS was generally not associated with social anxiety (Kashdan & Roberts, 2006; Kimbrel et al., 2008; Vervoot et al., 2010) with one study (Coplan et al., 2006) finding it to have weak negative correlations with two of three measures of social anxiety. Although it should be noted that some studies have found social anxiety to negatively correlate with similar traits including extraversion (Bienvenu et al., 2001; Eysenck, 1947; Trull & Sher, 1994), positive affectivity (Watson, Clark, & Carey, 1988) and novelty-seeking (Chatterjee et al., 1997; Cloninger, 1987; Mortberg et al., 2007), as well as traits such as self-direction (Chatterjee et al., 1997;

Mortberg et al., 2007; Pelissolo et al., 2002), and cooperation (Chatterjee et al., 1997; Marteinsdottir et al., 2003; Mortberg et al., 2007).

The Present Study

Based on the above findings, the main purpose of this study was to investigate the relationships between RST traits and social anxiety in a community sample. BIS and BAS were measured using two different scales: Carver and White's (1994) BIS/BAS Scales and Torrubia et al.'s (2001) Sensitivity to Punishment and Sensitivity to Reward Scale (SPSRQ). Both scales were developed on the original RST. Confirmatory factor analyses of the BIS scale (Heym et al., 2008) suggests that separate items can be taken as measures of r-BIS (BIS anxiety) and FFFS (BIS fear) (Heym et al., 2008). The items that reflect fear 'Even if something bad is about to happen to me, I rarely experience fear or nervousness' and 'I have very few fears compared to my friends' are proposed to measure BIS fear. The BAS scale consists of subscales: Reward-Responsiveness (RR), Drive and Fun-Seeking (Fun-S) (Carver & White, 1994). Sensitivity to Punishment (SP) and Sensitivity to Reward (SR) are alternative measures of BIS and BAS respectively. Observation anxiety and interaction anxiety were also measured separately (Mattick & Clarke, 1998) in order to observe if they relate differently to RST traits.

Although the focus of the present study is on RST traits, other personality variables that are strongly related with both social anxiety and RST traits were also included in the study. Extraversion and neuroticism were measured with the Eysenck Personality Questionnaire-Revised Short Scale (EPQ-RSS; Eysenck & Eysenck, 1991) and positive affectivity (PA) and negative affectivity (NA) were measured with Watson and Clarke's (1988) Positive and Negative Affectivity Schedule (PANAS). These variables were also included in a principal components analysis with RST traits to observe if composite 'avoidance' (i.e. r-BIS, o-BIS, FFFS, SP, NA, neuroticism) and 'approach' (i.e. BAS, Drive,

RR, SR, PA, extraversion) components would be found. A third composite component „control’ comprised of Eysenck’s psychoticism and Fun-S was also expected to be found. All of these components were then entered in a path analyses to observe if they predicted social anxiety.

The following hypotheses were examined:

H1: R-BIS and FFFS would positively correlate with both observation anxiety and interaction anxiety, with r-BIS exhibiting a stronger correlation with interaction anxiety and FFFS exhibiting a stronger correlation with observation anxiety.

H2: O-BIS and SP would correlate positively with both observation anxiety and interaction anxiety.

H3: BAS subscales and SR would not significantly correlate with either observation anxiety or interaction anxiety.

H4: Neuroticism, NA and the composite „avoidance’ component would positively correlate with both observation anxiety and interaction anxiety.

H5: Extraversion and PA would negatively correlate with both observation anxiety and interaction anxiety.

H6: As previous findings are mixed, there were no specific predictions made about the relationships between the composite „approach’ and „control’ components with observation anxiety and interaction anxiety.

Method

Participants

The sample ($N = 200$) comprised of 150 females (75%) and 49 males (24.5%). Gender is unknown for one participant. Age ranged from 18 to 65 years ($M = 26.84$, $SD = 11.19$). The majority of participants were first year undergraduate psychology students recruited from the psychology participant pool in exchange for course credit at the University of Tasmania. Other participants were members of the general community who were individually approached and invited to participate. 86.5% of the sample identified themselves as Caucasian, 3.5% as Black, 4% as Asian, 2.5% as European and 2% as Other. Regarding employment status, 23% were unemployed, 4% were seeking work, 37% were working on a casual basis, 13.5% were working part-time, 18% were working full-time and 1.5% were on a pension. The majority of participants were currently studying with 69.5% on a full-time basis and 13.5% on a part-time basis.

Measures

All participants completed a 45 minute questionnaire comprised of a demographics sheet and the following measures:

Behavioural Inhibition System/Behavioural Approach System Scale.

The Behavioural Inhibition System/Behavioural Approach System Scales (BIS/BAS Scales; Carver & White, 1994) is a 20-item self-report scale that measures BIS and BAS sensitivities. Each item is rated on a four-point Likert scale, ranging from 1 = strongly disagree to 4 = strongly agree. Higher scores indicate higher sensitivities.

The BIS scale comprises seven items (e.g. „Criticism or scolding hurts me quite a bit’). Scores range from 7 to 28. Research has shown that r-BIS and FFFS can be measured using separate subscales of the BIS scale (Heym et al., 2008) therefore these were used in order to examine r-BIS and FFFS separately. Good internal consistency for the BIS total

scale has been reported at $\alpha = 0.78$ (Carver & White, 1994) and $\alpha = 0.83$ (Cooper, Perkins, & Corr, 2007). The current study reports $\alpha = .79$ for o-BIS, $\alpha = .79$ for r-BIS and $\alpha = .46$ for FFFS.

The BAS scale comprises 13 items and three subscales. The Fun-S subscale measures the tendency to impulsively pursue enjoyment (e.g. „I crave excitement and new sensations’), the Drive subscale assesses motivation to approach goals (e.g. „I go out of my way to get what I want’) and the Reward Responsiveness (RR) subscale measures the degree of positive response to rewards (e.g. „When I get what I want, I feel excited and energised’). The BAS total score is calculated by totalling the three subscale scores and ranges from 13 to 52. Reliability coefficient alphas have been reported as 0.66 (Fun-S), 0.76 (Drive) and 0.73 (RR) (Carver & White, 1994; Gomez, Cooper, & Gomez, 2005; Heubeck, Wilkinson, & Cologon, 1998). The current study reports $\alpha = .84$ for BAS total, $\alpha = .77$ for RR, $\alpha = .82$ for Drive, and $\alpha = .72$ for Fun-S.

Sensitivity to Punishment and Sensitivity to Reward Questionnaire.

The Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ; Torrubia et al., 2001) is a 48-item scale that measures SP and SR and is also used as a scale to measure BIS and BAS. Items are answered in a dichotomous YES/NO format with YES scored as 1 and NO as 0 on each item. Higher scores indicate higher sensitivities. The SP scale score is derived by totalling scores of the odd-numbered items (e.g. „Are you afraid of new or unexpected situations?’) and the SR scale score, by totalling the even-numbered items (e.g. „Do you sometimes do things for quick gains?’). Reliability coefficient alphas have been reported at $\alpha = 0.84$ for the SP scale and 0.82 for the SR scale (Gomez & Cooper, 2008) and the scale has been shown to have good convergent and discriminant validity (Torrubia et al., 2001). The current study reports $\alpha = .85$ for SP and $\alpha = .78$ for SR.

Eysenck Personality Questionnaire-Revised Short Scale.

The Eysenck Personality Questionnaire-Revised Short Scale (EPQ-RSS; Eysenck & Eysenck, 1991) is a shortened version of the EPQ-R, the most recently developed version of the scale. It is a 48-item „yes/no’ (e.g. Are you a talkative person?) scale that measures three dimensions of personality: extraversion, neuroticism and psychoticism. It also includes a lie scale to detect if respondents attempt to „fake good’. A score is calculated for each sub-scale. The scale has been shown to have adequate to good psychometric properties (Eysenck & Eysenck, 2003). The current study reports $\alpha = .86$ for extraversion, $\alpha = .83$ for neuroticism and $\alpha = .54$ for psychoticism.

Positive and Negative Affectivity Schedule.

The Positive and Negative Affectivity Scale (PANAS; Watson et al., 1988) consists of 20 word items (10 for negative affectivity (NA) and 10 for positive affectivity (PA)) that describe emotions or feelings (e. g. „distressed’ (NA) and „excited’ (PA)). Respondents were required to indicate the extent (1 = very slightly or not at all to 5 = extremely) to which they generally felt these emotions on an average day. Strong psychometric properties of the PANAS have been well-established (DePaoli & Sweeney, 2000; Melvin & Molloy, 2000). Reliability coefficient alphas have been reported to range from .84 to .87 for NA and .84 to .90 for PA (Melvin & Molloy, 2000; Watson et al., 1988) and the scale has been reported to have good convergent and discriminant validity (DePaoli & Sweeney, 2000; Melvin & Molloy, 2000). The current study reports $\alpha = .89$ for NA and $\alpha = .87$ for PA.

Social Interaction Anxiety Scale and Social Phobia Scale.

The Social Interaction Anxiety and the Social Phobia Scales (SIAS, SPS; Mattick & Clarke, 1989) are companion scales designed to measure social anxiety. The SIAS measures interaction anxiety (e.g. „I worry about expressing myself in case I appear awkward’) and the SPS measures observation anxiety or performing tasks in front of others (e.g. „I feel self-

conscious if I have to enter a room where others are already seated’). They are both 20-item scales on a five-point Likert scale (0 = Not at all characteristic of me to 4 = Extremely characteristic of me). Total scores range from 0 to 80 for both scales. Higher scores indicate higher anxiety. Both scales have been shown to have good reliability and validity (Brown et al., 1997; Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992; Mattick & Clarke, 1998). The current study reports $\alpha = .88$ for SIAS and $\alpha = .93$ for SPS.

Demographics.

A demographics sheet consisted of items pertaining to participant’s sex, age in years, relationship status, ethnicity, employment status, and studying status.

Procedure

The study was approved by the Human Research Ethics Committee (Tasmania) Network. Participants from the first year psychology participant pool were invited to participate in the research. Questionnaires were picked up at psychology reception and were returned either via university internal mail or a return-box left at reception. Members of the general community were directly approached by the chief investigator and invited to participate. Questionnaires were returned via post in the attached reply-paid envelope. All questionnaires included an information sheet (see Appendix A) and were completed anonymously.

Statistical Analyses

A series of hierarchical regressions were conducted to determine if personality variables predicted observation anxiety and interaction anxiety, after controlling for the effects of gender. Regression analyses were performed separately for each of the four personality measures. For the BIS/BAS scale, two separate regressions were performed with one regression entering BIS total as a predictor in the equation, and the other entering BIS anxiety and BIS fear in the equation as separate predictors. Therefore, a total of ten regressions (five

for observation anxiety and five for interaction anxiety) were performed. In each regression, gender was entered in the first step as previous studies suggest that social anxiety is more common amongst women (Kessler et al., 1994; Offord et al., 1996). Personality variables were entered in the second step. A principal components analysis was then conducted with all personality variables to observe if personality variables loaded onto expected components: „avoidance’ (i.e. r-BIS, o-BIS, FFFS, SP, NA, neuroticism), „approach’ (i.e. BAS, Drive, RR, SR, PA, extraversion) and „control’ (psychoticism and Fun-S). These composite components were then entered in a path analyses to observe if they predicted observation and interaction anxiety.

Results

All statistical analyses were undertaken using SPSS 18.0 for Windows. Prior to conducting regression analyses, all variables were examined for accuracy of data entry, missing values, and fit between their distributions and their requisite assumptions for multiple regression analyses. No patterns were identified in the missing data and it was determined that missing values were randomly dispersed among the variables. Missing data for the quantitative variables in the regression analyses were treated using the Expectation Maximisation (EM) method.

Examination of z-scores revealed a univariate outlier for age, one for BIS, two for NA, three for SPS, two for SIAS, and one for psychoticism. NA, age, gender were found to be skewed, and SPS was both skewed and had high kurtosis. Curran, West and Finch (1996) recommend that moderate deviations from normality fall into skewness values between 2 and 3, and kurtosis values between 7 and 21. All variables had values well below the values defined as non normal, and thus retained in all subsequent data analyses.

A preliminary multiple regression analysis was conducted, first, with the original NA, age, gender, SPS and ethnicity, and then with these variables transformed to determine

whether the two analyses would produce similar or different results (Tabachnick & Fidell, 2001). Transformation of the variables did not make a significant difference and for the sake of easier interpretation (Tabachnick & Fidell, 2001) and because the sample was large (>100) (Tabachnick & Fidell, 2001), the original variables were retained for all subsequent analyses. Using $p < .001$ criterion for Mahalanobis distance, two cases, having a value greater than 51.18, were identified as multivariate outliers. Examination of the scale values indicated that the cases were representative of the intended population and a Cook's Distance less than 1 indicated that the cases were not influential. Therefore, as recommended by Cook and Weisberg (1982) and Stevens (1996), the cases were retained in the analyses.

Examination of the normal probability plots, residual scatter plots of residuals (and partial residual scatter plots of residuals) against predicted social anxiety scores demonstrated that (a) residuals were normally distributed, (b) the residuals evidenced a straight line relationship with predicted social anxiety scores and (c) the variance of the residuals about social anxiety scores was the same across all values of the predicted scores. The residual (and partial residual) scatter plots therefore indicated that the assumptions of linearity, normality and homoscedasticity had not been violated (Tabachnick & Fidell, 2001). Collinearity tolerance diagnostics revealed no multi-collinearity and singularity, and suppressor variables were not found. Alpha levels were set at $p < 0.05$. Table 2 presents the descriptives of social anxiety and all personality variables.

Partial correlations (controlling for gender) are shown in Table 3. Observation anxiety positively correlated with BIS anxiety, BIS fear, SP, NA, and Neuroticism and negatively correlated with Fun-S, PA, and Extraversion. For interaction anxiety, a similar pattern of results was observed, that is, interaction anxiety also positively correlated with BIS anxiety, BIS fear, SP, NA, and Neuroticism, and negatively correlated with Fun-S, PA, and Extraversion.

Table 2

Descriptives of Observation Anxiety, Interaction Anxiety and all Personality Variables.

Variable	Scale Range	Mean (SD)	Skewness	Kurtosis
OA	0-80	17.31 (13.40)	1.38	3.04
IA	0-80	23.68 (13.23)	.90	.91
BIS Total	7-28	20.47 (3.24)	-.27	.44
BIS Anxiety	5-20	14.74 (2.52)	-.50	.95
BIS Fear	2-8	5.74 (1.18)	-.00	-.11
BAS Total	13-52	37.24 (4.99)	.29	.54
Fun-S	4-16	11.05 (2.05)	.14	-.05
Drive	5-20	9.87 (2.22)	.51	.11
RR	4-16	16.33 (2.17)	-.28	-.22
SP	0-24	12.38 (5.45)	-.08	-.76
SR	0-24	10.04 (4.39)	.17	-.48
NA	10-50	17.62 (6.60)	1.39	2.08
PA	10-50	30.30 (6.90)	-.02	-.36
E	0-12	7.61 (3.46)	-.53	-.74
N	0-12	6.02 (3.57)	.05	-1.17
P	0-12	2.29 (1.81)	.86	.47

Note: OA = Observation Anxiety; IA = Interaction Anxiety; BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; Fun-S = Fun Seeking; RR = Reward Responsiveness; SP = Sensitivity to Punishment; SR = Sensitivity to Reward; NA = Negative Affectivity; PA = Positive Affectivity; E = Extraversion; N = Neuroticism; P = Psychoticism

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

Table 4 presents the results of the regression analyses of observation anxiety on all personality variables. Gender was a significant predictor of observation anxiety in all five regressions. In the first regression, observation anxiety was positively predicted by BIS anxiety and BIS fear and negatively predicted by Fun-S. Similarly, BIS total positively predicted observation anxiety and Fun-S negatively predicted observation anxiety in the second regression. In the third regression, SP was a positive predictor while SR appeared to

Table 3

Partial Correlations (controlling for Gender) between Observation Anxiety and Interaction Anxiety and all Personality Variables.

Personality Variable	OA	IA
BIS Total	.46***	.44***
BIS Anxiety	.42***	.43***
BIS Fear	.33***	.29***
BAS Total	-.13	-.16*
Fun-S	-.24**	-.21**
Drive	-.06	-.12
RR	-.01	-.05
SP	.67***	.69***
SR	.10	.10
NA	.58***	.55***
PA	-.28***	-.37***
E	-.38***	-.62***
N	.51***	.51***
P	-.04	-.06

Note: OA = Observation Anxiety; IA = Interaction Anxiety; BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; Fun-S = Fun Seeking; RR = Reward Responsiveness; SP = Sensitivity to Punishment; SR = Sensitivity to Reward; NA = Negative Affectivity; PA = Positive Affectivity; E = Extraversion; N = Neuroticism; P = Psychoticism

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

have no significant effect. As expected, NA and Neuroticism positively predicted observation anxiety, and PA and Extraversion negatively predicted observation anxiety.

For interaction anxiety, gender was not a significant predictor in any of the regressions. With the exception of BIS fear, which was not a significant predictor of interaction anxiety, a similar pattern of results was found for the predictions of observation

anxiety. Interaction anxiety was positively predicted by BIS anxiety, BIS total, SP, NA and Neuroticism positively predicted interaction anxiety. Fun-S, PA, and Extraversion negatively predicted interaction anxiety. Table 5 presents the regression analyses results for interaction anxiety.

Table 4

Regression Analyses Results of Observation Anxiety on all Personality Variables.

Variable	<i>Adj R²</i>	<i>ΔR²</i>	<i>B</i>	<i>SE</i>	<i>β</i>	<i>t</i>
<i>BIS/BAS scales (BIS Anxiety and BIS Fear examined separately)</i>						
<i>Step 1</i> Gender	.02	.03	4.86	2.18	.16*	2.23
<i>Step 2</i> BIS Anxiety	.25	.25	2.00	.38	.38***	5.22
BIS Fear			1.94	.81	.17*	2.41
Fun-S			-1.33	.45	-.20**	-2.98
Drive			-.06	.45	-.01	-.14
RR			-.18	.46	-.03	-.40
<i>BIS/BAS scales (BIS Total examined)</i>						
<i>Step 1</i> Gender	.02	.03	4.86	2.18	.16*	2.23
<i>Step 2</i> BIS Total	.25	.25	1.99	.28	.48***	7.19
Fun-S			-1.33	.45	-.20**	-2.99
Drive			-.07	.45	-.01	-.15
RR			-.18	.46	-.03	-.40
<i>Sensitivity to Punishment and Sensitivity to Reward Questionnaire</i>						
<i>Step 1</i> Gender	.03	.03	5.69	2.29	.18*	2.49
<i>Step 2</i> SP	.45	.43	1.67	.14	.67***	11.66
SR			-.03	.18	-.01	-.18
<i>Positive and Negative Affectivity Schedule</i>						
<i>Step 1</i> Gender	.02	.02	4.79	2.17	.16*	2.20
<i>Step 2</i> NA	.35	.34	1.09	.12	.54***	9.20
PA			-.32	.11	-.17**	-2.88

Eysenck's Personality Questionnaire

<i>Step 1</i> Gender	.02	.03	5.11	2.23	.16*	.25
<i>Step 2</i> E	.28	.27	-.92	.25	-.24***	-3.62
N			1.58	.26	.42***	6.16
P			.28	.47	.04	.61

Note: OA = Observation Anxiety; IA = Interaction Anxiety; BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; Fun-S = Fun Seeking; RR = Reward Responsiveness; SP = Sensitivity to Punishment; SR = Sensitivity to Reward; NA = Negative Affectivity; PA = Positive Affectivity; E = Extraversion; N = Neuroticism; P = Psychoticism

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

Table 5

Regression Analyses Results of Interaction Anxiety on all Personality Variables.

Variable	<i>Adj R</i> ²	ΔR^2	<i>B</i>	<i>SE</i>	β	<i>t</i>
<i>BIS/BAS scales (BIS Anxiety and BIS Fear examined separately)</i>						
<i>Step 1</i> Gender	-.01	.00	1.45	2.18	.05	.67
<i>Step 2</i> BIS Anxiety	.22	.25	2.17	.38	.42***	5.66
BIS Fear			1.49	.81	.13	1.84
Fun-S			-.93	.45	-.14*	-2.08
Drive			-.58	.45	-.10	-1.29
RR			-.36	.46	-.06	-.79
<i>BIS/BAS scales (BIS Total score examined)</i>						
<i>Step 1</i> Gender	-.00	.00	1.45	2.17	.05	.67
<i>Step 2</i> BIS Total	.23	.24	2.00	.28	.49***	7.21
Fun-S			-.93	.45	-.14*	-2.07
Drive			-.59	.45	-.10	-1.31
RR			-.33	.46	-.06	-.73
<i>Sensitivity to Punishment and Sensitivity to Reward Questionnaire</i>						
<i>Step 1</i> Gender	-.00	.00	1.87	2.29	.06	.82
<i>Step 2</i> SP	.46	.47	1.73	.14	.70***	12.37

SR			-.06	.17	-.02	-.35
<i>Positive and Negative Affectivity Schedule</i>						
Step 1 Gender	-.00	.00	1.42	2.17	.05	.66
Step 2 NA	.37	.38	1.02	.12	.51***	8.84
PA			-.53	.11	-.28***	-4.86
<i>Eysenck's Personality Questionnaire</i>						
Step 1 Gender	-.00	.00	1.46	2.23	.05	.66
Step 2 E	.47	.48	-1.90	.21	-.50***	-8.87
N			1.40	.22	.38***	6.45
P			.08	.40	.01	.21

Note: OA = Observation Anxiety; IA = Interaction Anxiety; BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; Fun-S = Fun Seeking; RR = Reward Responsiveness; SP = Sensitivity to Punishment; SR = Sensitivity to Reward; NA = Negative Affectivity; PA = Positive Affectivity; E = Extraversion; N = Neuroticism; P = Psychoticism

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

In order to better understand the relations between the personality dimensions, a principal components analysis (PCA), using principal axis factoring with oblique rotation, was conducted with all of the personality scales. The composite scores of the components were obtained by adding the z-scores of the variables comprising the components.

The results of the PCA are presented in Table 6. As can be seen, the PCA indicated three components with eigenvalues more than unity. BIS anxiety, BIS fear, BIS total, SP, NA and Neuroticism all positively loaded on the first components, reflecting Avoidance tendencies. Fun-S, Drive, RR, BAS total, SR, PA, and Extraversion all positively loaded onto the second component, reflecting Approach tendencies. Finally, Fun-S and psychoticism both positively loaded on the third component, reflecting control/impulsivity tendencies.

A path analysis was conducted (using *MPlus* software) to simultaneously determine if these components predicted observation anxiety and interaction anxiety. Maximum likelihood estimation was used. Gender was controlled as it was significantly associated with observation anxiety in the regression analyses. As can be seen in Figure 5, the findings

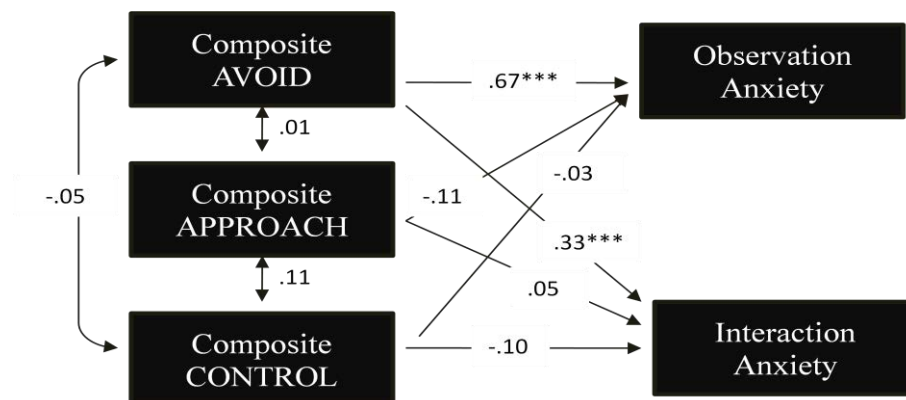
revealed that Avoidance was positively associated with both observation anxiety and interaction anxiety but that Approach and Control had no significant associations.

Table 6

Component Loadings of the Principal Components Analyses with all Personality Variables.

Scales	Component 1	Component 2	Component 3
BIS Anxiety	.80	.18	-.13
BIS Fear	.61	-.12	.25
Fun-S	-.03	.57	.55
Drive	.07	.73	.14
RR	.18	.74	-.20
SP	.85	-.19	-.21
SR	.39	.62	.31
NA	.76	.05	.16
PA	-.47	.45	-.14
E	-.40	.61	.01
N	.86	.02	-.01
P	-.15	-.02	.89

Note: OA = Observation Anxiety; IA = Interaction Anxiety; BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; Fun-S = Fun Seeking; RR = Reward Responsiveness; SP = Sensitivity to Punishment; SR = Sensitivity to Reward; NA = Negative Affectivity; PA = Positive Affectivity; E = Extraversion; N = Neuroticism; P = Psychoticism
Component names: 1 = Avoidance; 2 = Approach; and 3 = Control.
Component loadings $\geq .45$ are italicized



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

Figure 5. *Standardised coefficients for path model.*

Discussion

The aim of this study was to investigate the relationships between social anxiety and RST traits. For observation anxiety, BIS anxiety (r-BIS), BIS fear (FFFS), BIS total (o-BIS) and SP were significant positive predictors, as well as Neuroticism and NA and the composite avoidance component. Fun-S, PA and Extraversion negatively predicted observation anxiety. The same pattern of results was found for the predictions of interaction anxiety, with the exception of BIS fear, which was not a significant predictor of interaction anxiety.

BIS and Avoidance as Predictors of Social Anxiety

As expected, BIS and the other personality variables characterised by avoidance, as well as the composite avoidance component, positively predicted social anxiety. This is consistent with previous studies investigating BIS relationships with social anxiety (Coplan et al., 2006; Kashdan & Roberts, 2006; Kimbrel et al., 2008; Vervoot et al., 2010) and that BI is likely to be the behavioural expression of the BIS (Fox et al., 2005; Gray & McNaughton, 2000; Kimbrel, 2008). These results are also not surprising given that social anxiety is maintained by avoidance behaviour (Clark & Beck, 2010). Further, FFFS significantly predicted observation anxiety but not interaction anxiety. Although the correlation between FFFS and observation anxiety was relatively small, it is consistent with the idea that observation anxiety, more than interaction anxiety, is comparable to panic and phobia profiles (Craske, 1991; Hook & Valentiner, 2002; Lundh & Öst, 1997).

BAS and Approach as Predictors of Social Anxiety

The fact that most of the BAS variables did not predict social anxiety is consistent with most previous research on the relationships between social anxiety and BAS (Kashdan & Roberts, 2006; Kimbrel et al., 2008; Vervoot et al., 2010). According to these results, it appears that BAS overall is not related to social anxiety. Also consistent with previous research, PA

(Watson et al., 1988) and Extraversion (Bienvenu et al., 2001; Trull & Sher, 1994) were significant predictors of social anxiety. Although PA and Extraversion are conceptually similar and correlate positively with the BAS (Elliot & Thrash, 2010), they differ from BAS in that they specifically reflect approach tendencies of a social nature while BAS reflects more general approach behaviours, including impulsivity. This may explain why BAS overall does not appear to be related to social anxiety, as measured by both the BIS/BAS Scale and the SPSRQ. Social anxiety would be expected to relate to low levels of social approach tendencies but not necessarily to low sensitivity to reward in general. For example, it is more easily conceivable that an individual can have high social anxiety without this necessarily impacting on his or her general drive or reward-responsiveness.

Control as a Predictor of Social Anxiety

Fun-S was the only BAS subscale that correlated (negatively) with social anxiety. If Fun-S is taken to be a measure of impulsivity, this result is not surprising given that the prototypical personality of social anxiety is characterised by low impulsivity and high control.

Interestingly, psychoticism did not predict social anxiety which might not be expected given that it is also a measure of control/impulsivity (Eysenck, 1947, 1967; Eysenck & Eysenck, 1975; Eysenck & Eysenck, 1976) and that it loaded on the control component in the present study. However, the psychoticism construct also encapsulates more than impulsivity as it also reflects low agreeableness and antisocial behaviour. This could explain why it did not significantly correlate with social anxiety while Fun-S was a significant predictor. The composite control component also did not predict social anxiety. It is noteworthy that r-BIS (which can be conceptualised as a measure of control, according to its proposed function as a conflict-resolver in revised RST) did not load strongly on the control component. This would suggest that it may be more appropriately conceptualised as an avoidance/threat perception system, as consistent with the o-BIS, rather than as a control mechanism.

SSH or JSH?

These results of the current study are consistent with the SSH, that is, BIS and BAS do not have interdependent effects on social anxiety. While this is consistent with the majority of studies finding support for the SSH (Gomez & Cooper, 2008), this does not support Corr's (2004) argument that the JSH is more applicable in community samples when BIS/BAS levels are less extreme and when there are combinations of threat and reward in the environment (as often the case in social anxiety contexts). It should be noted that high social anxiety would be expected to be more common amongst younger adults (mean age of current study = 26.84) compared with older adults (Davidson et al., 1994; Dell'Osso et al., 2003; Fehm et al., 2008).

Summary

In summary, a few conclusions can be drawn about the relationships between social anxiety and RST in the community. Firstly, the BIS and similar avoidance traits positively predicted both observation anxiety and interaction anxiety, with the FFFS possibly having a stronger relationship with observation anxiety. Secondly, the BAS overall does not appear to be related to social anxiety while Fun-S, a measure of impulsivity/control, appears to be relevant. Finally, these results are supportive of the SSH, that is, the BIS and BAS operate independently of one another in predicting social anxiety within a community population.

CHAPTER 5: STUDY 2

Investigating the Effects of Reinforcement Sensitivity Traits on Cognitive, Affective and Avoidance Responses to Induced Social Anxiety

The results of Study 1 showed that social anxiety was positively related to the BIS (original and revised) and did not appear to be related to the BAS (with the exception of Fun-Seeking). This is consistent with most previous studies, which have all measured social anxiety on a trait level with questionnaires (i.e. trait tendencies of social anxiety). The present study investigates the relevance of RST traits to *states* of social anxiety as they are experienced. Examining responses that occur while the individual is in a state of anxiety permits a richer understanding of how RST traits may relate to the experience of social anxiety, beyond measuring general trait tendencies.

Reinforcement Sensitivity Theory Mood Induction Studies

Although no previous published studies have investigated state experiences of social anxiety with relation to RST traits, studies have investigated RST relationships with other emotional states, including general anxiety (Gomez & Cooper, 2008). Such studies have used procedures to deliberately induce mood including a variety of techniques, such as performance tasks, imagery activities and autobiographical recall of past events. As discussed in Chapter 2, Gomez and Cooper (2008) conducted a major review of these studies and concluded that overall, BIS and BAS positively relate to negative emotions (e.g. anxiety, frustration) and positive emotions (e.g. happy) respectively. It appears that RST trait sensitivities can influence the tendency to generally experience positive and negative moods/emotions. Gomez and Cooper also concluded that studies were more supportive of the

Separate Subsystems Hypothesis (SSH, as discussed in Chapters 1 and 2), that is, that BIS and BAS appear to function independently in predicting mood states.

Reinforcement Sensitivity Cognitive Model of Psychopathology

As discussed in Chapter 2, Gomez and Cooper (2008) concluded in their review that cognitive variables may mediate the relationships between BIS/BAS and emotions. This proposal was based on studies showing that BIS traits appear to relate positively with unpleasant emotional information processing and that BAS traits relate positively with pleasant emotional information processing (e.g. Amin et al., 2004; Gomez & Gomez, 2002). This is consistent with previous theory and research suggesting that individuals cognitively process stimuli that is congruent with their emotions (Bower, 1981, 1991; Rusting, 1998). As such, when individuals experience strong levels of emotions, they are likely to be more biased in their abilities to attend to, recall and interpret stimuli, compared to when they may be experiencing weaker levels of emotions.

It was discussed in Chapter 2 that the revised BIS (r-BIS) is proposed to have a negative bias towards processing threatening stimuli as a result of its close associations with the FFFS and its function as a conflict-resolver (Gray & McNaughton, 2000; McNaughton & Corr, 2004). Gomez and Cooper (2008) consequently developed the Reinforcement Sensitivity Theory Cognitive Model of Psychopathology (also described in Chapter 2, see Figure 3), which illustrate how the r-BIS may be fundamentally responsible for the negative biases that characterise psychopathology. The model suggests that particularly when there are strong negative stimuli present, an over-active r-BIS can directly enhance BIS-congruent beliefs and schemas, which lead to a cycle of biased thoughts, emotions and behaviours. Alternatively, the r-BIS can directly stimulate activated unpleasant mood (depending on

certain neurological activations) which also lead to the same cycle of biased emotions, thoughts and behaviours.

Given that social anxiety is maintained by biased cognitions, emotions and behaviours (especially avoidance) (Beck, 1979; Clark & Beck, 2010), this model is particularly appropriate as a guiding framework for investigating responses to induced social anxiety and how they may relate to RST traits. As discussed in Chapter 3, a fundamental characteristic of social anxiety is a negative cognitive bias in attending to and processing cues in the social environment (Clark & Wells, 1995; Rapee & Heimberg, 1997). These negative cognitive biases function to support unhelpful (and often exaggerated) core beliefs that they will automatically be judged by others in a negative way, that they will embarrass themselves and/or sometimes that their anxiety will be visible to others (Clark & Wells, 1995). As a result, such individuals will often avoid feared social situations, which further perpetuate the anxiety over time. This cycle occurs for both types of social anxiety - observation anxiety and interaction anxiety (Hook & Valentiner, 2002; Turk et al., 2008), as discussed in Chapter 3 and Study 1.

The Present Study

The aim of the present study therefore was to investigate whether individual differences in RST traits relate to individual differences in cognitive, affective, and avoidance responses to a state of social anxiety. A state of social anxiety was induced in participants with an autobiographical mood induction procedure. Participants were asked to recall and re-experience in their minds a specific situation in which they had experienced social anxiety within the past 12 months. Cognitive, affective and avoidance responses to the induction were then rated on a questionnaire. For affective responses, individuals were asked to rate both levels of anxiety and fear separately, in order to observe if anxiety and fear relate

differently to RST traits. For cognitive responses, the degree to which participants endorsed four cognitions characteristic of social anxiety: fear of embarrassment (*I am going to do something embarrassing*), desire to leave/avoid the situation (*I want to exit/avoid/escape this situation*), perception of being judged negatively (*I am being judged by these people*) and visibility of their anxiety (*People can see that I feel anxious*). For avoidance responses, participants were asked whether firstly, they desired to avoid the situation regardless of whether they had that option and secondly, whether they actually avoided/exited the situation as a result of their anxiety. The nine RST traits that were used in Study 1 (i.e. r-BIS, FFFS, o-BIS, SP, BAS total, RR, Drive, Fun-S, SR), were also used in the present study.

Based on previous findings, the following hypotheses were made:

H1: It was predicted that r-BIS, FFFS, o-BIS (BIS total) and SP would positively predict post-induction scores for both anxiety and fear, with r-BIS exhibiting a stronger correlation with post-induction anxiety and FFFS exhibiting a stronger relationship with post-induction fear.

H2: It was predicted that r-BIS, FFFS, o-BIS and SP would positively predict all four post-induction cognition scores (*I am going to do something embarrassing*; *I want to exit/avoid/escape this situation*; *I am being judged by these people* and *People can see that I feel anxious*). It was further expected that *I want to exit/avoid/escape this situation* and *People can see that I feel anxious* cognitions would exhibit stronger correlations compared with the other two cognitions, given that these cognitions reflect BIS outputs: anxiety and avoidance.

H3: It was predicted that r-BIS, FFFS, o-BIS and SP would positively predict desire to avoid and actual avoidance.

H4: As previous findings are mixed, no specific predictions are made about BAS relationships with post-induction scores.

Method

Participants

The sample ($N=103$) comprised of 54 females (52.4%) and 49 males (47.6%) with ages ranging from 18 to 65 years ($M=30.22$, $SD=12.84$). Participants were either students recruited from the undergraduate participant pool at the University of Tasmania or members of the general community who were individually approached and invited to participate. 76.7% of the sample were Caucasian, 2.9% were of African descent, 18% were of Asian descent, and 2.9% were of European descent.

Materials

Three personality measures were administered to participants (refer to Study 1 for details about these measures):

Behavioural Inhibition System/Behavioural Approach System Scale. (BIS/BASS; Carver & White, 1994)

Sensitivity to Punishment and Sensitivity to Reward Questionnaire. (SPSRQ; Torrubia et al., 2001)

Neutral mood induction script.

The neutral mood induction script (see Appendix C) was pre-recorded on a voice-recording device by the primary investigator and played to the participant. The purpose of the script was to minimise any pre-experimental emotions the participant may have been feeling and was thus designed to elicit a minimal emotional response. It described an individual undertaking an everyday routine at home. The following instructions were given to the participant before the script was played:

“Please listen carefully and imagine yourself in the position of the person in the story. I would really like you to get totally immersed in the story and relive in your mind the feelings and thoughts that are going through the person in the story”.

Post-neutral mood induction scale.

The post-neutral mood induction scale (see Appendix D) measured participant’s emotions following the neutral mood induction. The purpose of the measure was to determine if the neutral mood induction was effective in minimising any heightened levels of pre-experimental emotions. The scaled contained six items pertaining to the emotions; shame, fear, sadness, happiness, anger and anxiety. Participants rated the degree to which they experienced each of the six emotions on a five-point Likert-scale ranging from 1= Not at all to 5= Extremely. A separate score for each emotion was obtained. Higher scores indicated stronger levels of the given emotion.

Post social anxiety induction questionnaire.

The post social anxiety induction questionnaire measured the responses of participants to the social anxiety induction procedure (refer to procedure below). The questionnaire included four sections. The first section measured affective responses and used identical items to the post neutral mood induction scale. The second section measured avoidance responses, that is, firstly whether the participant desired to avoid/exit the social situation regardless of whether they had that choice, and secondly whether they actually avoided the social situation. The third section measured cognitive responses. Participants were asked to rate the degree to which they endorsed four cognitions characteristic of social anxiety on four-point Likert scales (1 = Did not occur to 4 = Strong). Cognitions reflected fear of embarrassment (*I am going to do something embarrassing*), desire to leave/avoid the situation (*I want to exit/avoid/escape this situation*), perception of being judged negatively (*I am being judged by these people*) and visibility of their anxiety (*People can see that I feel anxious*). The fourth

section required participants to rate the level of difficulty (1 = Easy, 2 = Moderate, 3 = Difficult) they experienced in recalling the details of the event. This question was included in order to detect any confounding effects of recall.

Mental relaxation script.

Participants listened to a mental relaxation script (Nelson et al., 2005; see Appendix G) to neutralise any adverse effects that potentially occurred during the experiment. The script was also pre-recorded and played to the participant.

Post mental relaxation questionnaire.

In order to ensure that any adverse effects during the anxiety mood induction were neutralised, participants were asked to complete the post mental relaxation questionnaire (see Appendix H) after the relaxation procedure. It measured the degree to which participants were currently experiencing the six emotions measured in the post neutral mood induction scale, and again the same items were used.

Demographics sheet.

Participants provided demographic data including gender, age, and ethnicity.

Procedure

Participants were tested individually in either a laboratory at the University of Tasmania or another quiet room free from distractions. Upon arrival, the participant was presented with an information sheet (see Appendix B) and a consent form (see Appendix C), which was read and signed before the commencement of the testing.

There were four phases in the experimental procedure, which were undertaken in the following order: the questionnaire completion phase, neutral mood induction phase, social anxiety mood induction phase, and the relaxation phase.

In the questionnaire completion phase, participants completed the personality measures. This took participants an average of 15 minutes to complete.

In the neutral mood induction phase, participants listened to the neutral mood induction script and then completed the post neutral mood induction questionnaire. The neutral mood induction took approximately five minutes to complete.

In the social anxiety induction phase, participants undertook an autobiographical mood induction procedure, in which they were asked to recall a specific situation that had involved them experiencing some degree of social anxiety (within the past 12 months). Specific instructions (see Appendix E for more details) were given on how to do this, including the investigator clarifying the definition of social anxiety and asking participants to identify a few different events to ensure that they understood the nature of social anxiety. Participants were asked to spend a few minutes re-experiencing the situation in their minds, including recalling details of their cognition, emotions and behaviours at the time. This phase took approximately 5 minutes to complete.

Finally, in the relaxation phase, participants undertook a mental relaxation exercise by listening to the post mental relaxation script that was also pre-recorded (see Appendix G). Participants then completed the post mental relaxation questionnaire (see Appendix H). The idea was that if the participant scored a 4 or above, for any negative item/emotion (i.e., shame, fear, sadness, anger and anxious), the investigator would discuss the matter with the participant and provided information regarding other options for seeking assistance, or would offer to repeat the relaxation exercise. The relaxation phase took approximately 15 minutes.

Upon completion of the relaxation phase, participants were informed that all the necessary data had been collected and were debriefed with an explanation of the study.

Statistical Analyses

A series of hierarchical regressions were conducted to determine if RST variables predicted post-induction affect, cognition and avoidance scores. Regression analyses were performed separately for each of the eight dependent measures: post-induction anxiety and fear, the four cognitions, desire to avoid and actual (physical) avoidance. In each regression, gender and age were entered as initial control variables in Step 1, as previous research has shown that prevalence of anxiety are affected by these variables (Kessler et al., 1994; Offord et al., 1996). For the regressions predicting post-induction anxiety and post-induction fear, pre-induction anxiety and pre-induction fear, respectively, were also included as control variables in Step 2. RST variables were entered in subsequent steps.

Results

Prior to conducting regression analyses, all variables were examined for accuracy of data entry, missing values, and fit between their distributions and their requisite assumptions for multiple regression analyses. No patterns were identified in the missing data and it was determined that missing values were randomly dispersed among the variables. Most of the missing data in the regression analyses were treated using the Expectation Maximisation (EM) Method. One case was deleted from the data set as data was missing for the majority of variables for that case.

Examination of z-scores revealed univariate outliers for BAS D, pre-induction anxiety and pre-induction fear. NA, age, gender were found to be skewed, and SPS was found to be both skewed and have high kurtosis. Curran, West and Finch (1996) recommend that moderate deviations from normality is reflected by skewness values between 2 and 3, and kurtosis values between 7 and 21. All variables had values well below the values defined as non-normal, and thus retained in all subsequent data analyses.

A preliminary multiple regression analysis was conducted, first, with the original NA, age, gender, and SPS, and then with these variables transformed to determine whether the two analyses would produce similar or different results (Tabachnick & Fidell, 2001). Transformation of the variables did not make a significant difference and for the sake of easier interpretation (Tabachnick & Fidell, 2001) and because the sample was large (>100) (Tabachnick & Fidell, 2001), the original variables were retained for all subsequent analyses. Using $p < .001$ criterion for Mahalanobis distance, two cases, having a value greater than 51.18, were identified as multivariate outliers. Examination of the scale values indicated that the cases were representative of the intended population and a Cook's Distance less than 1 indicated that the cases were not influential. Therefore, as recommended by Cook and Weisberg (1982) and Stevens (1996), the cases were retained in the analysis.

Examination of the normal probability plots, residual scatter plots of residuals (and partial residual scatter plots of residuals) against predicted dependent variables demonstrated that (a) residuals were normally distributed, (b) the residuals evidenced a straight line relationship with dependent variables and (c) the variance of the residuals about dependent variables was the same across all values of the dependent variable scores. The residual (and partial residual) scatter plots therefore indicated that the assumptions of linearity, normality and homoscedasticity had not been violated (Tabachnick & Fidell, 2001). Collinearity tolerance diagnostics revealed no multi-collinearity and singularity, and suppressor variables were not found. Alpha levels were set at $p < 0.05$. Table 7 presents the scale ranges, means, standard deviations, skewness values, and kurtosis values for the study variables.

Table 7

Descriptives of Age, all Personality Variables, Pre-Induction Anxiety and Fear Scores, Post-Induction Anxiety and Fear Scores and Cognition Scores.

Variable	Scale Range	Mean (SD)	Skewness	Kurtosis
Age	-	30.22 (12.32)	1.24	.71
BIS Total	7-28	18.66 (1.96)	.01	-.67
BIS Anxiety	5-20	14.11 (2.17)	.19	-.19
BIS Fear	2-8	4.56 (1.02)	.18	-.22
BAS Total	13-52	36.86 (5.25)	.19	.08
Fun-S	4-16	11.02 (2.07)	.35	-.26
RR	5-20	15.96 (2.19)	-.41	-.27
Drive	4-16	10.83 (9.92)	9.20	89.77
SP	0-24	9.75 (5.12)	.41	-.47
SR	0-24	9.20 (4.33)	.30	-.52
Pre-Induction Anxiety	1-5	1.35 (0.68)	2.25	5.26
Pre-induction Fear	1-5	1.15 (0.48)	3.26	9.62
Post-Induction Anxiety	1-5	3.95 (0.86)	-.48	-.41
Post-induction Fear	1-5	3.05 (1.12)	-.14	-.87

Cognition: <i>I am going to do something embarrassing.</i>	1-4	2.57 (1.01)	-.16	-1.04
Cognition: <i>I want to leave/exit/escape this situation.</i>	1-4	2.45 (1.10)	.06	-1.32
Cognition: <i>I am being judged/evaluated negatively by these people.</i>	1-4	2.99 (0.96)	-.60	-.63
Cognition: <i>People can see that I feel anxious.</i>	1-4	2.99 (0.91)	-.55	-.52

Note: BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; Fun-S = Fun Seeking; RR = Reward Responsiveness; SP = Sensitivity to Punishment; SR = Sensitivity to Reward

Paired-samples t-tests were conducted between pre-induction and post-induction affect scores to determine if the mood-induction was effective. As can be seen in Table 8, the induction was effective in increasing scores from pre-induction to post-induction for all affect variables, except for happiness. If using Cohen's (1988) effect size criteria (0.2 to 0.3 as small, 0.5 as moderate and 0.8 and higher as large) Cohen's *d* effect sizes for anxiety and fear were large, whereas it was moderate for anger, and small for sadness.

Table 8

Descriptives and Paired-Sample T-Test Results of Pre-Induction and Post-induction Affect Scores.

Variable	Pre Induction Mean (<i>SD</i>)	Post Induction Mean (<i>SD</i>)	Post vs Pre <i>t</i> statistic (<i>df</i> =101)	Effect Size <i>d</i>	SE
Anxiety	1.35 (0.68)	3.95 (0.86)	-17.27***	1.71	0.16
Fear	1.15 (0.48)	3.05 (1.12)	-26.04***	2.58	0.21
Anger	1.18 (0.45)	1.71 (0.91)	-5.68***	0.56	0.11
Sadness	1.94 (1.03)	1.66 (0.92)	2.29*	0.23	0.10
Shame	1.18 (0.38)	2.71 (1.14)	-14.21***	1.41	0.14
Happiness	1.78 (0.45)	1.71 (0.91)	.76	0.08	0.10

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

Table 9 presents the partial correlations of the personality variables (independent variables) with all of the dependent measures of affect (post-induction anxiety and fear), all four cognitions, and avoidance (desire to avoid and actual avoidance). All partial correlations were controlled for age and gender, and post-induction anxiety was additionally controlled for pre-induction anxiety and post-induction fear was controlled for pre-induction fear.

Most of the significant correlations were with SP. SP had small positive correlations with post-induction fear, *I want to leave/exit/escape this situation* cognition, *I am being judged/evaluated negatively by these people* cognition and desire to avoid. Both BIS fear and BAS D correlated with *I am being judged/evaluated negatively by these people* cognition positively and negatively respectively. The other correlations were not significant.

Post-induction anxiety.

Table 10 presents the results of the regression analyses for post-induction anxiety, with gender and age entered in step 1, pre-induction anxiety in step 2 and personality variables in step 3, and the SP x SR interaction entered in step 4. As can be seen in Table 10, neither SP nor SR independently predicted induced social anxiety, however, there was a significant SP x SR interaction. Figure 6 below shows that SR moderated the relationship between SP and induced anxiety. For high levels of SR, the relationship between SP and induced anxiety was not influenced by SR. The regression coefficient for induced anxiety for high SR (+ 1 SD) at low (- 1 SD) and high (+ 1 SD) SP was not significant [$b = -0.01$, $t(df = 98) = -0.33$, $p > .05$]. However, for low levels of SR, the strength of the relationship between SP and induced anxiety increased with increased levels of SP. The regression coefficient for low SR (- 1 SD) at low and high SP was significant [$b = 0.07$, $t(df = 98) = 2.82$, $p < .05$]. The difference between the regression coefficients for high and low SR was also significant, [$t(df = 98) = 2.25$, $p < .05$]. As can also be seen in Table 10, none of the BIS/BAS variables significantly predicted post-induction anxiety.

Table 9

Partial Correlations of Personality Variables with Post-Induction Anxiety and Fear, Cognitions and Avoidance Scores.

	Affect		Cognitions				Avoidance	
	Post- Induction Anxiety	Post- Induction Fear	Cognition <i>I will embarrass myself</i>	Cognition <i>I want to leave/exit</i>	Cognition <i>People are judging</i>	Cognition <i>People can see my anxiety</i>	Actual Avoidance	Desire Avoid
BIS	.11	.09	.02	.09	-.07	.04	.02	.04
Total								
BIS	.14	.13	.03	.14	.04	.13	.02	.10
Anxiety								
BIS	.11	.11	.02	.13	.23*	.20	-.01	.13
Fear								
BAS	-.03	-.10	-.04	-.14	.01	-.13	.05	-.03
Total								
Fun-S	.06	.02	.02	-.14	.15	-.07	-.06	-.11
RR	.01	-.04	.05	-.07	-.00	.02	-.03	-.02
Drive	-.03	-.16	-.10	-.16	-.23*	-.19	.01	-.07
SP	.18	.26*	.13	.29**	.09	.29**	.13	.21*
SR	.12	.07	.05	.03	.10	.02	-.09	-.10

Note. BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; Fun-S = Fun Seeking; RR = Reward Responsiveness; SP = Sensitivity to Punishment; SR = Sensitivity to Reward

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

For Affect, partial correlations are controlled for age, gender, pre-induction anxiety (for post-induction anxiety) and pre-induction fear (for post-induction fear).

For Cognitions and Avoidance, partial correlations are controlled for age and gender.

Post-induction fear.

Table 11 presents the results of the regression analyses for post-induction fear. It shows that age predicted post-induction fear, and that SP also significantly predicted post-induction fear, accounting for additional variance in step 3. None of the BIS/BAS variables predicted post-induction fear.

Cognition: I am going to do something embarrassing.

Table 12 presents the results of the regression analyses for *I am going to do something embarrassing* cognition. Gender and age were entered as control variables in step 1 before personality variables. None of the predictors were significant.

Cognition: I want to leave/exit/escape this situation.

Table 13 presents the results of the regression analyses for *I want to leave/exit/escape this situation* cognition. It shows that SP significantly predicted this cognition and that none of the BIS/BAS variables were significant predictors.

Cognition: I am being judge/evaluated negatively by these people.

Table 14 presents the results of the regression analyses for *I am being judge/evaluated negatively by these people* cognition. It shows that BIS fear, Drive and Fun-S were significant predictors. Neither SP nor SR were significant predictors.

Cognition: People can see that I feel anxious

Table 15 presents the results of the regression analyses for *People can see that I feel anxious* cognition. It shows that SP significantly predicted this cognition. None of the BIS/BAS variables were significant predictors.

Table 10

*Regression Analyses of Personality Variables as Predictors of Post- Induction Anxiety
Controlling for Gender, Age and Pre-Induction Anxiety.*

Variable	<i>Adj R²</i>	<i>ΔR²</i>	<i>β</i>	<i>t</i>
<i>Sensitivity to Punishment and Sensitivity to Reward Questionnaire</i>				
<i>Step 1</i>	.01	.03		
Gender			.09	.92
Age			-.13	-1.27
<i>Step 2</i>	.02	.02		
Pre Anxiety			.15	1.45
<i>Step 3</i>	.04	.04		
SP			.18	1.75
SR			.11	1.05
<i>Step 4</i>	.08	.05*		
SP x SR			-.23	-2.32*
<i>BIS/BAS Scales</i>				
<i>Step 1</i>	.01	.03		
Gender			.09	.92
Age			-.13	-1.27
<i>Step 2</i>	.02	.02		
Pre Anxiety			.15	1.45
<i>Step 3</i>	.00	.03		
BIS Anxiety			.15	1.30
BIS Fear			.06	.51
RR			-.04	-.33
Drive			-.04	-.40
Fun-S			.12	1.03

Note: β = Standardised beta coefficients from the final step of the regression equation;
 BIS = Behavioural Inhibition System; BAS = Behavioural Approach System;
 RR = Reward responsiveness; Fun-S = Fun Seeking; SP = Sensitivity to Punishment;
 SR = Sensitivity to Reward

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

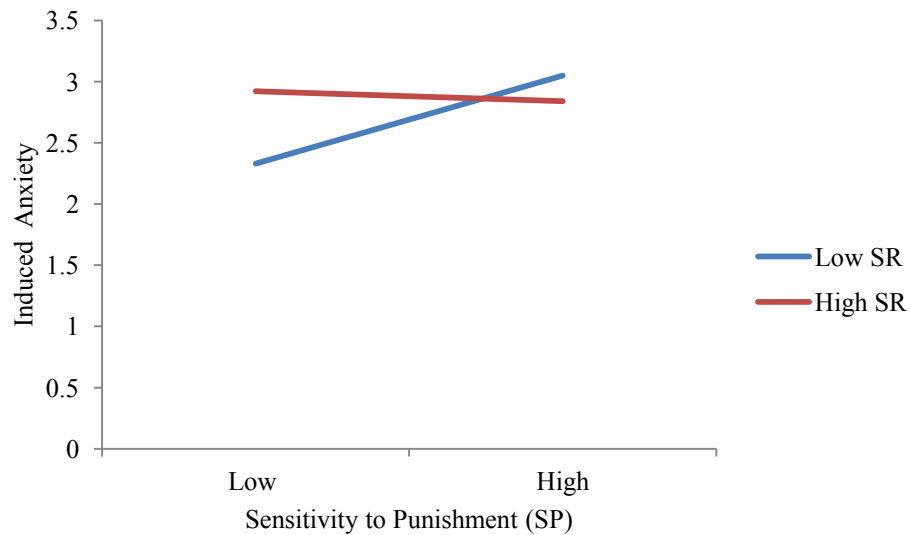


Figure 6. Sensitivity to reward moderating the relationship between sensitivity to punishment and induced anxiety.

Behavioural avoidance.

Table 16 presents the results of the regression analyses for behavioural avoidance. None of the predictors were significant.

Desire to avoid.

Table 17 presents the results of the regression analyses for desire to avoid. SP was the only significant personality predictor.

Table 11

*Regression Analyses of Personality Variables as Predictors of Post-Induction Fear**Controlling for Gender, Age and Pre-Induction Fear.*

Variable	<i>Adj R</i> ²	ΔR^2	β	<i>t</i>
<i>Sensitivity to Punishment and Sensitivity to Reward Questionnaire</i>				
<i>Step 1</i>	.08	.10**		
Gender			.16	1.62
Age			-.26	-2.73**
<i>Step 2</i>	.10	.03		
Pre Fear			.15	1.54
<i>Step 3</i>	.15	.06*		
SP			.25	2.60*
SR			.04	.41
<i>Step 4</i>	.14	.00		
SP x SR			-.05	-.54
<i>BIS/BAS Scales</i>				
<i>Step 1</i>	.08	.10**		
Gender			.16	1.62
Age			-.26	-2.73**
<i>Step 2</i>	.10	.03		
Pre Fear			.15	1.54
<i>Step 3</i>	.11	.05		
BIS Anxiety			.15	1.34
BIS Fear			.04	.36
RR			-.08	-.68
Drive			-.17	-1.71
Fun-S			.08	.70

Note: β = Standardised beta coefficients from the final step of the regression equation; BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; RR = Reward responsiveness; Fun-S = Fun Seeking; SP = Sensitivity to Punishment; SR = Sensitivity to Reward.

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

Table 12

Regression Analyses of Personality Variables (Controlling for Gender and Age) as

Predictors of Cognition 'I am going to do something embarrassing'.

Variable	<i>Adj R²</i>	<i>ΔR²</i>	<i>β</i>	<i>t</i>
<i>Sensitivity to Punishment and Sensitivity to Reward Questionnaire</i>				
<i>Step 1</i>	.05	.07*		
Gender			.03	.29
Age			-.26	-2.72**
<i>Step 2</i>	.05	.02		
SP			.13	1.26
SR			.04	.37
<i>BIS/BAS Scales</i>				
<i>Step 1</i>	.05	.07*		
Gender			.03	.29
Age			-.26	-2.72**
<i>Step 2</i>	.02	.01		
BIS Anxiety			.05	.39
BIS Fear			-.00	-.02
RR			.03	.27
Drive			-.10	-.97
Fun-S			.02	.13

Note: β = Standardised beta coefficients from the final step of the regression equation; BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; RR = Reward responsiveness; Fun-S = Fun Seeking; SP = Sensitivity to Punishment; SR = Sensitivity to Reward.

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

Table 13

Regression Analyses of Personality Variables (Controlling for Gender and Age) as Predictors of Cognition 'I want to leave/exit/escape this situation'.

Variable	<i>Adj R²</i>	<i>ΔR²</i>	<i>β</i>	<i>t</i>
<i>Sensitivity to Punishment and Sensitivity to Reward Questionnaire</i>				
<i>Step 1</i>	.01	.03		
Gender			.04	.37
Age			-.17	-1.74
<i>Step 2</i>	.08	.08*		
SP			.30	3.01**
SR			.01	.13
<i>BIS/BAS Scales</i>				
<i>Step 1</i>	.01	.03		
Gender			.04	.37
Age			-.17	-1.74
<i>Step 2</i>	.03	.07		
BIS Anxiety			.13	1.10
BIS Fear			.04	.35
RR			-.04	-.37
Drive			-.18	-1.83
Fun-S			-.11	.90

Note: β = Standardised beta coefficients from the final step of the regression equation; BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; RR = Reward responsiveness; Fun-S = Fun Seeking; SP = Sensitivity to Punishment; SR = Sensitivity to Reward.
 *** $p < .001$, ** $p < .01$, * $p < .05$

Table 14

Regression Analyses of Personality Variables (Controlling for Gender and Age) as Predictors of Cognition 'I am being judged/evaluated negatively by these people.'

Variable	<i>Adj R²</i>	<i>ΔR²</i>	<i>β</i>	<i>t</i>
<i>Sensitivity to Punishment and Sensitivity to Reward Questionnaire</i>				
<i>Step 1</i>	.01	.03		
Gender			-.07	-.68
Age			-.16	-1.59
<i>Step 2</i>	.01	.02		
SP			.09	.83
SR			.10	.95
<i>BIS/BAS Scales</i>				
<i>Step 1</i>	.01	.03		
Gender			-.07	-.68
Age			-.16	-1.59
<i>Step 2</i>	.10	.13*		
BIS Anxiety			.02	.22
BIS Fear			.26	2.30*
RR			-.08	-.69
Drive			-.21	-2.11*
Fun-S			.203	.90*

Note: β = Standardised beta coefficients from the final step of the regression equation; BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; RR = Reward responsiveness; Fun-S = Fun Seeking; SP = Sensitivity to Punishment; SR = Sensitivity to Reward.

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

Table 15

Regression Analyses of Personality Variables (Controlling for Gender and Age) as Predictors of Cognition 'People can see that I feel anxious'.

Variable	<i>Adj R²</i>	<i>ΔR²</i>	<i>β</i>	<i>t</i>
<i>Sensitivity to Punishment and Sensitivity to Reward Questionnaire</i>				
<i>Step 1</i>	.10	.12**		
Gender			.11	.26
Age			-.31	-3.29**
<i>Step 2</i>	.16	.08*		
SP			.29	3.00**
SR			-.00	-.02
<i>BIS/BAS Scales</i>				
<i>Step 1</i>	.10	.12**		
Gender			.11	.26
Age			-.31	-3.29**
<i>Step 2</i>	.13	.07		
BIS Anxiety			.07	.64
BIS Fear			.15	1.34
RR			.04	.36
Drive			-.18	-2.11
Fun-S			-.05	-.45

Note: β = Standardised beta coefficients from the final step of the regression equation; BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; RR = Reward responsiveness; Fun-S = Fun Seeking; SP = Sensitivity to Punishment; SR = Sensitivity to Reward.

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

Table 16

Regression Analyses of Personality Variables (Controlling for Gender and Age) as Predictors of Behavioural Avoidance.

Variables	<i>Adj R²</i>	<i>ΔR²</i>	<i>β</i>	<i>t</i>
<i>Sensitivity to Punishment and Sensitivity to Reward Questionnaire</i>				
<i>Step 1</i>	.00	.02		
Gender			.15	1.49
Age			-.04	-.37
<i>Step 2</i>	.00	.03		
SP			.14	1.34
SR			-.11	-.99
<i>BIS/BAS Scales</i>				
<i>Step 1</i>	.00	.02		
Gender			.15	1.49
Age			-.04	-.37
<i>Step 2</i>	-.05	.00		
BIS Anxiety			.02	.13
BIS Fear			-.03	-.21
RR			-.01	-.11
Drive			.00	.00
Fun-S			-.06	-.48

Note: β = Standardised beta coefficients from the final step of the regression equation; BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; RR = Reward responsiveness; Fun-S = Fun Seeking; SP = Sensitivity to Punishment; SR = Sensitivity to Reward.

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

Table 17

Regression Analyses of Personality Variables (Controlling for Gender and Age) as Predictors of Desire to Avoid.

Variable	<i>Adj R²</i>	<i>ΔR²</i>	<i>β</i>	<i>t</i>
<i>Sensitivity to Punishment and Sensitivity to Reward Questionnaire</i>				
<i>Step 1</i>	.01	.03		
Gender			-.01	-.07
Age			-.17	-1.66
<i>Step 2</i>	.05	.06		
SP			.23	2.23*
SR			-.12	-1.16
<i>BIS/BAS Scales</i>				
<i>Step 1</i>	.01	.03		
Gender			-.01	-.07
Age			-.17	-1.66
<i>Step 2</i>	-.01	.03		
BIS Anxiety			.04	.37
BIS Fear			.10	.83
RR			.02	.14
Drive			-.07	-.69
Fun-S			-.09	-.74

Note: β = Standardised beta coefficients from the final step of the regression equation; BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; RR = Reward responsiveness; Fun-S = Fun Seeking; SP = Sensitivity to Punishment; SR = Sensitivity to Reward.
 *** $p < .001$, ** $p < .01$, * $p < .05$

Discussion

The aim of the present study was to investigate whether individual differences in BIS and BAS sensitivities relate to individual differences in cognitive, affective and avoidance responses to an induced state of social anxiety. For affective responses, SP positively and independently predicted post-induction fear and SP interacted with SR to positively predict post-induction anxiety. For cognitive responses, *I want to leave/exit/escape this situation* and *People can see that I feel anxious* were both positively predicted by SP and *I am being judged/evaluated negatively by these people* was positively predicted by BIS Fear (FFFS) and Fun-S, and negatively predicted by Drive. For avoidance responses, desire to avoid was positively predicted by SP.

Affect: Fear and Anxiety

The fact that SP positively predicted fear is consistent with previous research that BIS is positively related to negative mood (Gomez & Cooper, 2008). It is surprising that SP did not also independently predict anxiety, although the coefficient was almost significant ($p = .07$). Given that SP interacted with SR to predict anxiety, it appears that the effects of SP on state social anxiety are particularly strong when the individual also has a low SR. This is consistent with theory suggesting that having a low BAS can act as risk factor for developing social anxiety and/or that having a high BAS can act as a protecting factor (Kimbrel, 2008). This result is also consistent with the JSH (Corr, 2002) that the BIS and BAS can interact under certain conditions when predicting emotions. This includes when situations contain both appetitive and aversive stimuli and indeed a need for rapid attentional and behavioural shifts between aversive and appetitive stimuli (Avila, 2001).

The fact that SR interacted with SP to predict social anxiety makes sense as social anxiety frequently involves co-occurring withdrawal and approach tendencies, that is, the simultaneous desires to both avoid social situations yet make social connections. Individuals

with approach tendencies may also feel less anxious as a result of endorsing BAS-related cognitions, for example, by reminding themselves of the potential social rewards. This is also consistent with theory that BAS individuals are better able to disengage from aversive stimuli after they have been detected (Avila & Torrubia, 2008). Consequently, such individuals are better able to cope with social situations, even if they are feeling anxious. This conflict in goals is also more apparent when individuals experience social „anxiety’ as compared with when individuals experience social „fear’, which is more often characterised by a sole desire to avoid (Hofmann, 2000; Hook & Valentiner, 2002). This is consistent with the fact that SR did not significantly predict fear.

On the other hand, it is interesting that most previous studies (and Study 1) suggest that BAS is not related with social anxiety at all (Kashdan & Roberts, 2006; Kimbrel et al., 2008; Vervoot et al., 2010). This inconsistency may be explained by the fact that previous studies use measures of trait tendencies while this study measured responses to states of social anxiety. Standard measures of social anxiety used in previous studies aim to capture general severity levels of social anxiety whereas the current study measured responses to a specific social situation. The social situations that were included in the study were also more likely to be situations that the individual desired to overcome and of which they had a personal investment in, despite their anxiety about it (e.g. dance recital, course oral presentation). However, these social incentive elements are less likely to be captured when measuring social anxiety with trait questionnaires that are used in previous studies.

Cognitions

The fact that SP predicted *I want to exit/avoid/leave this situation* and *People can see that I feel anxious* is consistent with the fact that the themes of these cognitions (anxiety and avoidance) reflect the outputs of the BIS. The fact that the other two cognitions *I am being judged/evaluated negatively* and *I am going to embarrass myself* were not predicted by SP

may be because they are less central to BIS outputs and also because these cognitions may be less relevant for individuals in the community with normal levels of social anxiety. In other words, individuals with normal levels of social anxiety may still experience social anxiety even while not strongly endorsing beliefs that they are going to embarrass themselves or be judged negatively, whereas individuals with clinical levels of social anxiety are more likely to hold these beliefs more strongly. On the other hand, cognitions reflecting desires to avoid and the concern that people can see their anxiety are more objective and widely held across normal and clinical levels of social anxiety.

I am being judged/evaluated negatively by these people was also positively predicted by FFFS, which is consistent with research suggesting that observation anxiety is closely associated with fear (Hook & Valentiner, 2002). Fun-S was also a significant positive predictor which may be interpreted in two ways. On the one hand, this finding might be surprising given that impulsive tendencies would theoretically be negatively related with concerns about negative judgement. However, it might also be explained by the fact that individuals with high Fun-S tendencies are also more likely to undertake risky behaviour, which are more likely to be susceptible to scrutiny by others. *I am being judged/evaluated negatively by these people* was also negatively predicted by Drive, which is not surprising given that individuals with high drive are less likely to be concerned about potential negative judgement.

Avoidance

As predicted, desire to avoid was positively predicted by SP however *actual* avoidance was not significantly predicted by SP. This suggests that many individuals chose not to avoid these social situations despite feeling anxious. This is consistent with the fact that SR interacted with SP in predicting anxiety and the associated implication that the potential social incentives may have overrode the decision to actually avoid or leave the situation. This

would not necessarily have any bearing on the *desire* to avoid, which is consistent with the fact that it was positively predicted by SP while actual avoidance was not.

Summary

In summary, SP appears to be the most relevant RST trait as it positively related with a range of responses including post-induction fear, cognitions reflecting themes of desired avoidance and anxiety, and desire to avoid. It also interacted with SR to predict post-induction anxiety. Given that SP is proposed to regulate avoidant behaviour away from perceived threat, and that social anxiety is maintained by avoidance and vigilance to perceived threat, these results are not surprising. The fact that SR buffered the effects of SP on anxiety is also consistent with the approach-withdrawal nature that is particularly unique to social anxiety. It appears that the BIS (as measured by the SPSRQ) may be directly related to the cognitive, affective and behavioural responses that characterise social anxiety, and possibly that SR may act as a protective factor in these relationships. This is consistent with the predictions of the RST Cognitive Mood of Psychopathology (Gomez & Cooper, 2008).

CHAPTER 6: STUDY 3

The Effects of Reinforcement Sensitivity Theory Traits on Response to Cognitive Behavioural Therapy Outcome for Social Anxiety Disorder

In investigating whether the Behavioural Inhibition System (BIS) and Behavioural Approach System (BAS) sensitivities relate to cognitive, affective and avoidance responses that characterise social anxiety, Study 2 found that Sensitivity to Punishment (SP) positively predicted cognitions characterised by desire to avoid (*I want to exit/escape this situation*) and concern about anxiety being visible to others (*People can see my anxiety*). SP also positively predicted social fear and interacted with Sensitivity to Reward (SR) to positively predict social anxiety, with low levels of SR influencing the relationship between SP and anxiety. BAS Fun-Seeking positively predicted the cognition concerning potential negative evaluation by others (*People will judge me negatively*). This cognition was also negatively predicted by Drive. Overall, these results are consistent with the findings of Study 1 that social anxiety is positively related to the BIS and suggest the possibility that high BAS may act as a protective factor in the relationship between social anxiety and the BIS.

These findings suggest that individuals with a high BIS (original and revised) are more likely to experience social anxiety. Further, given that r-RST predicts that r-BIS is linked to negative cognitive biases and avoidance relevant to social anxiety (Gray & McNaughton, 2000; Gomez & Cooper, 2008), this provides an avenue for exploring whether RST traits affect cognitive behavioural therapy (CBT) outcomes for social anxiety disorder. As discussed in Chapter 3, CBT has been established as the most effective psychosocial treatment for social anxiety (Butler et al., 2006; Chambless et al., 1998; Chambless & Ollendick, 2001; Clarke & Beck, 2010; Hofmann & Barlow, 2002; Rodebaugh et al., 2004; Stein, 2008; Taylor, 1996; Turk et al., 2008) with most literature reviews and meta-analyses (e.g. Rodebaugh et al., 2004; Turk et al., 2008) reporting moderate to large effect sizes. CBT

programs typically consist of a combination of cognitive restructuring (CR; identifying and challenging thinking errors with rational, disputing questions) and exposure (physically confronting the feared stimulus) (Turk et al., 2008).

Cognitive Behavioural Group Therapy

Cognitive Behavioural Group Therapy (CBGT; Heimberg et al., 1985; Heimberg et al., 1993; Heimberg & Becker, 2002) is a program designed specifically for the treatment of social anxiety and is utilised in the current study. CBGT is a 12-week program consisting of psychoeducation, cognitive restructuring, weekly exposures, as well as homework tasks in between sessions. The program operates on the principles that social anxiety can be treated by (1) identifying and challenging thinking errors that lead to social anxiety and (2) exposing participants to feared social situations (reduce avoidance) in a systematic, graduating fashion. It is a highly structured program that includes in-session exposures, which allows individuals to practice their skills in a controlled social environment before applying them to real-life situations. Practice is particularly essential in exposures for social anxiety as social situations are more multifaceted than other feared stimulus (e.g. spiders) and some individuals may require practice in social behaviours (Rodebaugh et al., 2004). The group setting also automatically provides individuals with exposures to a real audience.

CBGT has been identified as a treatment of choice for social anxiety (Heimberg, 2001; see Rodebaugh et al., 2004 for review of CT). It has found to be more effective in reducing anxiety and maintaining gains than an attention control treatment (Heimberg et al., 1990; Heimberg et al., 1993); waiting-list controls (Hope, Heimberg, & Bruch, 1995); pill placebo controls (Heimberg et al., 1990; 1998) and comparably more effective than pharmacotherapy in relapse rates at six-month follow-up (50% of pharmacotherapy group, 17% of CBGT group; Liebowitz et al., 1999). Approximately, three quarters of individuals achieve clinically significant change (Ledley & Heimberg, 2005), although relapse is not

uncommon (Clark & Beck, 2010) and quality of life is generally still poorer for treatment responders compared to non-socially anxious individuals (Eng et al., 2001).

Personality as a Predictor of CBT Outcome

As discussed in Chapter 1, personality has been identified as an important predictor of treatment outcome for a range of psychopathologies (Reich, 2003), however, few studies have investigated the relevance of personality traits to treatment outcome for social anxiety disorder. Given that co-morbid Avoidant Personality Disorder (e.g. Chambless et al., 1997; Feske et al., 1996), Generalised Social Phobia subtype (shown to be associated with personality traits e.g. Brown et al., 1995; Hope et al., 1995) have been identified as two important factors that impact treatment outcome (see review, Ledley & Heimberg, 2005), this suggests that personality traits may be important for predicting treatment outcome. The few existing studies that have investigated this possibility have focused on Cloninger's (1987) „harm avoidance' (HA) trait: “the heritable tendency to respond intensely to signals of aversive stimuli, thereby learning to inhibit behaviour to avoid punishment, novelty, and frustrative nonreward” (p. 55). These studies have found that reductions in HA relate to reductions in social anxiety symptoms following CBT (Faytout et al., 2007; Hofman & Loh, 2006; Mortberg et al., 2007). Mortberg et al., also found that an increase in self-directedness, reward-dependence and novelty-seeking related to reduced social anxiety.

Given that HA and BIS are conceptually similar, it is not surprising that studies have found HA and BIS to be highly correlated (Carver & White, 1994; Caseras, Avila, & Torrubia, 2003; Mardaga & Hansenne, 2007; Zelenski & Larsen, 1999) and that HA is common amongst individuals with social anxiety disorder (Chatterjee et al., 1997; Kim & Hoover, 1996; Marteinsdottir et al., 2003; Pelissolo et al., 2002; Stein et al., 2001). This suggests that findings pertaining to HA can be taken to be directly applicable to the BIS and in this case, supports the idea that BIS may be relevant to CBT outcome, as proposed by the

Reinforcement Sensitivity Theory Cognitive Model of Psychopathology (Gomez & Cooper, 2008), discussed in Chapter 2. The fundamental premise of the model is that high r-BIS activity activates anxiety-relevant beliefs and schemas that help maintain the cognitive, affective and avoidance responses that characterise anxiety.

Kimbrel's (2008) model for the development and maintenance of generalised social phobia (see Figure 4 in Chapter 3) proposes similar ideas to the concepts put forth by the RST Cognitive Model of Psychopathology. Kimbrel proposes that the information-processing biases associated with increased BIS and FFFS levels predispose individuals to GSP and also helps maintain symptoms. This effect is proposed to occur either directly or by moderating the effects of environmental factors, such as childhood bullying or low maternal care. These biases then lead to the dysfunctional cycles that characterise social anxiety. The model also tentatively proposes that having high levels of the BAS may play a role in protecting individuals against GSP symptoms.

The Present Study

Given that BIS is related to social anxiety, that HA is linked with CBT outcome for social anxiety, and that personality has been identified as an important influencing factor of treatment outcome for social anxiety, the aim of this final study is to investigate the effect that individual differences in RST traits have on response to CBGT outcome for social anxiety disorder. Specifically, the purpose was to observe whether the nine RST variables used in Studies 1 and 2 (r-BIS, FFFS, o-BIS, Drive, BAS Reward-Responsiveness, Fun-S, BAS, Sensitivity to Punishment, and Sensitivity to Reward) would moderate the relationships between pre-treatment and post-treatment scores for individuals with social anxiety disorder in a series of regression analyses. A total of eight outcome scales were completed by participants before and after undertaking CBGT: Three social anxiety scales measuring observation anxiety, interaction anxiety and fear of negative evaluation; a quality of life

measure; two social anxiety cognition scales measuring negative and positive cognitions in social situations' a general anxiety cognition measure; and a depression cognition measure.

Based on previous findings, the following hypotheses were made:

H1: Pre-treatment outcome scores would independently and positively predict post-treatment outcome scores.

H2: R-BIS, FFFS, o-BIS and SP would independently predict all post-treatment outcome scores. These personality variables would positively predict observation anxiety, interaction anxiety, FNE, negative social anxiety cognition scores, general anxiety cognition scores and depression cognition scores, and negatively predict positive social anxiety cognitions, and quality of life scores.

H3: R-BIS would have a stronger correlation with interaction anxiety and FFFS would have a stronger correlation with observation anxiety.

H4: R-BIS, FFFS, o-BIS and SP would interact with pre-treatment outcome scores to predict post-treatment outcome scores, after the variance for pre-treatment scores had been accounted for.

H5: As previous findings are mixed, no specific predictions were made about whether Drive, RR, Fun-S, BAS, and SR would predict outcome scores.

H6: As previous findings are mixed, no specific predictions were made about whether Drive, RR, Fun-S, BAS, and SR would interact with pre-treatment outcome scores to predict post-treatment outcome scores.

Method

Participants

Participants responded to advertisements (see Appendix K) that were distributed in the community. Advertisements were distributed via several recruitment methods including; community letterbox drops, waiting areas of General Practices, return-to-employment assistance agencies, media releases on the Mental Health Council of Tasmania website, and various health services via the Department of Health and Human Services in Tasmania. Potential participants made contact via telephone or email and were informed of details about the study. Individuals were initially screened over the phone to determine if their presenting problem was of a social anxiety nature, and that anxiety levels were severe enough to interfere with their current level of functioning. No participants were excluded if they were found to meet this criterion.

A total of 28 participants attended a two-hour assessment interview with the principal investigator at a laboratory at the University of Tasmania. Nine of these participants dropped out prior to treatment commencing. A total of 19 participants participated in the treatment program. There were originally four separate treatment groups. Participants were allocated to groups according to the timing of which they were recruited and/or the compatibility of group members, as judged by the principal investigator with reference to clinical guidelines in the treatment manual (Heimberg & Becker, 2002).

Group 1 consisted of six participants. Group 2 consisted of five participants, one of whom dropped out. Group 3 originally consisted of five participants, three of whom dropped out in the early weeks of the program. As the group was too small to continue running, one of the two remaining participants was re-allocated into Group 4, which commenced after the Group 3 program was discontinued. There were a total of four participants in Group 4. The other remaining participant from Group 3 was unable to attend Group 4 and was therefore

provided with an individual form of the treatment (Clark et al., 2003; Federoff & Taylor, 2001; Gould et al., 1997; Taylor, 1996).

The final sample ($N=16$) consisted of five males (31.30%) and eleven females (68.80%). Age ranged from 28 to 59 years ($M=41.82$, $SD=8.50$). Thirteen participants (81.30%) were Caucasian, two were Asian and one was European. 43.8% were married, 31.4% were single, 6.3% were in a de facto relationship, 12.5% were divorced, and 6.3% were widowed. 37.5% had children and 37.5% also had been married previously. 69% were employed at the time of assessment, two participants were seeking work, another two were studying, and one was a pensioner. Regarding highest level of education attained, 18.8% had completed year 10, 18.8% had completed year 12, 18.8% had completed an undergraduate degree, 12.5% had completed a postgraduate degree, one participant had completed a trade certificate, and another had completed TAFE. Thirteen participants had GSP and three participants had SSP. All participants met criteria for a diagnosis of social anxiety disorder, with the exception of one who qualified for sub-clinical levels of anxiety (DiNardo et al., 1994). Mean scores of depressive tendencies (30.19) and generalised anxiety (59.67) also indicate significant levels of these symptoms (generalised anxiety, 60 and greater; depressive tendencies, 16 and greater).

Assessment

After reading the information sheet (see Appendix J) and signing a consent form (see Appendix I), participants were assessed using the social anxiety disorder section of the Anxiety Disorders Interview Schedule for DSM-IV-Lifetime Version (ADIS-IV-L; DiNardo, Brown, & Barlow, 1994), a widely-used structured interview used to assess for current anxiety disorders symptoms. The instrument has been shown to have good psychometric properties (Di Nardo, Moras, Barlow, Rapee, & Brown, 1993).

Participants also completed a pre-treatment questionnaire battery, comprised of social anxiety scales as well as the measures of generalised anxiety and depression. Some of the scales were used in Studies 1 or 2 (refer to methodologies of those studies for details about the scale).

The Social Interaction Anxiety and the Social Phobia Scales (SIAS, SPS; Mattick & Clarke, 1989) (see Studies 1 and 2).

Observation anxiety was measured with the SPS and interaction anxiety was measured with the SIAS.

The Centre for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977).

The CES-D is a 20-item, widely used scale to measure depression. Respondents answer on a four-point scale ranging from 0 = Rarely or none of the time to 3 = All of the time. Examples of items include „My sleep was restless’ and „I was bothered by things that don’t usually bother me’. Scores range from 0 to 60. High scores reflect higher depressive tendencies. A score of 16 and higher is considered to be indicative of clinical levels of depression. The scale has been shown to have high internal consistency ($\alpha = .87$; Campo-Arias et al., 2007) and to have good convergent validity (correlated positively with other depression measures and related variables (Radloff, 1977)).

The Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990).

The PSWQ is a 17-item scale that measures degree of worry. Respondents answer on a five-point scale (1 = „Not at all Typical’ to 5 = „Very Typical’). Examples of scale items are „I find it easy to dismiss worrisome thoughts’ and „My worries overwhelm me’. Scores range from 17 to 85. High scores reflect higher tendency to worry. Means for individuals with generalised anxiety disorder fall in the 60 to 68 range. The scale has been shown to have good internal consistency ($\alpha = .95$), to have good test-retest reliability ($r = 0.92$), to relate positively to other measures of worry and to distinguish between a university sample and

individuals with a diagnosis of generalised anxiety disorder (Meyer et al., 1990). It has also been shown to discriminate generalised anxiety disorder from other anxiety disorders (Brown, Antony, & Barlow, 1992).

Outcome Measures

Participants completed the following outcome measures at pre-treatment and post-treatment:

The SPS and SIAS.

Fear of Negative Evaluation Scale (FNE; Watson & Friend, 1969).

The FNE is a widely-used measure of social anxiety as it measures the core cognitive characteristic of social anxiety - fear of negative scrutiny by others. It is a 30-item true/false scale (e.g. I am often afraid that I may look ridiculous or make a fool of myself). Total scores range from 0 to 30. Higher scores reflect higher levels of fear. The scale has been shown in a range of studies to have good reliability and validity (Collins, Westra, Dozois, & Stewart, S. H., 2005; Musa, Kostogianni, & Lepine, 2004; Oei, Kenna, & Evans, 1991). For example, for a sample of individuals with social anxiety disorder or panic disorder, the scale was shown to have good internal consistency ($\alpha = .97$), test-retest reliability ($r = .94$), concurrent validity (with a social avoidance scale, $r = .56$), discriminant validity (non-significant correlations with agoraphobic avoidance or panic) and factor analyses results demonstrated construct validity. The FNE has also been shown to be a highly sensitive outcome measure for cognitive behavioural group therapy (Cox et al., 1998).

Social Interactions Self-Statement Test (SISST; Glass, Merluzzi, Biever, & Larsen, 1982).

The SISST is a frequently used self-statement test in social anxiety research. It measures the cognitions that individuals may have in social situations. The original SISST was designed to be administered following a behavioural task, however, versions measuring dispositional reactions to social interaction situations have been established by modifying instructions

accordingly (Hoffman & Ruth, 1996). The SISST consists of 30 self-statement items (e.g. „What I say will probably say stupid’). It requires respondents to rate the frequency (0=Hardly ever to 4 = Very often) to which they typically have each thought in a feared social interaction situation. It consists of two subscales that measure positive self-statements (e.g. „I can usually talk to people pretty well; SISSTP) and negative self-statements („When I can’t think of anything to say, I can feel myself getting anxious’; SISSTN). The SISST has been shown to have high item-total correlations (Glass et al., 1982), and high convergent (Myszka, Galassi, & Ware, 1986), and concurrent validity (Dodge, Hope, Heimberg, & Becker, 1988).

Cognitions Checklist (CCL; Beck, Brown, Steer, Eidelson, & Riskind, 1987).

The CCL is a 26-item scale that measures frequency (0=Never to 4=Always) of dysfunctional cognitions (e.g. „I will never overcome my problems’). A total score is yielded, as well as separate subscale scores for depression cognitions (CCL Dep) and anxiety cognitions (CCL Anx). Higher scores reflect higher frequency. Good reliability and validity has been reported (Beck et al., 1987; Taylor, Koch, Woody, & Mclean, 1997). For example, the scale has been shown to have good internal consistency ($\alpha = .90$, CCL Anx; $\alpha = .92$, CCL Dep); test re-test reliability ($r=.79$, CCL Anx; $r=0.76$, CCL Dep) and convergent and discriminant validity with the Hamilton Scales (Beck et al., 1987).

Quality of Life and Enjoyment and Satisfaction Questionnaire (QLES-Q; Endicott, Harrison, & Blumenthal, 1993).

The QLES-Q is a 15-item scale that measures quality of life and satisfaction. Respondents rate the quality (1=Very poor to 5=Very good) of different areas of their lives including physical health, mood, work, household activities, social relationships, family relationships, leisure time activities, daily functioning, sexual drive, economic status, living situation, vision, medication (if relevant) and overall satisfaction. Total scores are reported as

percentages. Higher scores reflect higher levels of perceived quality. The QLES-Q has been shown to have good psychometric properties with a range of clinical and normal populations (e.g. Endicott et al., 1993; Ritsner, Kurs, Gibel, Ratner & Endicott, 2005; Endicott et al., 1993; Rucci et al., 2007). For example, the scale has been shown to have good internal consistency ($\alpha = .88$, normal controls; patients $\alpha = .94$), test-retest reliability (intra-class correlations of 0.91, patients; normal controls 0.86) and construct validity (distinguished between normal controls and patients, positively correlated with the Lancashire Quality of Life Profile (Ritsner et al., 2005).

Participants also completed the following personality measures (see Studies 1 and 2):

The BIS/BASS (Carver & White, 1994) was used to measure o-BIS, r-BIS, FFFS, BAS, Drive, RR, and Fun-S.

The SPSRQ (Torrubia et al., 2001) was used to measure SP and SR.

Treatment

Cognitive Behavioural Group Therapy (CBGT; Heimberg et al., 1985).

Participants were treated with the CBGT program, which is a program designed specifically for the treatment of social phobia. It consists of 12 weekly 2.5 hour sessions and is regarded as one of, if not the most, effective social anxiety disorder treatments to date (Rodebaugh et al., 2004). The program operates on the principles that social anxiety can be treated by (1) identifying and challenging thinking errors that lead to social anxiety and (2) exposing participants to feared social situations (reduce avoidance) in a systematic, graduating fashion.

There are three components of the program. The first two sessions consist of psychoeducation, where participants learn about social anxiety, how it is maintained and the tools for how to challenge relevant thinking errors. In Session 1, several exercises are undertaken, including introduction and discussion of the cognitive-behavioural model,

provision of the treatment rationale, early teaching of cognitive restructuring skills and discussion of the first homework exercise (identifying automatic thoughts during the first week). In Session 2, additional training in cognitive restructuring is provided. Participants learn how to identify and dispute common thinking errors and to come up with alternative rational responses. Homework is assigned to identify and dispute thinking errors throughout the week.

Sessions 3 to 11 are dedicated to in-session exposures. Participants use their learnt cognitive restructuring skills in conjunction with in-session exposures, which involve participants role-playing feared social situations in session. Prior to the exposure, participants identify relevant automatic thoughts, thinking errors are identified and disputed, and rational responses are suggested. Participants are encouraged to utilise these rational responses when they are feeling anxious during the social situation. Goals are then identified (e.g. „talk to the person for at least five minutes’) before the exposure begins. During the exposure, the participant is prompted to verbally rate their anxiety level (on a scale of 1 to 10) every sixty seconds (Subjective Units of Distress, SUDS). After the exposure, cognitive debriefing occurs that includes discussing whether the participant met his or her goal(s), use of rational responses, review of evidence for automatic thoughts and rational responses, and SUDS ratings. Homework assignments for real life exposures are then designed. Participant take turns in undertaking exposures, in order that all participants undergo approximately the same number of exposures by the end of the program. On average, there are three exposures a session. The idea of the program is for participants to gradually work their way up a personal hierarchy of feared situations that increase in fear intensity. This hierarchy is established in an individual treatment orientation prior to the commencement of the program.

In the last session (Session 12), the first half is dedicated to any remaining exposures. The second half involves reviewing progress over the program, identifying any situations that

may still provoke anxiety for the participants and assigning future goals that that may be pursued after the treatment finishes. Each participant also attends an individual feedback session with the therapist post-treatment.

The groups were run by the primary investigator, who was a provisionally registered clinical psychologist and had completed her doctoral training. Groups are ideally run by two therapists; however, groups can be run effectively with only one therapist, particularly if groups are smaller than the standard six-member group (Heimberg & Becker, 2002). Group 1 was run first, Groups 2 and 3 were run in the same time period (Group 3 was discontinued halfway through the program, as explained previously), and Group 4 commenced after Groups 2 and 3 finished.

Ideally, all groups include members of both genders, a mix of older and younger participants, a balance of participants with varying severity levels, as well as a mix of different types of social fears (Heimberg & Becker, 2002). Groups fulfilled these ideals, except that Group 1 consisted of all females. This was inevitable as circumstances did not permit this group to include males. There were no statistically significant differences in treatment outcomes across groups.

Statistical Analyses

A series of hierarchical regressions were conducted to determine if RST variables interacted with pre-treatment outcome scores to predict post-treatment outcome scores, after the effects of pre-treatment scores were controlled. Due to a small sample size, regression analyses were performed separately for each of the eight outcome variables across the nine personality variables. Therefore, a total of 72 regressions were performed, which are presented in Tables 22 to 30. A table is dedicated to one personality variable predicting each of the outcome variables. In each regression, the pre-treatment outcome variable and the personality variable are entered in Step 1, and the interactions between these variables are entered in Step 2.

Before testing for interactive effects, both independent variables were centred to address the problem of multi-collinearity (Cohen & Cohen, 1983; Jaccard, Turrisi, & Wan, 1990).

Results

Prior to conducting regression analyses, all variables were examined for accuracy of data entry, missing values, and fit between their distributions and their requisite assumptions for multiple regression analyses. No patterns were identified in the missing data and it was determined that missing values were randomly dispersed among the variables. Missing data for the quantitative variables in the regression analyses were treated using the Expectation Maximisation (EM) method. Examination of z-scores revealed no univariate outliers and as can be seen in Tables 1 and 2, all skewness and kurtosis values were within acceptable ranges. Curran, West and Finch (1996) recommend that moderate degrees of deviation from normality fall between skewness values 2 and 3, and kurtosis values between 7 and 21.

Examination of the normal probability plots, residual scatter plots of residuals (and partial residual scatter plots of residuals) against predicted social anxiety scores demonstrated that (a) residuals were normally distributed, (b) the residuals evidenced a straight line relationship with predicted social anxiety scores and (c) the variance of the residuals about social anxiety scores was the same across all values of the predicted scores. The residual (and partial residual) scatter plots therefore indicated that the assumptions of linearity, normality and homoscedasticity had not been violated (Tabachnick & Fidell, 2001). Collinearity tolerance diagnostics revealed no multi-collinearity and singularity, and suppressor variables were not found.

As the study involved a small sample size ($N = 16$), which reduces the power of the results, alpha levels were set at $p < .10$. At this alpha level, a correlation of .40 is required in order to achieve a significant result. This correlation size is considered to be high, particularly

for clinical studies, and therefore a $p < .10$ is regarded as conservative for interpretation of effect sizes (Cohen, 1988, 1992).

The descriptives for personality variables are presented in Table 18 and the descriptive for outcome variables (pre- and post-treatment) are presented in Table 19.

Table 18

Descriptives of Personality Variables.

Personality Variables	Scale Range	Mean (SD)	Skewness	Kurtosis
BIS Total	7-28	20.29 (2.30)	.43	-.66
BIS Anxiety	5-20	16.91 (1.98)	-.39	-.58
BIS Fear	2-8	6.63 (1.20)	-.47	-.24
BAS Total	13-52	33.92 (4.80)	.10	-.82
Fun-S	4-16	9.07 (2.14)	.32	1.06
RR	5-20	15.63 (2.15)	.46	-.11
Drive	4-16	9.22 (1.82)	.40	-.77
SP	0-24	19.85 (3.08)	-.93	.19
SR	0-24	9.56 (4.72)	.25	.52

Note. BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; RR = Reward Responsiveness; Fun-S = Fun Seeking; SP = Sensitivity to Punishment; SR = Sensitivity to Reward

Paired-samples t-tests were conducted between pre-treatment and post-treatment scores to determine if the treatment was effective. As can be seen in Table 20, the treatment was effective in reducing scores from pre-treatment to post-treatment for all outcome variables. If

Table 19

Descriptives for Pre- and Post-Treatment Outcome Variables.

Outcome Variable	Scale Range	Pre-treatment			Post-Treatment		
		Mean (SD)	Skewness	Kurtosis	Mean (SD)	Skewness	Kurtosis
OA	0-80	31.69 (14.68)	.37	-1.24	14.80 (11.74)	1.23	1.10
IA	0-80	49.91 (12.87)	.08	-.62	28.29 (16.94)	1.08	.70
FNE	0-30	25.63 (4.00)	-.76	-.86	16.96 (8.22)	-.06	-.57
SISSTN	0-60	36.17 (10.20)	.60	.22	21.47 (12.42)	.29	-.16
SISSTP	0-60	23.35 (9.01)	-.17	.65	28.74 (9.96)	-.88	.17
CCL Anx	0-52	12.50 (8.19)	1.13	1.91	6.07 (6.04)	1.16	.99
CCL Dep	0-52	16.08 (9.15)	.10	-1.00	10.80 (10.38)	.75	-1.16
QLES	15-75	.53 (.15)	.98	1.39	.61 (.13)	.51	.47

Note. OA = Observation Anxiety; IA = Interaction Anxiety; FNE = Fear of Negative Evaluation; QLES = Quality of Life Enjoyment and Satisfaction; SISSTN = Social Interaction and Self-Statements-Negative; SISSTP = Social Interaction and Self-Statements-Positive; CCL Anx = Cognition Checklist-Anxiety; CCL Dep = Cognition Checklist-Depression.

using Cohen's (1988) effect size criteria (0.2 to 0.3 as small, 0.5 as moderate and 0.8 and higher as large), Cohen's *d* effect sizes show that changes were large for all outcome variables with the exception of SISSTP (social anxiety positive cognitions), CCL Dep (depression cognitions) and QLES (quality of life), which were moderate.

Table 20

Paired-Samples T-Test Results of Pre-treatment and Post-Treatment Outcome Variable Scores.

Outcome Variable	Mean Difference (SD)	Post vs Pre-treatment <i>t</i> statistic (<i>df</i> =14)	Effect Size <i>d</i>	SE
OA	-16.94 (11.06)	-5.93****	1.483	0.362
IA	-21.35 (11.84)	-6.98****	1.745	0.397
FNE	-8.51 (8.15)	-4.04***	1.010	0.307
SISSTN	-15.38 (9.58)	-6.22****	1.555	0.372
SISSTP	5.70 (9.01)	2.45**	0.613	0.272
CCL Anx	-6.53 (7.11)	-3.56***	0.890	0.295
CCL Dep	-5.68 (9.68)	-2.27**	0.568	0.269
QLES	.08 (0.12)	2.71**	0.678	0.277

Note. OA = Observation Anxiety; IA = Interaction Anxiety; FNE = Fear of Negative Evaluation; QLES = Quality of Life Enjoyment and Satisfaction; SISSTN = Social Interaction and Self-Statements-Negative; SISSTP = Social Interaction and Self-Statements-Positive; CCL Anx = Cognition Checklist-Anxiety; CCL Dep = Cognition Checklist-Depression.

*****p*<.001, ***p*<.01, ****p*<.05, **p*<.10

Table 21 presents the partial correlations between personality scores and post-treatment outcome scores, after the effects of pre-treatment outcome scores were controlled. Significant moderate relationships were found for Drive with Fear of Negative Evaluation (negative), Drive with Anxiety Cognitions (negative), Fun-S with Positive Social Anxiety Cognitions (negative), BAS Total with Positive Social Anxiety Cognitions (negative) and between SR and Positive Social Anxiety Cognitions (negative). None of the BIS variables correlated significantly with the outcome variables.

Table 21

Partial Correlations between Post-Treatment Outcome Scores and Personality Scores, Controlling for Pre-Treatment Outcome Scores.

	Post-Treatment Outcome Variables							
	OA	IA	FNE	QLES	SISSTN	SISSTP	CCL Anx	CCL Dep
BIS Anxiety	.31	.25	.15	-.28	.09	-.12	.05	.06
BIS Fear	.10	-.06	.04	.31	-.12	.22	-.21	-.32
BIS Total	.23	.25	.10	.41	.14	-.21	.14	.21
RR	.05	-.13	-.16	.03	-.03	-.19	-.02	-.17
Drive	.30	.33	-.55**	.01	.11	-.39	-.67***	-.12
Fun-S	.00	-.07	-.41	-.34	.31	-.50*	.24	.18
BAS Total	.16	.04	-.46	-.15	.17	-.48*	-.11	-.03
SP	.12	-.05	.11	-.37	.05	-.09	.41	.18
SR	.09	.22	-.39	-.12	.29	-.60**	-.30	-.12

Note. BIS = Behavioural Inhibition System; BAS = Behavioural Approach System; RR = Reward Responsiveness; Fun-S = Fun Seeking; SP = Sensitivity to Punishment; SR = Sensitivity to Reward; OA = Observation Anxiety; IA = Interaction Anxiety; FNE = Fear of Negative Evaluation; QLES = Quality of Life Enjoyment and Satisfaction; SISSTN = Social Interaction and Self-Statements-Negative; SISSTP = Social Interaction and Self-Statements-Positive; CCL Anx = Cognition Checklist-Anxiety; CCL Dep = Cognition Checklist-Depression.

*** $p < .001$, ** $p < .01$, * $p < .05$, $p < .10$

Regression Analyses

BIS Anxiety as Predictor

Table 22 presents the results for BIS Anxiety predicting the outcome variables. As can be seen, BIS Anxiety did not independently predict any of the outcome variables, however, it

interacted with pre-treatment interaction anxiety to predict post-treatment interaction anxiety, accounting for an additional 19% of the variance, after the effects of pre-treatment interaction anxiety were accounted for. Interactions for the other outcome variables were not significant.

Table 22

Unstandardised Beta Values of Hierarchical Regression Analyses of Post-Treatment Outcome Scores on BIS Anxiety and Pre-Treatment Scores.

Predictors		Post-Treatment Outcome Variables							
		OA	IA	FNE	QLES	SISSTN	SISSTP	CCL Anx	CCL Dep
<i>Step 1</i>	<i>Adj R²</i>	.45**	.47***	-.06	.44**	.34**	.21*	.21	.15
Pre-treatment		.55***	.88***	.72	.46*	.79**	.58**	.40**	.56*
BIS Anxiety		1.30	1.46	-.67	-.02	.43	-.51	.11	.27
<i>Step 2</i>	<i>ΔR²</i>	.10	.19**	.00	.08	.05	.02	.07	.01
Pre-treatment X BIS Anxiety		.14	.25**	-.02	-.12	-.14	.10	-.07	-.06

Note. BIS = Behavioural Inhibition System; OA = Observation Anxiety; IA = Interaction Anxiety, FNE = Fear of Negative Evaluation; QLES = Quality of Life Enjoyment and Satisfaction; SISSTN = Social Interaction and Self-Statements-Negative; SISSTP = Social Interaction and Self-Statements-Positive; CCL Anx = Cognition Checklist-Anxiety; CCL Dep = Cognition Checklist-Depression.

*** $p < .001$, ** $p < .01$, * $p < .05$, $p < .10$

Figure 7 below shows that BIS Anxiety moderated the relationship between pre- and post-treatment interaction anxiety. For low levels of BIS Anxiety, the relationship between pre- and post-treatment interaction anxiety was not influenced by BIS Anxiety. The regression coefficient for post-treatment interaction anxiety for low BIS Anxiety (- 1 SD) at low (- 1 SD) and high (+ 1 SD) pre-treatment interaction anxiety was not significant [$b = 0.25$, $t(df = 11) = 0.82$, $p > .05$]. However, for high levels of BIS Anxiety, the strength of the relationship between pre-treatment and post-treatment interaction anxiety increases with increased levels

of pre-treatment interaction anxiety. The regression coefficient for low BIS Anxiety (- 1 SD) at low and high pre-treatment interaction anxiety was significant [$b = 1.24$, $t(df = 11) = 5.12$, $p < .05$]. The difference between the regression coefficients for high and low BIS Anxiety was also significant, [$t(df = 11) = 2.58$, $p < .05$].

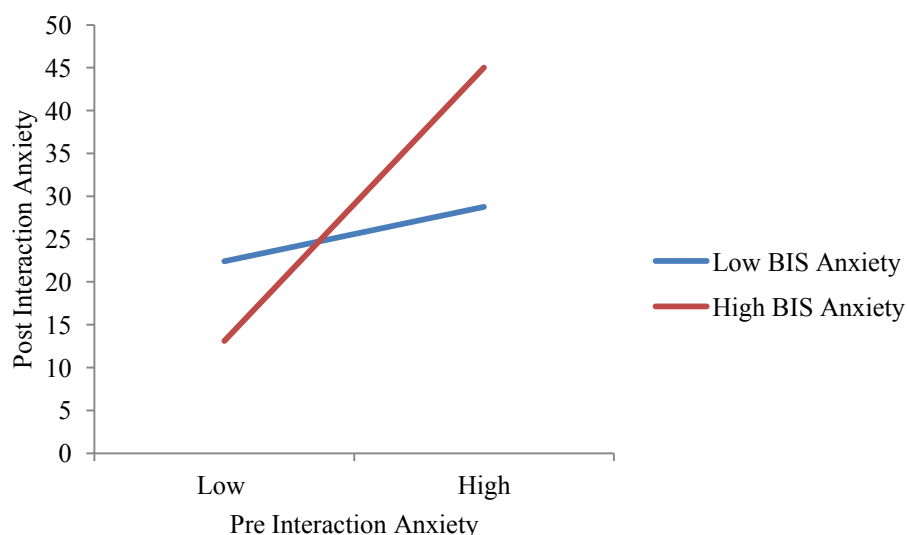


Figure 7. BIS anxiety moderating the relationship between pre-treatment and post-treatment interaction anxiety.

BIS Fear as Predictor

Table 23 presents the results for BIS Fear predicting the outcome variables. As can be seen, BIS Fear did not independently predict any of the outcome variables, however, it interacted with pre-treatment Anxiety Cognitions to predict post-treatment Anxiety Cognitions, and interacted with pre-treatment Depression Cognitions to predict post-treatment Depression Cognitions. Interactions for the other outcome variables were not significant.

Table 23

Unstandardised Beta Values of Hierarchical Regression Analyses of Post-Treatment Outcome Scores on BIS Fear and Pre-Treatment Scores.

Predictors		Post-Treatment Outcome Variables							
		OA	IA	FNE	QLES	SISSTN	SISSTP	CCL Anx	CCL Dep
<i>Step 1</i>	<i>Adj R²</i>	.40**	.44**	-.08	.44**	.35**	.24*	.24*	.23*
Pre-treatment		.53***	.93***	.59	.61***	.84**	.67**	.45**	.66**
BIS Fear		.71	-.62	-.30	.03	-.99	1.58	-.94	-2.43
<i>Step 2</i>	<i>ΔR²</i>	.04	.00	.09	.02	.01	.00	.19*	.19*
Pre-treatment X BIS Fear		.15	.01	-.54	-.13	-.10	.04	-.28*	-.49*

Note. BIS = Behavioural Inhibition System; OA = Observation Anxiety; IA = Interaction Anxiety, FNE = Fear of Negative Evaluation; QLES = Quality of Life Enjoyment and Satisfaction; SISSTN = Social Interaction and Self-Statements-Negative; SISSTP = Social Interaction and Self-Statements-Positive; CCL Anx = Cognition Checklist-Anxiety; CCL Dep = Cognition Checklist-Depression.

*** $p < .001$, ** $p < .01$, * $p < .05$, $p < .10$

Figure 8 shows that BIS Fear moderated the relationship between pre- and post-treatment Anxiety Cognitions scores. For high levels of BIS Fear, the relationship between pre- and post-treatment Anxiety Cognitions was not influenced by BIS Fear. The regression coefficient for post-treatment Anxiety Cognitions for high BIS fear (+ 1 SD) at low (- 1 SD) and high (+ 1 SD) pre-treatment CCL Anx was not significant [$b = 0.24$, $t(df = 11) = 1.32$, $p > .05$]. However, for low levels of BIS Fear, the strength of the relationship between pre- and post-treatment Anxiety Cognitions increased with increased levels of pre-treatment Anxiety Cognitions. The regression coefficient for low BIS Fear (- 1 SD) at low and high pre-treatment Anxiety Cognitions was significant [$b = 0.91$, $t(df = 11) = 3.40$, $p < .05$]. The difference between the regression coefficients for high and low BIS Fear was also significant, [$t(df = 11) = 2.09$, $p < .10$].

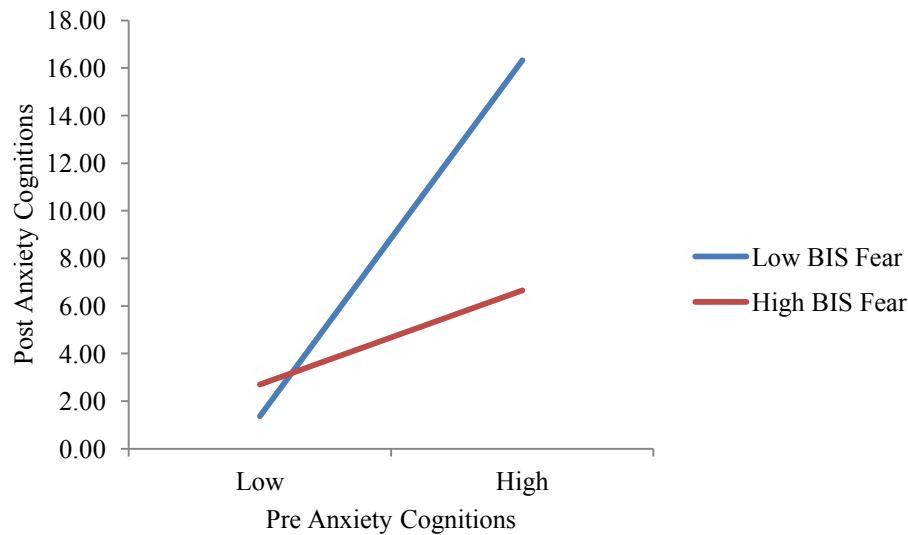


Figure 8. BIS fear moderating the relationship between pre- and post- treatment CCL Anx.

Figure 9 shows that BIS Fear moderated the relationship between pre- and post-treatment Depression Cognitions. For high levels of BIS Fear, the relationship between pre- and post-treatment Depression Cognitions was not influenced by BIS Fear. The regression coefficient for post-treatment Depression Cognitions for high BIS Fear (+ 1 SD) at low (- 1 SD) and high (+ 1 SD) pre-treatment Depression Cognitions was not significant [$b = 0.14$, $t(df = 11) = 0.42$, $p > .05$]. However, for low levels of BIS Fear, the strength of the relationship between pre- and post-treatment Depression Cognitions increased with increased levels of pre-treatment Depression Cognitions. The regression coefficient for low BIS Fear (-1 SD) at low and high pre-treatment Depression Cognitions was significant [$b = 1.33$, $t(df = 11) = 3.34$, $p < .05$]. The difference between the regression coefficients for high and low BIS Fear was also significant, [$t(df = 11) = 2.28$, $p < .05$].

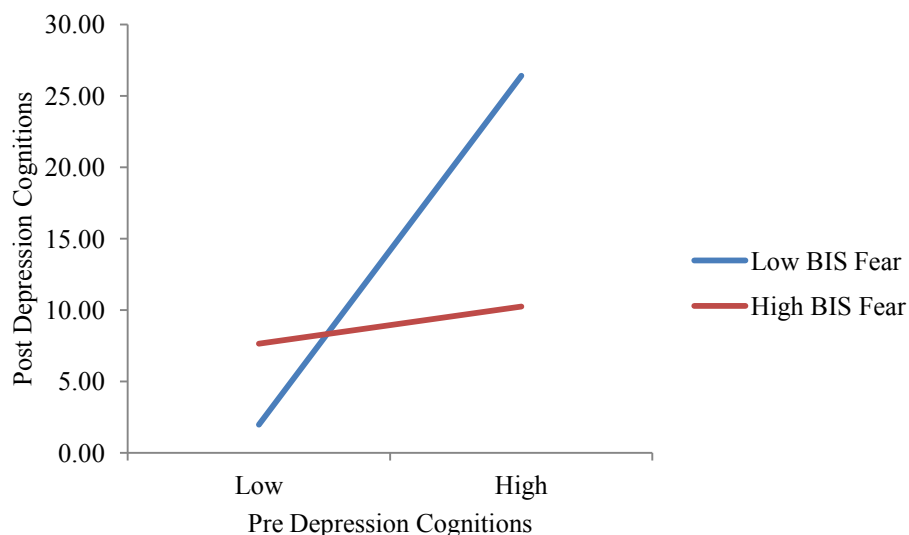


Figure 9. BIS fear moderating the relationship between pre- and post-treatment CCL Dep.

BIS Total as Predictor

Table 24 presents the results for BIS Total predicting the outcome variables. As can be seen, BIS Total did not independently predict any of the outcome variables, however, it interacted with pre-treatment interaction anxiety to predict post-treatment interaction anxiety.

Interactions for the other outcome variables were not significant.

Figure 10 below shows that BIS Total moderates the relationship between pre- and post-treatment Interaction Anxiety. For low levels of BIS Total, the relationship between pre- and post-treatment Interaction Anxiety is not influenced by BIS Total. The regression coefficient for post-treatment Interaction Anxiety for low BIS Total (- 1 SD) at low (- 1 SD) and high (+ 1 SD) pre-treatment Interaction Anxiety was not significant [$b = 0.16$, $t(df = 11) = 0.51$, $p > .05$]. However, for high levels of BIS Total, the strength of the relationship between pre- and post-treatment Interaction Anxiety increases with increased levels of pre-treatment Interaction Anxiety. The regression coefficient for high BIS Total (+1 SD) at low

Table 24

Unstandardised Beta Values of Hierarchical Regression Analyses of Post-Treatment Outcome Scores on BIS Total and Pre-Treatment Scores.

Predictors		Post-Treatment Outcome Variables							
		OA	IA	FNE	QLES	SISSTN	SISSTP	CCL Anx	CCL Dep
<i>Step 1</i>	Adj R^2	.42**	.47***	-.07	.49***	.35**	.24*	.22*	.19
Pre-treatment		.55***	.91***	.57	.45**	.80**	.60**	.41**	.54*
BIS Total		.85	1.27	-.34	-.02	.57	-.77	.30	.83
<i>Step 2</i>	ΔR^2	.10	.21**	.02	.07	.02	.03	.01	.05
Pre-treatment X BIS Total		.13	.24**	.11	-.16	-.11	.09	-.02	.16

Note. BIS = Behavioural Inhibition System; OA = Observation Anxiety; IA = Interaction Anxiety, FNE = Fear of Negative Evaluation; QLES = Quality of Life Enjoyment and Satisfaction; SISSTN = Social Interaction and Self-Statements-Negative; SISSTP = Social Interaction and Self-Statements-Positive; CCL Anx = Cognition Checklist-Anxiety; CCL Dep = Cognition Checklist-Depression.

*** $p < .001$, ** $p < .01$, * $p < .05$, $p < .10$

and high pre-treatment Interaction Anxiety was significant [$b = 1.25$, $t(df = 11) = 5.65$, $p < .05$]. The difference between the regression coefficients for high and low BIS Total was also significant, [$t(df = 11) = 2.87$, $p < .05$].

BAS Reward Responsiveness as Predictor

Table 25 presents the results for RR predicting the outcome variables. As can be seen, RR did not independently predict any of the outcome variables, however, it interacted with pre-treatment Observation Anxiety to predict post-treatment Observation Anxiety. Interactions for the other outcome variables were not significant.

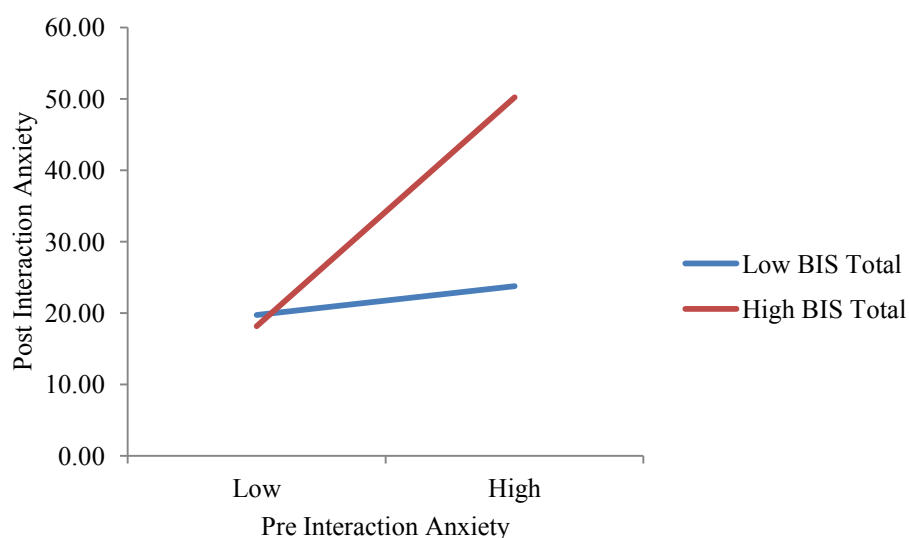


Figure 10. BIS total moderating the relationship between pre-treatment and post-treatment interaction anxiety.

Table 25

Unstandardised Beta Values of Hierarchical Regression Analyses of Post-Treatment Outcome Scores on BAS Reward Responsiveness and Pre-Treatment Scores.

Predictors		Post-Treatment Outcome Variables							
		OA	IA	FNE	QLES	SISSTN	SISSTP	CCL Anx	CCL Dep
Step 1	Adj R ²	.39**	.45**	-.06	.39**	.34**	.23*	.20	.17
Pre-treatment		.52**	.92***	.61	.59***	.80**	.65**	.41**	.57*
RR		.26	-.84	.68	.01	-.16	-.85	-.05	-.81
Step 2	ΔR ²	.19**	.00	.00	.00	.00	.04	.01	.00
Pre-treatment		.27**	.04	.05	.02	-.02	-.12	-.04	.02
X RR									

Note. RR = Reward Responsiveness; OA = Observation Anxiety; IA = Interaction Anxiety, FNE = Fear of Negative Evaluation; QLES = Quality of Life Enjoyment and Satisfaction; SISSTN = Social Interaction and Self-Statements-Negative; SISSTP = Social Interaction and Self-Statements-Positive; CCL Anx = Cognition Checklist-Anxiety; CCL Dep = Cognition Checklist-Depression.

*** $p < .001$, ** $p < .01$, * $p < .05$, $p < .10$

Figure 11 below shows that RR moderated the relationship between pre- and post-treatment Observation Anxiety. For low levels of RR, the relationship between pre- and post-treatment Observation Anxiety was not influenced by RR. The regression coefficient for post-treatment Observation Anxiety for low RR (- 1 SD) at low (- 1 SD) and high (+ 1 SD) pre-treatment Observation Anxiety was not significant [$b = -0.09$, $t(df = 11) = -0.30$, $p > .05$]. However, for high levels of RR, the strength of the relationship between pre- and post-treatment Observation Anxiety increased with increased levels of pre-treatment Observation Anxiety. The regression coefficient for high RR (+1 SD) at low and high pre-treatment Observation Anxiety was significant [$b = 1.07$, $t(df = 11) = 3.94$, $p < .05$]. The difference between the regression coefficients for high and low RR was also significant, [$t(df = 11) = 2.93$, $p < .05$].

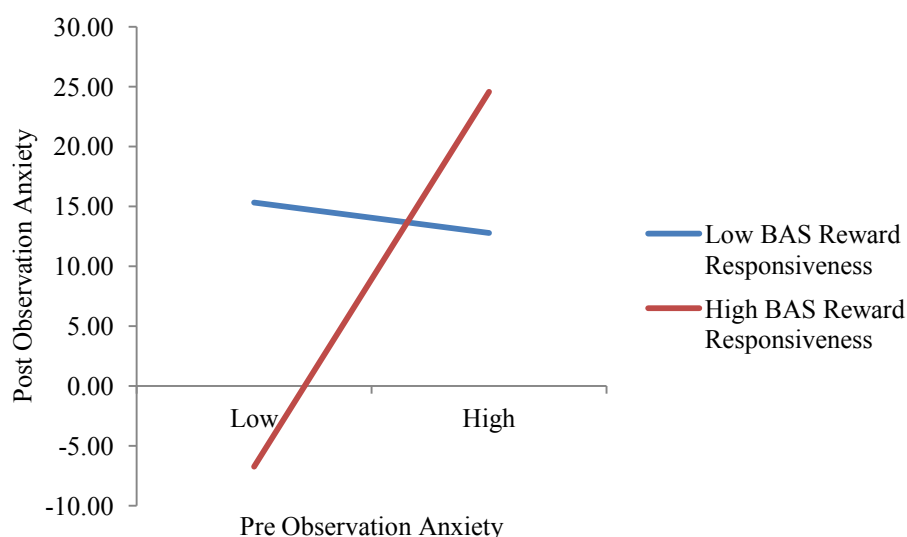


Figure 11. BAS Reward Responsiveness moderating the relationship between pre- and post-treatment observation anxiety.

BAS Drive as Predictor

Table 26 presents the results for Drive predicting the outcome variables. As can be seen, Drive significantly and independently predicted post-treatment Fear of Negative Evaluation and Anxiety Cognitions. Drive also interacted with pre-treatment Anxiety Cognitions and

pre-treatment Observation Anxiety to predict post-treatment Anxiety Cognitions and post-treatment Observation Anxiety, respectively. Interactions for the other outcome variables were not significant.

Table 26

Unstandardised Beta Values of Hierarchical Regression Analyses of Post-Treatment Outcome Scores on Drive and Pre-Treatment Scores.

Predictors		Post-Treatment Outcome Variables							
		OA	IA	FNE	QLES	SISSTN	SISSTP	CCL Anx	CCL Dep
<i>Step 1</i>									
	<i>Adj</i> <i>R</i> ²	.45**	.50***	.25	.39**	.35**	.33**	.56***	.16
Pre-treatment		.49**	.93***	.34	.59***	.79**	.75**	.78***	.61*
Drive		1.47	2.13	2.46*	.01	.56	-1.94	-2.55***	-.60
<i>Step 2</i>									
	ΔR^2	.18**	.05	.00	.00	.00	.10	.18***	.00
Pre-treatment X Drive		.17**	.16	.02	-.02	-.04	.17	-.17***	-.02

Note. OA = Observation Anxiety; IA = Interaction Anxiety, FNE = Fear of Negative Evaluation; QLES = Quality of Life Enjoyment and Satisfaction; SISSTN = Social Interaction and Self-Statements-Negative; SISSTP = Social Interaction and Self-Statements-Positive; CCL Anx = Cognition Checklist-Anxiety; CCL Dep = Cognition Checklist-Depression.

*** $p < .001$, ** $p < .01$, * $p < .05$, $p < .10$

Figure 12 shows that Drive moderated the relationship between pre- and post-treatment Observation Anxiety. For low levels of Drive, the relationship between pre- and post-treatment Observation Anxiety was not influenced by Drive. The regression coefficient for post-treatment Observation Anxiety for low Drive (- 1 SD) at low (- 1 SD) and high (+ 1 SD) pre-treatment Observation Anxiety was not significant [$b = 0.23$, $t(df = 11) = 1.39$, $p > .05$]. However, for high levels of Drive, the strength of the relationship between pre- and post-treatment Observation Anxiety increased with increased levels of pre-treatment Observation

Anxiety. The regression coefficient for high Drive (+1 SD) at low and high pre-treatment Observation Anxiety was significant [$b = 0.86$, $t(df = 11) = 4.60$, $p < .05$]. The difference between the regression coefficients for high and low Drive was also significant, [$t(df = 11) = 2.52$, $p < .05$].

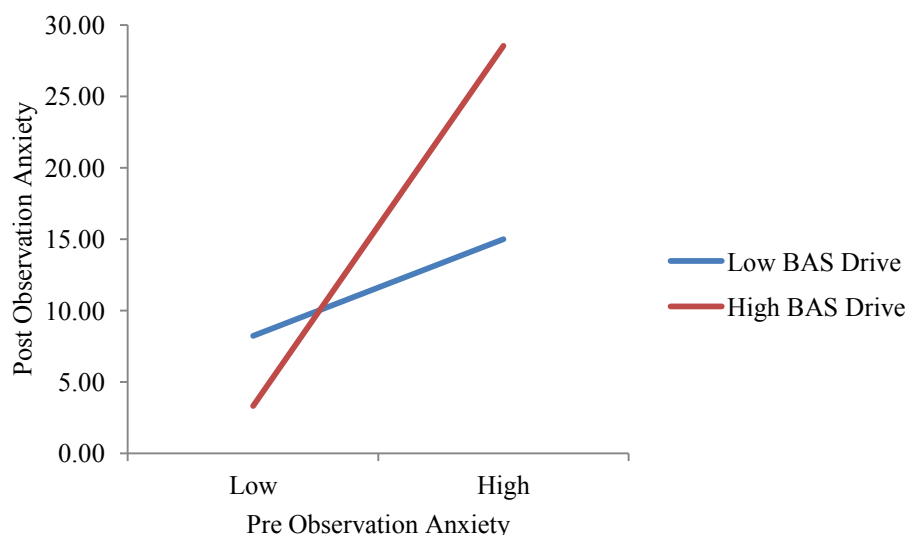


Figure 12. BAS Drive moderating the relationship between pre-treatment and post-treatment observation anxiety.

Figure 13 shows that Drive moderated the relationship between pre- and post-treatment Anxiety Cognitions. For both high and low levels of Drive, the relationship between pre- and post-treatment Anxiety Cognitions is influenced by Drive. The regression coefficient for post-treatment Anxiety Cognitions for low Drive (- 1 SD) at low (- 1 SD) and high (+ 1 SD) pre-treatment Anxiety Cognitions was significant [$b = 1.20$, $t(df = 11) = 6.30$, $p < .05$]. The regression coefficient for post-treatment Anxiety Cognitions for high Drive (- 1 SD) at low (- 1 SD) and high (+ 1 SD) pre-treatment Anxiety Cognitions was also significant [$b = 0.58$, $t(df = 11) = 3.95$, $p < .05$]. The difference between the regression coefficients for high and low Anxiety Cognitions was also significant [$t(df = 11) = -2.56$, $p < .05$]. The strength of the relationship between pre- and post-treatment Anxiety Cognitions increases with increased

levels of pre-treatment Anxiety Cognitions for both high and low Drive, however, low Drive has a stronger influence on this relationship.

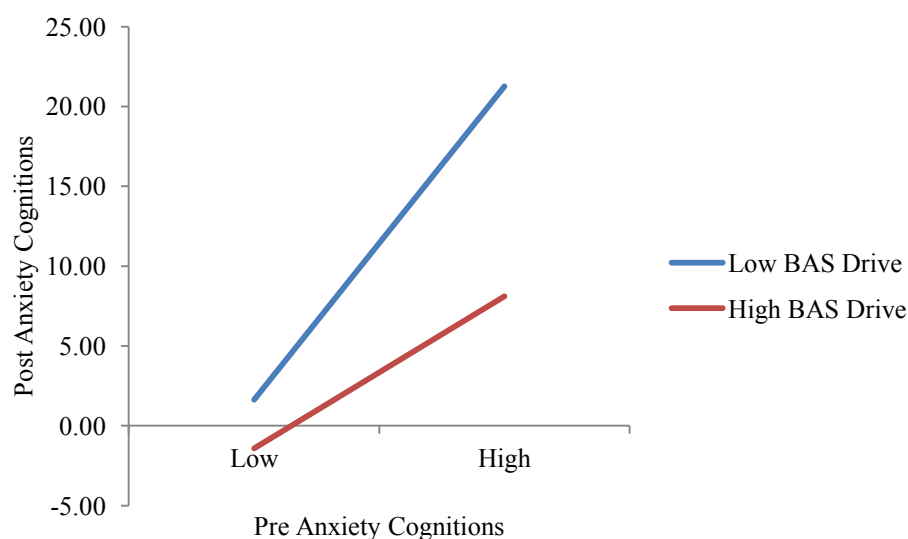


Figure 13. BAS Drive moderating the relationship between pre-treatment and post-treatment CCL Anx.

BAS Fun Seeking as Predictor

Table 27 presents the results for Fun-S predicting the outcome variables, which shows that Fun-S significantly and independently predicted Positive Social Anxiety Cognitions. Predictions of the other outcome variables were not significant.

BAS Total as Predictor

Table 28 presents the results for BAS Total predicting the outcome variables. Like Fun-S, BAS Total significantly and independently predicted Positive Social Anxiety Cognitions and predictions of the other outcome variables were not significant.

Table 27

Unstandardised Beta Values of Hierarchical Regression Analyses of Post-Treatment Outcome Scores on BAS Fun Seeking and Pre-Treatment Scores.

Predictors		Post-Treatment Outcome Variables							
		OA	IA	FNE	QLES	SISSTN	SISSTP	CCL Anx	CCL Dep
<i>Step 1</i>	<i>Adj R²</i>	.39**	.44**	.10	.46**	.40**	.40**	.25*	.18
Pre-treatment		.53**	.93***	.93	.58***	.82***	.83***	.35*	.55*
Fun-S		.02	-.38	1.63	-.02	1.30	-2.06*	.58	.71
<i>Step 2</i>	ΔR^2	.00	.00	.11	.05	.08	.05	.08	.06
Pre-treatment X Fun-S		.01	.01	.51	.11	.27	.11	.10	.12

Note. Fun-S = Fun Seeking; OA = Observation Anxiety; IA = Interaction Anxiety, FNE = Fear of Negative Evaluation; QLES = Quality of Life Enjoyment and Satisfaction; SISSTN = Social Interaction and Self-Statements-Negative; SISSTP = Social Interaction and Self-Statements-Positive; CCL Anx = Cognition Checklist-Anxiety; CCL Dep = Cognition Checklist-Depression.

*** $p < .001$, ** $p < .01$, * $p < .05$, $p < .10$

Sensitivity to Punishment as Predictor

Table 29 presents the results for SP predicting the outcome variables. SP did not significantly predict any of the outcome variables.

Sensitivity to Reward as Predictor

Table 30 presents the results for SR predicting the outcome variables. SR significantly and independently predicted Positive Social Anxiety Cognitions, and also interacted with pre-treatment Observation Anxiety to predict post-treatment Observation Anxiety, and interacted with pre-treatment Interaction Anxiety to predict post-treatment Interaction Anxiety.

Interactions for the other outcome variables were not significant.

Table 28

Unstandardised Beta Values of Hierarchical Regression Analyses of Post-Treatment Outcome Scores on BAS Total and Pre-Treatment Scores.

Predictors		Post-Treatment Outcome Variables							
		OA	IA	FNE	QLES	SISSTN	SISSTP	CCL Anx	CCL Dep
<i>Step 1</i>	<i>Adj R²</i>	.41**	.44**	.14	.40**	.36**	.38**	.21*	.15
Pre-treatment		.46**	.91***	.75	.59***	.81**	.83***	.45*	.58*
BAS Total		.35	.11	.80	-.01	.35	-.95*	-.15	-.06
<i>Step 2</i>	<i>ΔR²</i>	.10	.40	.07	.01	.00	.01	.03	.01
Pre-treatment X BAS Total		.05	.04	.05	.02	.02	.02	-.03	.02

Note. BAS = Behavioural Approach System; OA = Observation Anxiety; IA = Interaction Anxiety, FNE = Fear of Negative Evaluation; QLES = Quality of Life Enjoyment and Satisfaction; SISSTN = Social Interaction and Self-Statements-Negative; SISSTP = Social Interaction and Self-Statements-Positive; CCL Anx = Cognition Checklist-Anxiety; CCL Dep = Cognition Checklist-Depression.

*** $p < .001$, ** $p < .01$, * $p < .05$, $p < .10$

Figure 14 shows that SR moderated the relationship between pre- and post-treatment Observation Anxiety. For low levels of SR, the relationship between pre- and post-treatment Observation Anxiety was not influenced by SR. The regression coefficient for post-treatment Observation Anxiety for low SR (- 1 SD) at low (- 1 SD) and high (+ 1 SD) pre-treatment Observation Anxiety was not significant [$b = 0.24$, $t(df = 11) = 1.29$, $p > .05$]. However, for high levels of SR, the strength of the relationship between pre- and post-treatment Observation Anxiety increased with increased levels of pre-treatment Observation Anxiety. The regression coefficient for high SR (+1 SD) at low and high pre-treatment Observation Anxiety was significant [$b = 0.95$, $t(df = 11) = 4.12$, $p < .05$]. The difference between the regression coefficients for high and low SR was also significant, [$t(df = 11) = 2.45$, $p < .05$].

Table 29

Unstandardised Beta Values of Hierarchical Regression Analyses of Post-Treatment Outcome Scores on Sensitivity to Punishment and Pre-Treatment Scores.

Predictors		Post-Treatment Outcome Variables							
		OA	IA	FNE	QLES	SISSTN	SISSTP	CCL Anx	CCL Dep
<i>Step 1</i>	<i>Adj R²</i>	.40**	.44	-.07	.47***	.34**	.21*	.34**	.18
Pre-treatment		.52***	.94***	.71	.53**	.79**	.55	.38**	.54*
SP		.34	-.21	-.36	-.01	.16	-.29	.65	.51
<i>Step 2</i>	<i>ΔR²</i>	.03	.06	.03	.02	.03	.07	.30	.07
Pre-treatment X SP		.06	.12	-.15	-.05	-.09	.11	.03	-.13

Note. SP = Sensitivity to Punishment; OA = Observation Anxiety; IA = Interaction Anxiety, FNE = Fear of Negative Evaluation; QLES = Quality of Life Enjoyment and Satisfaction; SISSTN = Social Interaction and Self-Statements-Negative; SISSTP = Social Interaction and Self-Statements-Positive; CCL Anx = Cognition Checklist-Anxiety; CCL Dep = Cognition Checklist-Depression.

*** $p < .001$, ** $p < .01$, * $p < .05$, $p < .10$

Figure 15 shows that SR moderated the relationship between pre- and post-treatment Interaction Anxiety. For low levels of SR, the relationship between pre- and post-treatment Interaction Anxiety was not influenced by SR. The regression coefficient for post-treatment Interaction Anxiety for low SR (- 1 SD) at low (- 1 SD) and high (+ 1 SD) pre-treatment Observation Anxiety was not significant [$b = 0.22$, $t(df = 11) = 0.44$, $p > .05$]. However, for high levels of SR, the strength of the relationship between pre- and post-treatment Interaction Anxiety increased with increased levels of pre-treatment Interaction Anxiety. The regression coefficient for high SR (+1 SD) at low and high pre-treatment Interaction Anxiety was significant [$b = 1.54$, $t(df = 11) = 3.95$, $p < .05$]. The difference between the regression coefficients for high and low SR was also significant, [$t(df = 11) = 2.08$, $p < .10$].

Table 30

Unstandardised Beta Values of Hierarchical Regression Analyses of Post-Treatment Outcome Scores on Sensitivity to Reward and Pre-Treatment Scores.

Predictors		Post-Treatment Outcome Variables							
		OA	IA	FNE	QLES	SISSTN	SISSTP	CCL Anx	CCL Dep
<i>Step 1</i>	<i>Adj R²</i>	.40**	.46***	.08	.39**	.39**	.48***	.27*	.16
Pre-treatment		.53***	1.01***	.65	.58***	.88***	1.06***	.45**	.58*
SR		.16	.60	.64	-.01	.59	-1.33**	-.31	-.21
<i>Step 2</i>	<i>ΔR²</i>	.15*	.11*	.07	.00	.05	.06	.07	.00
Pre-treatment X SR		.08*	.14*	.12	-.02	.08	.04	-.06	.01

Note. SR = Sensitivity to Reward; OA = Observation Anxiety; IA = Interaction Anxiety, FNE = Fear of Negative Evaluation; QLES = Quality of Life Enjoyment and Satisfaction; SISSTN = Social Interaction and Self-Statements-Negative; SISSTP = Social Interaction and Self-Statements-Positive; CCL Anx = Cognition Checklist-Anxiety; CCL Dep = Cognition Checklist-Depression.

*** $p < .001$, ** $p < .01$, * $p < .05$, $p < .10$

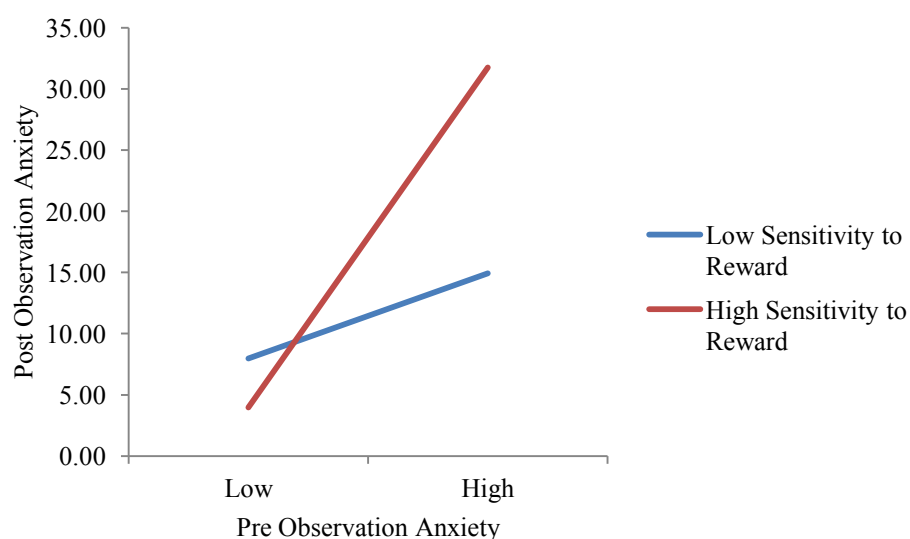


Figure 14. Sensitivity to reward moderating the relationship between pre-treatment and post-treatment observation anxiety.

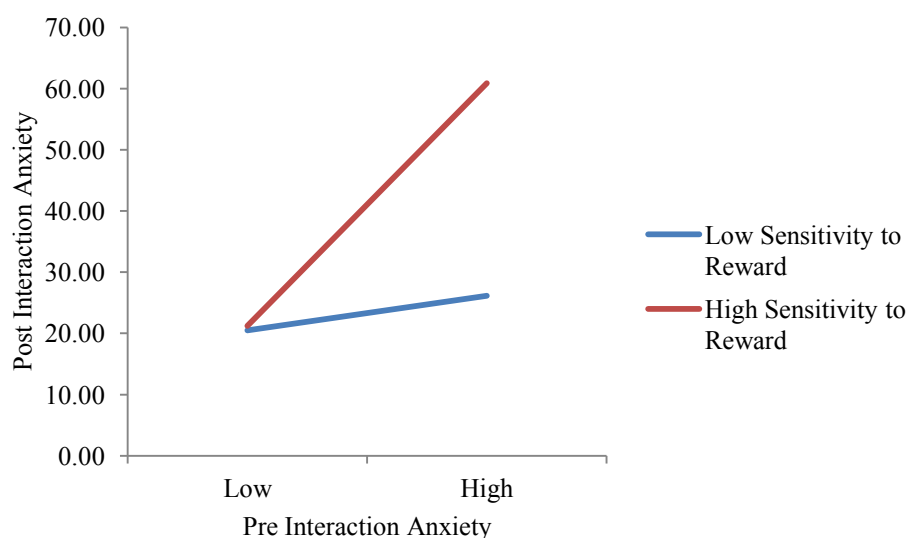


Figure 15. Sensitivity to reward moderating the relationship between pre-treatment and post-treatment interaction anxiety.

Discussion

The aim of this final study was to investigate the effect that individual differences in RST traits have on response to CBGT outcome for social anxiety disorder by observing whether RST traits moderated the relationships between pre-treatment and post-treatment outcome scores. Prior to conducting regression analyses on these relationships, significant differences between pre- and post treatment scores for all outcome measures revealed that the treatment was effective in reducing symptoms. Regression analyses revealed that pre-treatment scores (current functioning) were significant predictors of post-treatment scores for all outcome variables, except for fear of negative evaluation (FNE).

Interaction Anxiety

As predicted, and consistent with previous research on (Faytout et al., 2007; Hofman & Loh, 2006; Mortberg et al., 2007), both r-BIS (BIS Anxiety) and o-BIS (BIS Total) interacted with

pre-treatment interaction anxiety to predict post-treatment interaction anxiety, with high r-BIS and o-BIS scores influencing the relationship between pre- and post-treatment anxiety. This suggests that post-treatment interaction anxiety scores are likely to be higher for individuals with high BIS and higher levels of pre-treatment interaction anxiety. For individuals with low BIS, however, pre-treatment interaction anxiety scores have limited impact on post-treatment scores. These results make sense given that high BIS is associated with a strong negative bias in cognitive processes that are targeted in CBT (Gomez & Cooper, 2008). FFFS (BIS Fear) was not a significant predictor of interaction anxiety, which is consistent with the results of Study 1. It appears that interaction anxiety is characterised by r-BIS but not FFFS, which is consistent with previous research suggesting that interaction anxiety is characterised by „anxiety’ rather than „fear (Gray & McNaughton, 2000; Hofmann, 2000; Hook & Valentiner, 2002). This is supported by the fact that interaction anxiety involves conflict between avoidance of threat and approach to reward in social interactions, as discussed in Study 2.

Interestingly, SR also significantly interacted with pre-treatment interaction anxiety to predict post-treatment interaction anxiety scores, with high levels of SR influencing the relationship between pre- and post-treatment interaction anxiety. These results suggest that not only do high BIS levels affect treatment outcome, but that high BAS levels can also impact on this relationship. On the one hand, this result is contrary to theory in that BAS is associated with more adaptable cognitive processes (i.e. better ability to cognitively disengage from aversive stimuli; Avila & Torrubia, 2008) and that high BAS may protect against social anxiety (Kimbrel, 2008), however, it is consistent with research suggesting that more moderate or low levels of BAS are associated with optimal functioning and social adjustment (Knyazev et al., 2008). This is likely related to the fact that SR includes an element of impulsivity and difficulties in delaying gratification (e.g. ‘Do you sometimes do

things for quick gains?’). This result can also be explained by Carver’s (2004) velocity hypothesis that high BAS can lead to feelings of frustration and other negative emotions if level of expectations exceed level of performance. If this is the case, this may have impacted on response to treatment for individuals with higher BAS/SR.

Observation Anxiety

Similar to the above findings, RR, Drive, and SR all interacted with pre-treatment observation anxiety scores to predict post-treatment scores, with higher RR, Drive and SR resulting in higher post-treatment observation anxiety scores. Again, these findings suggest that high BAS may not be associated with optimal functioning and desired treatment outcome. It is surprising, however, that high Drive would be associated with higher observation anxiety scores, given that drive is generally considered to be associated with positive outcomes and also that Study 2 found that Drive *negatively* predicted cognitions concerned with judgement by others. This raises interesting questions about the role that drive plays in anxiety. Indeed, it is quite conceivable that individuals may be driven by their anxiety, that is, individuals can have both high drive and high anxiety simultaneously.

Interestingly, FFFS nor r-BIS appeared to relate to observation anxiety scores. This is inconsistent with previous research (Faytout et al., 2007; Hofman & Loh, 2006; Mortberg et al., 2007) and the results of Study 1. The fact that FFFS was not a significant predictor is particularly unexpected given that observation anxiety is considered to be characterised by fear symptom profiles (Hook & Valentiner, 2002). This finding may be explained by methodological limitations, particularly the small sample size.

Cognition Outcomes

Positive Social Anxiety Cognitions scores were independently and negatively predicted by BAS, SR and Fun-S. This is consistent with the discussion above regarding how BAS

variables can negatively relate with optimal functioning (Carver, 2004; Knyazev et al., 2008), and again this finding is contrary to the fact that BAS has been associated with effective cognitive processes (Avila & Torrubia, 2008). Clearly, further research is required to elucidate the BAS construct with relation to social anxiety and general psychopathology, as discussed in Chapter 2.

Drive moderated the relationship between pre- and post-treatment Anxiety Cognitions, with low levels of Drive having a stronger influence on this relationship. It appears that individuals with low levels of Drive are more likely to have higher post-treatment Anxiety Cognitions, which is expected, however is contrary to the fact that the reverse relationship was found for observation anxiety outcome (i.e. individuals with high levels of Drive are more likely to have higher post-treatment observation anxiety scores). As mentioned above, the role of drive in these relationships require further investigation. Interestingly, FFFS moderated the relationship between pre- and post-treatment scores for Anxiety Cognitions with lower FFFS scores associated with higher post-treatment scores. The same result was found for Depression Cognitions.

Summary

Although there were significant reductions from pre- to post treatment scores for all outcome variables, RST variables did not moderate all outcomes. There were no significant findings for measures of quality of life, negative social anxiety cognitions and fear of negative evaluation. An interesting mix of findings was revealed for the other outcomes. The finding most consistent with previous research was that r-BIS and o-BIS influenced treatment outcome for interaction anxiety with high BIS associated with higher post-treatment scores. High SR was also associated with higher post-treatment interaction anxiety scores. For observation anxiety, FFFS appeared to have no influence on treatment outcome, however, RR, Drive and SR were significant moderators with high scores predicting poorer outcome.

RST variables appeared to affect post-treatment cognition scores in unexpected directions, which require further research. Although predictions of these relationships depend on the outcome being measured, overall, the results suggest that having high levels of both BIS and BAS are not desirable for treatment outcome.

CHAPTER 7

GENERAL DISCUSSION

The overall aim of this thesis was to investigate the relevance of RST traits to social anxiety in community samples, and also response to cognitive behavioural therapy (CBT) outcome for individuals with social anxiety disorder. This chapter will present a general discussion of the thesis findings. The first section will summarise the results of the three studies. The implications of Studies 1, 2 and 3 will then be discussed separately, followed by a discussion of the general implications of the thesis. The next section will discuss the limitations of the thesis and suggestions for future research. Finally, the conclusions of the thesis will be summarised.

Summary of Results

Study 1

In Study 1, the relationships between RST traits (and similar personality variables) and observation anxiety and interaction anxiety were investigated using a survey methodology. For observation anxiety, r-BIS, FFFS, o-BIS, Sensitivity to Punishment (SP), neuroticism, negative affectivity (NA) as well as the composite factor of these personality variables (i.e. „avoidance’) were significant positive predictors. Fun-S, positive affectivity (PA) and extraversion were negative predictors. For interaction anxiety, the same pattern of results was found except that FFFS was not a significant predictor.

Study 2

In Study 2, an experimental mood-induction methodology was employed to investigate the effects of RST traits on cognitive, affective and avoidance responses to induced states of social anxiety. For affective responses, SP positively and independently predicted post-

induction fear, and SP interacted with SR to predict post-induction anxiety. For cognitive responses, *I want to leave/exit/escape this situation* and *People can see that I feel anxious* were both positively predicted by SP. *I am being judged/evaluated negatively by these people* was positively predicted by FFFS and Fun-S, and negatively predicted by Drive. For avoidance responses, desire to avoid was positively predicted by SP.

Study 3

Study 3 investigated how RST traits affected response to CBT outcome for individuals with clinical levels of social anxiety. The treatment was successful in reducing symptoms for all outcome measures from pre- to post-treatment. With regards to how RST variables affected treatment outcome, an interesting pattern of results emerged across the different outcome variables. For interaction anxiety treatment outcome, both r-BIS and o-BIS interacted with pre-treatment interaction anxiety to predict post-treatment interaction anxiety, with high r-BIS and o-BIS scores influencing the relationship between pre- and post-treatment anxiety. FFFS was not a significant predictor of interaction anxiety. SR also significantly interacted with pre-treatment interaction anxiety to predict post-treatment interaction anxiety scores, with high levels of SR influencing the relationship between pre- and post-treatment interaction anxiety. For observation anxiety treatment outcome, RR, Drive, and SR all interacted with pre-treatment observation anxiety scores to predict post-treatment scores, with higher RR, Drive and SR scores resulting in higher post-treatment observation anxiety scores. For SISSTP treatment outcome (positive social anxiety cognitions), scores were independently and negatively predicted by BAS, SR and Fun-S. Drive moderated the relationship between pre- and post-treatment CCL Anx (general anxiety cognitions), with low levels of Drive having a stronger influence on this relationship. FFFS also moderated the relationship between pre- and post-treatment scores for CCL Anx with lower FFFS scores

associated with higher post-treatment scores. The same result was found for CCL Dep treatment outcome (depression cognitions).

Implications of Study 1

BIS and FFFS Relationships with Social Anxiety

BIS and social anxiety.

In Study 1, it was found that r-BIS, o-BIS, and SP were significant positive predictors of both observation anxiety and interaction anxiety. These findings are consistent with the few previous studies conducted, which have shown that BIS is positively associated with social anxiety (Coplan et al., 2006; Kashdan & Roberts, 2006; Kimbrel et al., 2008; Vervoot et al., 2010). This finding suggests that having a high BIS is a risk factor for having high levels of social anxiety, which is not surprising given that high BIS is characterised by high anxiety and avoidance. NA and neuroticism as well as the composite „Avoidance’ factor were also positive predictors of both observation anxiety and interaction anxiety. These findings are again consistent with previous research that other personality variables characterised by avoidance and the tendency to experience negative emotions, are positively related with social anxiety (Bienvenu et al., 2001; Bienvenu & Stein, 2003; Chatterjee et al., 1997; Cloninger, 1987; Gray & McNaughton, 2000; Eysenck, 1947; Faytout et al., 2007; Fox et al., 2005; Hofmann & Loh, 2006; Kimbrel, 2008; Mortberg et al., 2007; Pelissolo et al., 2002; Trull & Sher, 1994; Watson et al., 1988)

FFFS and social anxiety.

FFFS was a positive predictor of observation anxiety but not interaction anxiety. This is consistent with some research that suggests that „fear’ (i.e. FFFS) and „distress’ (i.e. BIS) personality traits show different relationships with internalising disorders (e.g. Krueger, 1999; Krueger et al., 1998). Social anxiety and the way it has been conceptualised provides a

good example of this issue. Clinical levels of social anxiety has historically been referred to as „social phobia’ and this is consistent with empirical models of psychopathology that find that social anxiety clusters with „fear’ disorders, such as panic and the specific phobias (Krueger, 1999; Krueger et al., 1998). The DSM-IV-TR, on the other hand, brands the condition as *social anxiety disorder*, reflecting the idea that it is more closely aligned with generalised anxiety/distress features than phobias. The question underlying these issues then is whether the nature of „social anxiety’ is ‘distress/anxiety’ or ‚fear’.

The distinction between observation anxiety-FFFS and interaction anxiety-BIS.

Consideration of observation anxiety and interaction anxiety subtypes of social anxiety may reconcile conceptual confusions about whether social anxiety is a fear or an anxiety. As discussed in Chapter 2, previous research (Craske, 1991; Hook & Valentiner, 2002; Lundh & Ost, 1997) suggests that it is useful to distinguish between different sources of social anxiety – anxiety about being observed (i.e. observation anxiety) or anxiety about interacting with others (i.e. interaction anxiety). These studies have identified that observation anxiety is more closely aligned with fear/phobia/panic symptoms and that interaction anxiety is more closely aligned with generalised anxiety/distress disorders. The fact that Study 1 found that FFFS (reflects fear) predicted observation anxiety but did not predict interaction anxiety, supports this fear-distress distinction.

This finding can in fact be seen to have an evolutionary basis. Observation anxiety can be seen as akin to the fear our ancestors would have experienced when being hunted by potential predators. This situation naturally would have produced fear and would have been avoided at all costs. Interaction anxiety, on the other hand, is akin to the process of assessing for threat in other tribe members with the simultaneous aim of expanding group protection (Gray & McNaughton, 2000). This situation would have produced *anxiety* (potential threat combined with potential reward) and not *fear* (pure avoidance). Inconsistencies in the

contemporary literature about whether social anxiety is better considered as a fear or as an anxiety may depend on the specific source of the perceived social threat.

This fear-anxiety distinction might suggest that observation anxiety is better identified as a phobia and that interaction anxiety is better conceptualised as an anxiety disorder. However, key flaws in following this approach would be that it is quite common for individuals to have both interaction anxiety and observation anxiety (although it is currently unclear the extent to which one condition develops as a result of the other; Hook & Valentiner, 2002); that the FFFS and BIS systems have interrelating neural functions (Gray & McNaughton, 2000); and the fact that r-BIS (anxiety) also significantly predicted observation anxiety in Study 1. It appears that, while observation anxiety symptoms are more closely aligned with fear symptoms than interaction anxiety, that observation anxiety still exhibits a relationship with anxiety/distress symptoms. These results therefore show some support for the fear-anxiety distinction proposed in the revised version of RST (r-RST), however, given the strong relationships between observation anxiety, interaction anxiety and o-BIS, these results appear to be more consistent with the original RST (o-RST).

These findings are consistent with the proposed revisions for the social anxiety disorder criteria in the next edition of the DSM - the DSM 5 (due to be published in 2013). Proposed changes in the social anxiety disorder criteria include consistent use of the phrase „fear or anxiety’ and acknowledgement of the distinction between: observation anxiety, interaction anxiety and also anxiety that results from performing in front of others (Bogels et al., 2010). The criteria also require the clinician to specify whether presenting problems are restricted to performance anxiety (e.g. public speaking). This diagnostic approach is consistent with the literature as this approach emphasises that clinicians should make a distinction between different sources of social anxiety yet still considers observation anxiety and interaction anxiety as subtypes of the same disorder.

The proposed revisions for the DSM 5 do not emphasise the distinction between social anxiety subtypes: generalised social phobia (GSP; fear of most social situations) and specific social phobia (SSP; fear in a limited number of specific social situations). Although there is extensive discussion of these subtypes in the literature (Hofmann, 2000b; Hook & Valentiner, 2002), there is little evidence to show that their distinction has much diagnostic utility. In fact, the number of situations required to qualify for either subtypes is arbitrary and it appears that the important distinction between GSP and SSP is primarily qualitative. Compared to SSP, GSP has been shown to be more impairing (Clark & Beck, 2010; Herbert et al., 1992; Holt, Heimberg & Hope, 1992; Kessler et al., 1998; Tran & Chambless, 1995; Wittchen, Stein, & Kessler, 1999), to have earlier onset (Mannuzza et al., 1995), appears to have a more familial cause (Mannuzza et al., 1995; Stein et al., 1998) and is more closely related with distress personality variables (Herbert et al., 1992; Hofmann & Roth, 1996; Holt et al., 1992; Norton et al., 1997; Turner et al., 1992). Individuals with GSP almost always have interaction anxiety, and in fact this is usually the common factor across the feared social situations – interactions with other people are ubiquitous across many social contexts. On the other hand, it is not unusual for individuals with SSP to experience little interaction anxiety and to be primarily concerned with being observed in a specific context (e.g. eating in public). Any formal distinction between social anxiety subtypes therefore should perhaps depend on the source and nature of the social anxiety (i.e. observation anxiety, interaction anxiety or performance anxiety) rather than the number of situations. Fortunately, it appears that the DSM 5 social anxiety disorder criteria will be guided by this approach.

BAS Relationships with Social Anxiety

Study 1 found that BAS and most of its subscales did not significantly predict social anxiety. This result is consistent with most studies that have specifically investigated RST relationships with social anxiety (Kashdan & Roberts, 2006; Kimbrel et al., 2008; Vervoot et

al., 2010). PA and extraversion, on the other hand, were both significant predictors, which is also consistent with previous studies (Bienvenu et al., 2001; Eysenck, 1947; Trull & Sher, 1994; Watson et al., 1988b). Given that PA and extraversion are often found to be positively related with BAS (as all these traits reflect „Approach’ tendencies/positive emotions), it might be expected that the BAS would also have been a significant predictor. However, PA and extraversion are variables that directly measure pro-social behaviour while the BAS measures an individual’s sensitivity towards rewards of a more general nature. According to the results of Study 1, it appears that the BAS (as it is currently measured) does not have a relationship with social anxiety.

Fun-S was the only BAS subscale that was a significant predictor (negative). This finding is not particularly surprising given that the prototype presentation of social anxiety often includes low levels of impulsivity and high control. According to the BIS/BAS Scale conceptualisation of the BAS, Fun-S is a BAS subscale, however, given that it is a measure of external control (or impulsivity), it is perhaps better subsumed under the Control dimension of personality proposed in three-factor models, as discussed in Chapter 1. There has already been substantial discussion about whether impulsivity is the appropriate trait reflecting BAS tendencies (Corr, 2008; Depue & Collins, 1999; Smillie et al., 2006) and whether „reward-reactivity’ would be a more faithful description of the BAS. Indeed these unresolved issues regarding the conceptual nature of the BAS may conceal any existing relationships between the BAS and social anxiety.

Implications of Study 2

Effect of RST traits on Cognitive Responses

Given that r-RST proposes that high r-BIS is associated with cognitive processes that are biased towards detecting threat, it was expected that r-BIS would positively predict core

social anxiety cognitions. SP significantly predicted cognitions reflecting themes of avoidance (*I want to leave/exit/escape this situation*) and anxiety (*People can see that I feel anxious*). It was expected that the BIS would exhibit stronger correlations with these two cognitions than the other two cognitions investigated (*I am being judged/evaluated negatively* and *I am going to embarrass myself*) given that anxiety and avoidance are central to the outputs of the BIS. The two latter cognitions were not significantly predicted by the BIS. This finding was surprising as these cognitions were still expected to exhibit some correlation with social anxiety, given that they reflect core social anxiety concerns. It is possible, as mentioned in Chapter 5, that these latter cognitions may be less relevant for individuals in the community with normal levels of social anxiety. Individuals with normal levels of social anxiety may experience social anxiety while not strongly endorsing beliefs that they are going to embarrass themselves or be judged negatively. It was not uncommon for participants in Study 2 to acknowledge that they were not likely to embarrass themselves or be judged negatively and were able to give rational reasons for this (e.g. they were prepared for their presentation or their prospective audiences were comprised of friends and acquaintances). On the other hand, cognitions concerning desires to avoid the situation are a natural human reaction when individuals face anxiety-provoking situations. Similarly, cognitions concerning people observing their anxiety may be quite well objective (i.e. anxiety may be objectively visible to audience members). Therefore, the cognitions concerning desires to avoid and others observing their anxiety are more „objective’ than the other two cognitions.

I am being judged/evaluated negatively by these people was also positively predicted by FFFS, which is consistent with research suggesting that observation anxiety is closely associated with fear (Hook & Valentiner, 2002). Fun-S was also a significant positive predictor which may be interpreted in two ways. On the one hand, this finding might be surprising given that the prototype of impulsive personalities would not be expected to be

associated with concern about negative judgement. However, individuals with high Fun-S tendencies are also more likely to undertake risky behaviours that are more susceptible to scrutiny by others. This may lead such individuals to be more concerned about being judged by others compared to their less impulsive counterparts. *I am being judged/evaluated negatively by these people* was also negatively predicted by Drive, which is not surprising given that individuals with high drive are less likely to be concerned about potential negative judgement.

Effect of RST traits on Affective Responses

Regarding post-induction anxiety, it was interesting to find that SP did not independently predict post-induction anxiety levels (although p levels bordered on significant, $p=.07$) however its interaction with SR to was significant. This finding suggests that the effects of SP on social anxiety were particularly strong when combined with a low SR, and is consistent with theory that a high BAS can act as a protective factor against social anxiety (Kimbrel, 2008). BAS tendencies may protect against anxiety via the endorsement of BAS-related cognitions, for example, by reminding themselves of the potential social rewards. High BAS individuals are considered to be better able to disengage from aversive stimuli after they have been detected (Avila & Torrubia, 2008). In social situations, this would mean that higher levels of BAS would help individuals not to be discouraged by stimuli that they might perceive to be negative (e.g. a bored facial expression) and consequently, such individuals would be expected to cope better with social anxiety. This is also consistent with the fact that SR significantly predicted post-induction anxiety but not post-induction fear (fear is characterised by avoidance of threat without approach to reward) and that SP independently predicted fear response.

Curiously, the significant SP-SR interaction is inconsistent with most previous studies (and Study 1) finding that BAS is not related with social anxiety at all (Kashdan & Roberts,

2006; Kimbrel et al., 2008; Vervoot et al., 2010). The fact that BAS was not a significant predictor in Study 1 but emerged as significant in Study 2 may be explained by the fact that previous studies and Study 1 used measures of *trait* tendencies towards social anxiety. Study 2 measured responses to specific *states* of social anxiety induced in specific social anxiety contexts. The social situations that were included in Study 2 were also more likely to be situations that the individual desired to overcome and of which they had a specific personal investment in (e.g. dance recital, attracting a potential romantic partner). However, the incentives/reward elements inherent in social situations are not captured when measuring social anxiety with trait scales. The significant interaction between SP and SR is also consistent with the JSH (Corr, 2002a), which predicts that interactive effects are most likely to be found when there is a combination of perceived threats and incentives present in the environment.

Effect of RST traits on Avoidance Responses

SP significantly predicted *desire* to avoid but not *actual* avoidance (physical escape). This finding is consistent with the finding just discussed regarding how individuals were motivated by the rewards of the situations. For many of the participants in Study 2, it appears that the incentives inherent in the social situation may have overridden any desire to avoid the situation. Clearly, the context of a given social situation will have an influence on the extent to which BIS and BAS will be activated to influence anxiety.

Implications of Study 3

The final study investigated whether RST traits would affect response to CBT outcome for individuals with clinical levels of social anxiety. It was observed whether RST traits would interact with pre-treatment scores to predict post-treatment scores. interaction anxiety and

observation anxiety were the main treatment outcome variables; however, an interesting pattern of results emerged across the different outcome measures used.

Interaction Anxiety Outcome

As predicted, both o-BIS and r-BIS moderated the effects of pre-treatment interaction anxiety, such that individuals with high BIS scores had higher post-treatment interaction anxiety scores. This is consistent with the predictions of the RST model of psychopathology discussed in Chapter 2 (Gomez & Cooper, 2008) and theoretical models that have linked social anxiety disorder and RST (Kimbrel, 2008). Individuals with high BIS levels would be expected to be more difficult to treat as their cognitions would be more resistant to change. This would suggest that it would take longer for these individuals to achieve levels of change comparable to individuals with lower BIS levels. This finding is supportive of research that has found that high harm avoidance (HA; Cloninger et al., 1993), which is akin to the BIS, is positively associated with post-treatment social anxiety scores (Faytout et al., 2007; Hofmann & Loh, 2006; Mortberg et al., 2007). FFFS was also not a significant predictor of interaction anxiety outcome, which is consistent with the results of Study 1 and the idea that interaction anxiety is more closely associated with anxiety/distress than fear (Gray & McNaughton, 2000; Hofmann, 2000b; Hook & Valentiner, 2002).

Interestingly, SR also significantly interacted with pre-treatment interaction anxiety to predict post-treatment interaction anxiety scores, with high levels of SR influencing the relationship between pre- and post-treatment interaction anxiety. These results suggest that not only do high BIS levels affect treatment outcome, but that high *BAS* levels are also associated with poorer treatment outcome. This result is contrary to theory discussed earlier that *BAS* is associated with more adaptable cognitive processes (i.e. better ability to cognitively disengage from aversive stimuli; Avila & Torrubia, 2008) and that high *BAS* may protect against social anxiety (Kimbrel, 2008). Although the research on the cognitive

processes of the BAS are inconclusive, performance and conditioning studies to date do suggest that *low* BAS individuals would be expected to be deficient in attention and processing of reward stimuli, not *high* BAS individuals (Avila & Torrubia, 2008).

However, there is other research that suggests that a low BAS is better for optimal functioning and social adjustment (Knyazev et al., 2008). This might explain the unexpected BAS relationship with treatment outcome. The problem with this theory is that this research suggests that the risks of high BAS are traditionally associated with the externalising and impulse-control disorders, and not internalising disorders, such as social anxiety disorder. Individuals with social anxiety typically do not have problems with impulse-control and in fact the prototype presentation of social anxiety disorder often include symptoms associated with excessive control.

Recent research suggests that there may be a distinct ‘novelty-seeking, impulsive subtype’ of social anxiety (Kashdan & Hofmann, 2008). Contrary to the quiet and passive behaviour normally seen in socially anxious individuals, individuals who fall under this proposed subtype are expected to manifest their anxiety in impulsive behaviours in social situations. Such individuals would, for example, speak extremely rapidly or blurt inappropriate remarks to curtail anxiety and heightened self-consciousness. These behaviours in fact have a high potential of increasing anxiety as these behaviours could elicit genuine negative feedback from others. In this respect, these individuals may be expected to have more difficulties in overcoming their anxiety than their more passive socially anxious counterparts (high BIS, low BAS). This theory may explain why high SR scores also predicted higher post-treatment anxiety.

It is noteworthy that SR (and SP) is a measure of BAS *behaviour* while the BAS as measured by the BIS/BAS Scale, is more a measure of BAS *predisposition*. Given that BIS (as measured by the BIS/BAS Scale) also influenced treatment outcome, it is conceivable that

these individuals have core BIS tendencies, and *not* BAS predispositions but that BAS behaviours may at times manifest as expressions of their anxiety. For naturally anxious individuals, it would be expected that impulsive behaviours would emerge particularly in situations when they are feeling anxious or under threat. This raises the question of how and when BAS behaviours are manifestations of true tendencies or secondary expressions. There is currently very little research on the role of impulsivity and reward-reactivity in socially anxious individuals and future studies are required to further explore these possibilities.

Another potential explanation may be provided by the velocity hypothesis proposed by Carver (2004). Carver proposed that BAS can be associated with negative emotions and frustration if there is a mismatch between expectations of performance and actual performance level. Given that high BAS levels are associated with higher expectations for reward; this may also explain why high BAS levels were associated with higher post-treatment interaction anxiety scores. This may be particularly relevant for the socially anxious individuals with poor social skills (e.g. impulsive socially anxious individuals). Further, given that expectations of treatment are known to impact on CBT outcome for social anxiety disorder (see Ledley & Heimberg, 2005), it could follow that being too confident in a treatment may be just as detrimental as having low expectations. This is a situation, where from a cognitive perspective, two situations can result. On the one hand, high BAS is associated with the ability to disengage from aversive stimuli (Avila & Torrubia, 2008), which would help individuals better manage their anxiety. On the other hand, BAS has potential to be associated with less realistic expectations that may lead to negative feelings. Further research is required to refine the ways in BAS may affect social anxiety.

Observation Anxiety Outcome

Curiously, none of the BIS variables or FFFS predicted observation anxiety treatment outcome scores. It was particularly unexpected that FFFS was not a significant predictor,

given that FFFS reflects fear and fear is proposed to be highly related to observation anxiety symptoms. It was shown in Study 1 that BIS and related variables have a relationship with observation anxiety however the absence of significant results in Study 3 suggest that they are not related to treatment response. This finding may possibly be attributed to a methodological limitation, such as a lack of statistical power due to a small sample size. Moreover, it is interesting that while BIS variables were not significant; RR, Drive, and SR all emerged as significant and affected treatment outcome for observation anxiety. As with interaction anxiety, *high* scores on these BAS variables were associated with higher observation anxiety post-treatment scores. These results could be explained by the theories just discussed regarding how high BAS can be associated with higher post-treatment anxiety.

Cognition Outcomes

SISSTP outcome.

Positive social anxiety cognition scores (SISSTP) were also independently and negatively predicted by BAS, Fun-S and SR. This is consistent with the discussion above regarding how BAS variables can negatively relate with optimal functioning (Knyazev et al., 2008), and again this finding is contrary to the fact that BAS has been associated with effective cognitive processes (Avila & Torrubia, 2008). Clearly, further research is required to elucidate the BAS construct with relation to social anxiety and general psychopathology, as discussed.

Cognition Checklist Anxiety outcome.

Drive moderated the relationship between pre- and post treatment CCL Anx (general anxiety cognitions) with low Drive scores being associated with higher post-treatment CCL Anx scores. This finding makes sense as it would be expected that low drive would be associated with high general anxiety, particularly as the CCL Anx scale items largely measure worry about future health problems and well-being. However, it is interesting that the reverse relationship was found for observation anxiety outcome scores, that is, *high* Drive was

associated with higher observation anxiety post-treatment scores. This raises interesting questions about why *high* Drive would be associated with high observation anxiety scores while *low* Drive would be associated with high CCL Anx scores. One possible explanation could be the nature of the measured outcomes. CCL Anx items reflect concerns about future health and have a depressive quality about them (e.g. „What if I get sick and become an invalid?’ and „I am not a healthy person’) while observation anxiety items are more closely aligned with fear (e.g. „When in an elevator, I am tense if people look at me’). Clearly, Drive would not be expected to positively relate with depression yet it is conceivable that Drive is positively associated with fear. Individuals can be driven by their fear or anxiety, depending on the reasons for their anxiety. This is consistent with earlier discussions about how social anxiety can be positively associated with SR.

Finally, FFFS was found to moderate the relationship between pre- and post-treatment scores for CCL Anx with *low* FFFS scores associated with higher post-treatment scores. The same result was found for CCL Dep. These are unusual findings that have no clear theoretical explanation. It is possible that these findings can be explained by problems with the BIS Fear measure, especially as its validity has not been confirmed. Participants may not have responded to them appropriately as these two items were negatively phrased. Given that the measure showed correlations in unexpected directions with many of the other outcome variables, this possibility is not particularly unlikely. These unexpected results may not have emerged in Studies 1 and 2 because those studies involved larger sample sizes, thereby removing any inconsistent patterns of responding. The other outcome variables (SISSTN, negative social anxiety cognitions; FNE, Fear of Negative Evaluation, QLES, Quality of life) were not significantly related to RST variables.

General Implications

Personality and Psychopathology Share a Dimensional Relationship

It is only recently that personality and psychopathology have been re-united as two areas of related inquiries. The finding in this thesis that social anxiety and RST personality traits share dimensional relationships supports this recent shift in thinking. These results highlight the importance of extending these ideas from research to clinical practice. Fortunately, steps have been taken in this direction with the approach taken in current proposals for the DSM 5. One of the guiding principles underlying the revisions is the idea that psychopathology is a dimensional phenomenon. While the majority of disorders will continue to be regarded as „categories’ (at least in this DSM version), the DSM-5 Work Groups are currently considering the inclusion of dimensional assessments to compliment diagnoses. For example, there will be room for consideration of the intensity of symptoms that will be rated on a dimensional scale (e.g. “very severe,” “severe,” “moderate” or “mild”), rather than independently assessing whether individuals meet criteria X, Y and Z for a given disorder.

Normal Personality Traits can be used to inform Treatment Outcome for Psychopathology

The current findings that RST traits affect cognitive and affective response to states of social anxiety and treatment outcome for social anxiety disorder, support the view that normal personality traits can be used to inform treatment outcome. These results suggest that it is important to assess for personality traits in treatment planning. As mentioned in Chapter 1, researchers have emphasised that this component is lacking in standard clinical practice (Bagby et al., 2008; Ben-Porath, 1997; Harkness & Lilienfeld, 1997; Kotov et al., 2010; Quilty et al., 2008; Widiger et al., 1994) and there is emerging evidence that assessing for individual differences has diagnostic utility (Bagby et al., 2008; Quilty et al., 2008). It has been argued that screening for personality traits would be just as informative as assessing for personality disorders, which is standard practice (APA, 2000; Widiger et al., 1994). In

addition to the advantage of matching treatment to personalities of patients, a central benefit of assessing traits in treatment planning is knowing where to target in treatment and recognising the limitations of change (Harkness & Lilienfeld, 1997).

The individual differences approach would not aim to change core personality traits but to work with what it referred to as *character adaptations* (Harkness & Lilienfeld, 1997). Character adaptations refer to the behaviours that are instigated by basic personality tendencies (e.g. gambling as way of suppressing avoiding anxiety). This therapy approach is akin to behavioural analytic techniques, however, the individual differences approach would aim to intervene with sensitivity to the parameters of basic personality tendencies. In short, interventions designed would maximise a realistic view and would emphasise a need to change the behaviours while respecting the core traits of the person.

Using personality traits to inform assessment and diagnosis has been incorporated into the proposed revisions for the personality disorders in the DSM 5. This section of the DSM 5 will be adopting a „hybrid dimensional-categorical model for personality and personality disorder assessment and diagnosis’ which moves away from a purely categorical approach to personality „disorders’ to instead utilising the concepts of personality disorder *types* and personality *trait domains*. The rationale for this hybrid dimensional-categorical approach is not only to acknowledge the dimensional nature of personality and personality disorder but also to eliminate/reduce co-morbidity.

According to this model, there will no longer be ten personality disorders in the DSM. Instead, there will be five personality disorder types: borderline, antisocial/psychopathic, schizotypal, avoidant and obsessive-compulsive. These types were retained based on research that found these types have the “strongest psychometric evidence and clinical utility (e.g. Skodol et al., 2002; Siever & Davis, 2004). The remaining personality disorders (paranoid, schizoid, histrionic, narcissistic, dependent, depressive, and negativistic) are proposed to be

better characterised by general personality disorder criteria and complimented by basic personality traits domains. The six trait domains to include in the DSM 5 are: neuroticism, extraversion, agreeableness, conscientiousness, schizotypal, and obsessive-compulsive (O'Connor, 2005; Saulsman & Page, 2004; Tackett et al., 2008; Watson et al., 2008).

This model proposes a diagnostic rating scheme that in order for an individual to meet criteria for a personality disorder, they must qualify on three essential dimensional assessments. The individual must be a „good match’ or a „very good match’ to one of the personality disorder *types* OR „quite a bit’ to ‘extremely’ descriptive on one or more personality *trait domains*. Individuals must also be rated on a severity level of mild or greater impairment in functioning and must show stability of symptoms across time and situations, accounting for cultural and medical considerations.

It is encouraging to see that personality disorders are conceptualised within a dimensional approach and subsequently means that individuals are viewed as falling on a spectrum rather than having a certain „disorder’. The proposed revisions for the other mental disorders continue to be regarded as distinct categories, including social anxiety disorder. Avoidant Personality Disorder, which is often conceptualised as an extreme form of social anxiety disorder (Rettew, 2000), has been relabelled the „Avoidant Type’. Individuals are rated on a dimensional scale from „very good match’ to „no match’. While the description of the condition has slightly shifted from focusing on specific avoidance of interpersonal situations to more general feelings of negative emotions: “individuals who resemble this personality disorder type have a negative sense of self, associated with profound feelings of inadequacy, and inhibition in establishing close interpersonal relationships” (DSM 5 Task Force, 2010), this dimensional approach is a significant step forward in formally recognising the role of personality in social anxiety.

How can RST Personality Traits Inform Treatment Outcome?

From a cognitive perspective, it is assumed that individuals with high BIS levels would be more resistant to treatment because high BIS is associated with a negative bias in recall, perception and interpretation of stimuli. This suggests that individuals with high BIS had higher post-treatment anxiety scores because presumably their cognitions were more engrained than low BIS individuals, and subsequently were more resistant to change. For future reference, this may mean that high BIS individuals require more treatment sessions to reach comparable states of functioning or that they are more suited to therapies that directly address underlying schemas (e.g. Rational Emotive Behaviour Therapy; Ellis & Bernard, 1983). Although schema-change can result from attending standard CBT therapies, such as the one used in Study 3, these therapies aim to challenge surface cognitions (i.e automatic thoughts) and re-structuring fundamental schemas are not a focus. Individuals with high BIS may need more intensive cognitive therapies that work on the underlying roots of cognitive distortions.

The cognitive processes associated with the BAS are less understood however these results can be applied to non-cognitive therapies as well. There is some discussion in the literature that therapies that aim to challenge cognitions may not be as effective as approaches that emphasise *accepting* problematic cognitive and affective reactions (e.g. Longmore & Worrell, 2007). Acceptance and Commitment Therapy (ACT; Harris, 2009; Hayes, Luoma, Bond, Masuda, & Lillis, 2006) is currently taking the lead in this field of research. One of the core principles of ACT is to accept natural emotional and cognitive reactions to events by making room for discomfort, disengaging from difficult thoughts and then committing to identified values and goals. It emphasises that accepting and being present with uncomfortable thoughts, emotions and mood states enables one to reduce the power of these

sensations. ACT then teaches individuals to be guided by goals and values while accepting unpleasant feelings.

Therapies such as ACT would be particularly appropriate for individuals with high BAS and/or BIS levels, that is, individuals who are strongly reactive to stimuli. Given that ACT emphasises the importance of how individuals naturally react to stimuli, and how this contributes to psychopathology, this empowers such individuals with the knowledge that high reactivity levels can be managed. These techniques are akin to approaches used for individuals with borderline personality problems (Linehan, 1993).

The Important Role of Effortful Control

A common theme prevails in the implications of this thesis and that is the notion that effortful control is critical in regulating personality/psychopathology functioning (Linehan, 1993).

Effortful control refers to the ability to self-regulate by overriding dominant reactive tendencies with more adaptable responses, usually via relevant cognitive processes such as effective judgement (Kochanska, Murray, & Harlan, 2000; Rothbart, 1989; Rothbart & Bates, 1998). Current findings suggest that individuals with high levels of RST traits, that is highly reactive individuals, are at highest risk of psychopathology. These individuals require high degrees of effortful control in regulating their natural reactive tendencies. This theme can be seen in all therapy approaches. Within the individual differences approach, problem core traits would need to be overridden with effortful control to adopt helpful character adaptations. Within the traditional cognitive approaches, core problem schemas would need to be overridden with effortful control to adopt more rational/grounded schemas. Within an ACT approach, natural reactions are overridden via effortful control by accepting them and pursuing values and goals despite feeling these uncomfortable emotions.

The concept of effortful control may go a long way in helping researchers resolve the two- versus three-factor model debate of personality structure (Markon et al., 2005). The

ability to control emotions and behaviours is clearly critical to psychopathology, and by extension, normal personality. However, whether it stands as a separate dimension from the two first factors (Approach and Avoidance) is questionable. In fact, research has identified that personality dimensions can be defined by levels of control that are akin to the BIS and BAS: Overcontrollers (akin to BIS, low on extraversion and susceptible to internalising problems), Undercontrollers (akin to BAS; low on conscientiousness and agreeableness, impulsive and vulnerable to both internalising and externalising problems) and Resilients (well-functioning individuals with a healthy balance of control) (Robins et al., 1996). As expected, research has shown that resilients have low scores on BIS and BAS, that overcontrollers have scored high on BIS and that undercontrollers have high scores on BAS (Knyazev & Slobodskaya, 2006). Resilients would be expected to have good levels of effortful control. It is possible then that these two versus three factor solution confusions may be attributed to how control is conceptualised.

Conceptualising the role of personality and natural reactive tendencies as central to psychopathology may appear to some as proposing a rather pessimistic view with regards to treatment outcome. If psychopathology is a result of basic core tendencies, does this not imply that change is more difficult? To an extent, this view is valid. Elements of an individual's basic tendencies are resistant to change - this is not a new revelation. The advantage of using an individual differences approach is that it explicitly acknowledges that basic personality tendencies will affect the development and management of psychopathology. In fact, these results are seen as providing an optimistic view in that this approach can empower individuals to be aware of the extent to which their natural reactive tendencies affect their risk level. Individuals are subsequently in a better position to manage that risk (i.e. via effortful control). By placing clinical syndromes on the same spectrum as

normal personality, also helps to de-stigmatise psychopathology. With the right tools and environmental influences, both personality and psychopathology are malleable.

Limitations and Future Research

Limitations

The results of this research must be considered with their limitations. With regards to limitations across the three studies, firstly, RST traits and social anxiety symptoms were measured with self-rating scales. There is therefore potential for response bias due to common method variance. Secondly, all participants were self-selected and this had the potential to limit the generalisability of the results to the broader population. The possibility that the personalities of self-selecting individuals differ from other members of the population is particularly pertinent, given that the current studies investigated the relevance of personality to social anxiety. Thirdly, the studies used cross-sectional designs meaning that conclusions about causality could not be inferred from the results. Fourth, the FFFS was measured using the BIS Fear items from the BIS/BAS Scale and this means that conclusions about the FFFS must be made with particular caution as the validity of the scale has not been established. Fifth, the studies did not investigate subclinical levels of social anxiety. Although this was not an objective of the research, it would have been useful to distinguish these individuals from both „normal’ and clinical levels of social anxiety, particularly given indications that there are many individuals in the community who fall into this group (Davidson et al., 1994; Del’Osso et al., 2003; Fehm et al., 2008).

With regards to limitations specific to Study 1, the main limitation was that many of the participants were university psychology undergraduates and results should be generalised to the broader population with caution. Further, it should be kept in mind that many of these

participants participated in exchange for course credit and this may have impacted on motivation, compliance and related issues.

With regards to limitations specific to Study 2, the main limitation was that the study used an autobiographical recall experimental procedure to induce states of social anxiety. This method was used as an alternative to utilising generic anxiety scenarios as the experience of social anxiety is often of a personal nature and individuals differ in the kinds of social situations that evoke anxiety for them. This was the advantage to using this approach however the fact that these scenarios were not standardised had the potential to affect the generalisability of the results. Further, any procedure that relies on human recall is subject to error as post-event experiences may introduce subconscious memory and perception distortions. The scenarios that were selected for the experiment must also be considered. Given that many individuals in this study were also university students, certain types of situations were more likely to be chosen (e.g. class presentations). Although the purpose of the study was to investigate the *responses* experienced during social anxiety rather than the types of situations, the possibility remains that different types of social situations may affect responses. This is not particularly unlikely given that researchers have distinguished between observation, interaction and performance anxiety as discussed previously (Bogels et al., 2010). Another limitation of Study 2 that should be noted is that the mood induction also induced emotions besides anxiety and fear. Anger, for example, was induced and yielded a moderate effect size from pre- to post-induction. Although anxiety and fear produced the largest effect sizes, the potential interference of other emotions had the potential to confound results. Finally, another limitation to be considered is that the study did not measure subtle forms of avoidance otherwise known as „safety behaviours’ (e.g. avoiding eye contact, lack of participation in group conversations; Heimberg & Becker, 2002).

With regards to limitations specific to Study 3, the first limitation to be considered is that the participants were self-selected. This is a particularly important limitation for Study 3 as this was a clinical sample and it is quite possible that participants differ in significant ways from individuals who did not complete treatment or did not return after assessment. These particular individuals were highly motivated and compliant and therefore it is unknown if these results are generalisable to individuals who are less compliant in clinical settings. Secondly, a control group was not used in the study; therefore there was no way to be certain if score changes were due to treatment or time effects. It is also possible that social anxiety symptoms may have interfered with personality responses and vice versa. Thirdly, independent raters were not used in the study, as the primary investigator conducted all of the assessments and treatment groups. This had the potential to affect interpretation of results. Fourth, the sample was found to have high mean levels of depressive tendencies and generalised anxiety at assessment, therefore these co-morbid issues may have affected findings. Fifth, the study did not follow up participants post-treatment and therefore it is unknown whether RST traits affected long-term outcomes. Sixth, the study did not include behavioural assessments of social anxiety (e.g. Behavioural Assessment Tests; Fydrich, Chambless, Perry, Buerchner & Beazley, 1998). Behavioural assessments are not utilised as frequently as more standard assessments due to a more limited knowledge of their psychometric properties, although some studies support their utility (Fydrich et al., 1998). Sixth, the sample size was small, which limited the statistical power of results. Finally, social desirability effects may have been particularly significant with this sample as a desire to please is a common characteristic of social anxiety profiles.

Future Directions

RST traits as risk factors for social anxiety.

The findings of this thesis have implications for a number of directions in future research. Firstly, given that the literature on RST-social anxiety relationships is in its infancy, more studies are needed to replicate these findings. It appears that having high levels of BIS is a risk factor for developing high levels of social anxiety however these findings could be extended by investigating whether BIS interacts with environmental factors to predict social anxiety. Kimbrel (2008), in his model of the development and maintenance of social anxiety (see Figure 4), suggests that the effects of BIS are likely to be amplified when they interact with certain environmental variables, such as bullying experiences and parenting styles. One previous study found that BIS moderated the effects of parental overprotection on anxiety, such that parental overprotection was only an important factor for *high BIS* individuals but NOT low BIS individuals in developing problem anxiety (Kimbrel et al., 2007). This research would add to the knowledge base in identifying who are at highest risk for developing problem social anxiety.

The role of the BAS as a risk factor for social anxiety is currently unclear. BAS was not a significant predictor (except Fun-S) in Study 1 and results of Study 2 suggest that high BAS can act as a protective factor for social anxiety. Clearly, its relevance to social anxiety requires clarification. Eysenck's extraversion appears to be consistently related to social anxiety, and it would be useful to include both measures in future investigations. It is possible that the extraversion construct, as measured by the EPQ, is a better personality predictor of social anxiety than the BAS. Related to the relevance of the BAS to social anxiety is the potential for research to be conducted on the novelty-seeking, impulsive subtype of social anxiety. This is an emerging area of research that suggests that socially anxious individuals who exhibit impulsive tendencies (e.g. blurting out inappropriate remarks in conversation)

are more impaired compared to their BIS-like personality counterparts (Kashdan & Hofmann, 2008). If this is the case, future studies in this area would provide a more holistic picture of how personality tendencies can maintain social anxiety.

RST and treatment.

Beyond investigating RST traits as risk factors for social anxiety, these findings suggest that RST traits are relevant to treatment response. This suggests that RST measures would be useful for screening social anxiety in treatment programs. With regards to cognitive therapies, it would be useful in future studies to observe whether high BIS individuals would respond better to schema therapies than standard CBT programs, as discussed previously. Future studies could compare socially anxious individuals undertaking the two therapy types to wait-list controls. Further, as these results suggest that basic reactive tendencies are relevant to treatment outcome, future RST research would do well to focus efforts on treatment studies not only for social anxiety, but with the other psychopathologies as well. To date, there is very little research on RST-treatment relationships for psychopathology in general.

The current research showed that RST traits are relevant to treatment outcome however it did not look at whether they affect maintenance of treatment gains in the long-term. It would be useful for future studies to utilise longitudinal designs to investigate the relevance of RST traits to long-term outcomes. These suggestions for future treatment studies may also be applied to individuals with sub-clinical levels of social anxiety, given that social anxiety and personality appear to be dimensionally related.

Measurement of RST.

Finally, some suggestions must be made about how RST traits are measured in future studies. Firstly, it is important that when researchers compare results across studies, that these studies

use the same RST measures. SP was a significant predictor in Studies 1 and 2 but not in Study 3. This could possibly be attributed to the fact that Studies 1 and 2 used community samples and Study 3 used a treatment sample. It was also noted earlier that the SPSRQ measures behavioural/situational responses of RST traits while the BIS/BAS Scale measures RST predispositions. Comparing results of studies using different measures may further increase conceptual confusions.

Secondly, future studies need to focus efforts on the r-RST framework. As discussed previously, the validity of r-RST has not been established because there is a lack of r-RST measures. It is encouraging to see that at least one developed scale appears promising (Jackson, 2009). The Jackson-5 Scales have been shown to have good internal reliability and construct validity (Jackson, 2009) and hopefully this will encourage further development of r-RST scales.

Future RST-social anxiety studies would also do well to measure RST traits with non self-report measures, such as physiological and neurological instruments (DePascalis, 2008; Reuter, 2008). Also, a side measurement point that emerged in Study 3 is that the Fear of Negative Evaluation outcome scale was not significantly predicted in any of the regressions. Given that it has been established as a social anxiety scale with good psychometric properties (Musa et al., 2004; Watson & Friend, 1969), this raises interesting questions as to why it did not relate to RST traits while the SPS (observation anxiety) SIAS (interaction anxiety) relationships were significant. This finding suggests that future RST-social anxiety studies would do well to include multiple measures of social anxiety.

Summary and Conclusion

The overall aim of this thesis was to investigate the relevance of RST to social anxiety in the community and response to CBT outcome for social anxiety disorder. Study 1 found that o-

BIS, r-BIS and similar personality variables were positive predictors of both observation anxiety and interaction anxiety, and that Fun-S, extraversion and PA were negative predictors. FFFS also positively predicted observation anxiety. Study 2 found that SP positively predicted post-induction fear and cognitive responses associated with anxiety and avoidance. High SP also interacted with low SR to predict post-induction anxiety. Study 3 found that high levels of r-BIS, o-BIS and SR were associated with higher post-treatment interaction anxiety scores and that high levels of RR, Drive, and SR were associated with higher post-treatment observation anxiety scores.

The results suggest that BIS, FFFS and social anxiety share dimensional relationships; that RST traits affect cognitive, affective and avoidance responses to social anxiety and that high BIS and BAS scores relate to higher post-CBT outcome for social anxiety disorder. An important overall implication is that moderate BIS, BAS and FFFS levels are optimal for healthy functioning, particularly within clinical populations. Individuals who are less reactive to external stimuli are best equipped to self-regulate and for whom, less effortful control is required. These results support the notion that normal personality traits are highly relevant to the understanding of risk and management of psychopathology.

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Appendix A: Study 1 Information Sheet

The relevance of the behavioural inhibition system in understanding social anxiety and response to cognitive behavioural treatment for social anxiety disorder

Dear Participant,

Hi, my name is Corina Ly. As part of my Doctor of Philosophy (PhD) in Clinical Psychology, I am conducting research under the supervision of Professor Rapson Gomez (Director of Clinical Training) at the University of Tasmania. I am inviting you to participate in this research study.

1. ‘What is the purpose of this study?’

The purpose of the study is to investigate potential relationships between certain personality traits and social anxiety.

2. ‘Why have I been invited to participate in this study?’

You are eligible to participate in this study because you are an adult living in the community.

4. ‘What does this study involve?’

This study involves you completing a questionnaire comprised of seven short scales. It should take you approximately 20-25 minutes to complete and can be returned to myself either via the reply-paid envelope provided or left in the drop-off box at the UTAS School of Psychology administration office.

It is important that you understand that your involvement in this study is voluntary. While we would be pleased to have you participate, we respect your right to decline. There will be no consequences to you if you decide not to participate. If you decide to discontinue participation at any time, you may do so without providing an explanation. Please be assured that all data will remain anonymous. All information will be treated in a confidential manner and will be stored securely with the UTAS School of Psychology.

5. Are there any possible benefits from participation in this study?

By participating in this research, you will be contributing to new research that will further the understanding of the relationships between social anxiety and personality. Psychology students recruited through the participant pool will receive course credit.

6. Are there any possible risks from participation in this study?

There are no specific risks anticipated with participation in this study. However, in the unlikely event that it does cause some distress, you can immediately terminate your participation. Referrals for support and counseling will be made if required.

7. What if I have questions about this research?

If you would like to discuss any aspect of this study, please feel free to contact either myself on ph (03) 6226 7110 or email ccly@utas.edu.au or Prof. Rapson Gomez on ph (03) 6226 2887 or email Rapson.Gomez@utas.edu.au. Either of us would be happy to discuss any

aspect of the research with you. Once we have analysed the information, a summary of our findings is available. You are welcome to contact us at that time to discuss any issue relating to the research study.

This study has been approved by the Tasmania Social Science Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study should contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 7479 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. You will need to quote ethics reference number: H10128.

Thank you for taking the time to consider this study.

Please note that you will not be required to sign a consent form as your consent will be implied through participation in the study.

This information sheet is for you to keep.

Appendix B: Study 2 Information Sheet

The relevance of the behavioural inhibition system in understanding social anxiety and response to cognitive behavioural treatment for social anxiety disorder

Dear Participant,

Hi, my name is Corina Ly. As part of my Doctor of Philosophy (PhD) in Clinical Psychology, I am conducting research under the supervision of Professor Rapson Gomez (Director of Clinical Training) at the University of Tasmania. I am inviting you to participate in this research study.

2. ‘What is the purpose of this study?’

The purpose of the study is to investigate how certain personality traits influence the thoughts, emotions and behaviours associated with social anxiety.

3. ‘Why have I been invited to participate in this study?’

You are eligible to participate in this study because you are an adult living in the community.

4. ‘What does this study involve?’

This study involves you completing a questionnaire comprised of two short scales about personality. You will participate in a mental imagery exercise to induce a neutral mood as well as an exercise involving you recalling a past event in which you were socially anxious. Participation in this study is expected to take approximately 45 to 60 minutes. First year psychology students recruited from the Psychology Participant Pool will also receive course credit.

It is important that you understand that your involvement in this study is voluntary. While we would be pleased to have you participate, we respect your right to decline. There will be no consequences to you if you decide not to participate. If you decide to discontinue participation at any time, you may do so without providing an explanation. Please be assured that all data will remain anonymous. All information will be treated in a confidential manner and will be securely stored with the UTAS School of Psychology.

5. Are there any possible benefits from participation in this study?

By participating in this research, you will be contributing to new research that will further the understanding of the influences of personality on the thoughts, emotions and behaviours associated with social anxiety. Information collected will provide support for a new theory combining personality and cognitive models.

6. Are there any possible risks from participation in this study?

There are no specific risks anticipated with participation in this study. However, in the unlikely event that it does cause some distress, you can immediately terminate your participation. Referrals will be made for support and counseling if required.

7. What if I have questions about this research?

If you would like to discuss any aspect of this study, please feel free to contact either myself on ph (03) 6226 7110 or email ccly@utas.edu.au or Prof. Rapson Gomez on ph (03) 6226 2887 or email Rapson.Gomez@utas.edu.au. Either of us would be happy to discuss any aspect of the research with you. Once we have analysed the information, a summary of our findings is available. You are welcome to contact us at that time to discuss any issue relating to the research study.

This study has been approved by the Tasmania Social Science Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study should contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 7479 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. You will need to quote ethics reference number: H10128.

Thank you for taking the time to consider participating this study.

Please note that you will not be required to sign a consent form as your consent will be implied through participation in the study.

This information sheet is for you to keep.

Appendix C: Study 2 Neutral Mood Induction Script

It's just another ordinary evening. You follow your normal routine after getting home from work/university. You walk in the front door and drop your keys and bag on the table in the front hall. You say hello to anybody who is home. You walk into the kitchen, open the fridge and begin preparing dinner. When dinner is ready, you sit down at the kitchen table and eat whilst reading the newspaper. You then wash your dishes and clean up the kitchen. You take the rubbish out and feed the dog. You walk into the living room, settle down on the couch and watch a television show that happens to be on. After the show is finished, you get up and turn off the television before making your way to your bedroom to get ready for bed. You walk into the bathroom, undress and take a shower. You then brush your teeth before walking back to your bedroom, turning off the lights and getting into bed.

Appendix D: Study 2 Post-Neutral Mood Induction Scale

Please circle the number that corresponds to how you felt during the situation you have just recalled, on each scale.

Shame (like embarrassed, mortified, humiliated, foolish)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Fear (like frightened, timid, afraid, scared)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Sadness (like depressed, miserable, dejected)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Happy (like enthusiastic, joyful, cheerful, delighted)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Anger (like irritated, annoyed, mad, sore)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Anxious (like apprehensive, nervous, jittery, uneasy)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Appendix E: Study 2 Mood Induction Instructions

Starting Instructions

Ok I'm going to ask you to do a few different things today. Before we start, I'm going to get you to read this information sheet. This gives you all the information you need about the study. I will also get you to read and sign this consent form. If you have any questions about anything you are unclear about, please ask me.

Neutral Mood Induction Instructions

Ok first I'm going to get you to listen to a short story on this.

"Please listen carefully and imagine yourself in the position of the person in the story. I would really like you to get totally immersed in the story and relive in your mind the feelings and thoughts that are going through the person in the story".

I am now going to ask you to complete this scale.

Autobiographical Recall Social Anxiety Mood Induction Instructions

Ok we're going to do something a bit different now.

You may have heard of something called social anxiety. Social anxiety happens when people feel anxious or really shy in situations where they have to interact with other people or when they have to perform in front of other people. People experience social anxiety to different degrees. Some people experience social anxiety often whilst others experience it less frequently, however, everybody experiences it at some stage in their lives. Social anxiety can occur in any situation where there are other people present. Some examples include; parties, public speaking, work, university and restaurants.

I am now going to ask you to think of any two or three events in which you experienced social anxiety **in the past 12 months**. I will give you two or three minutes to do this. I will then ask you to tell me briefly about these events. Go ahead.

After the participant has thought of two or three events

Can you briefly tell me about the events.

After brief discussion about the events, the most appropriate event will be chosen for the mood induction. This process is to ensure that participants do recall relevant events that provoke social anxiety.

Ok we're going to focus on just one of the events that you have just told me about, and we are going to go with the event.

I am now going to ask you to think about this event in as much detail as possible. I would like you to try to vividly think of all the details of what was happening at the time, to the point that you could imagine it happening to you **right now**. Think about which people and events were involved, what you were doing, what you were thinking, and how you were feeling.

You will have approximately five minutes to think about this event and I will let you know when it is time. However, if you feel you have finished before five minutes, you can stop and

let me know. It is very important that you take this reflection exercise seriously. Afterwards, I will ask you to complete a questionnaire relating to the images you thought of.

Please sit back, close your eyes and get into a position that will best allow you to get in touch with your feelings. Take your time. Start now.

.....Can you please complete this questionnaire. Let me know if you have any questions.

Appendix F: Study 2 Post-Social Anxiety Mood Induction Questionnaire

Please circle the number that corresponds to how you felt during the situation you have just recalled, on each scale.

Shame (like embarrassed, mortified, humiliated, foolish)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Fear (like frightened, timid, afraid, scared)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Sadness (like depressed, miserable, dejected)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Happy (like enthusiastic, joyful, cheerful, delighted)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Anger (like irritated, annoyed, mad, sore)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Anxious (like apprehensive, nervous, jittery, uneasy)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Did you **physically** leave/exit/escape the situation early because you were feeling anxious?

YES NO

Did you **want** to leave/exit/escape the situation?

YES NO

To what degree did the thought '*I am going to do something embarrassing*' (or something similar) cross your mind? Please circle the appropriate number.

1	2	3	4
Did not occur	Weak	Medium	Strong

To what degree did the thought '*I want to leave/escape/exit this situation*' (or something similar) cross your mind? Please circle the appropriate number.

1	2	2	4
Did not occur	Weak	Medium	Strong

To what degree did the thought '*I am being judged/evaluated negatively by these people*' (or something similar) cross your mind? Please circle the appropriate number.

1	2	3	4
Did not occur	Weak	Medium	Strong

To what degree did the thought '*People can see that I feel anxious*' (or something similar) cross your mind? Please circle the appropriate number.

1	2	3	4
Did not occur	Weak	Medium	Strong

Appendix G: Study 2 Progressive Mental Relaxation Script

I would like you to settle back, and if you wish, close your eyes. Take this time for yourself and relax...

What we are going to do is relax each part of your body progressively. While we are doing this you will hear my voice clearly. You'll be aware of your surroundings, but outside sounds and noises will fade and not interfere with your relaxation....Continue to relax.

While you are relaxing I'd like to direct your attention to your hands and fingers...imagine that the relaxation is beginning in your fingertips, spreading from your fingertips, past each knuckle and into the palms of your hands...concentrate on pure relaxation in your hands, without any tension...Allow your fingers to slowly straighten out and relax more and more completely....Become aware of any sensation you may feel in your hands.

You may notice a pleasant warmth or heaviness, or perhaps a light tingling or numbing sensation...Your hands are relaxing more and more completely...The relaxation spreads into your wrists....Your hands and your wrists are beginning to relax further....further....deeper and deeper...Allow this pleasant feeling of relaxation to spread into your forearms...Your forearms are relaxing...relaxing...more and more completely. The relaxation spreads to your elbows...into your upper arms...your arms and your hands are relaxing further and further...your arms feel comfortably heavy as you allow them to relax...Let your whole body relax...Now allow this pleasant feeling of relaxation to flow right into your shoulders...Imagine all the muscles in your shoulders smooth and relaxed....Simply by thinking about a body part you are able to relax it...You are able to throw off all tension, all fatigue and irritation.

The relaxation flows across your shoulders and deep into your neck muscles...Allow your neck and your shoulders to relax further and further...deeper...deeper. The relaxation spreads from your neck to your scalp...Become aware of the support of the chair against your body....Feel how gently yet firmly the chair supports you. Imagine a gentle shower of relaxation falling over your scalp....Allow even the top of your head to relax....Now focus on your facial muscles. Think of your forehead. Picture your forehead muscles smooth and relaxing....All the muscles in your forehead are relaxing....relaxing completely....Allow the relaxation to spread to your eyes...relax all the tiny muscles around your eyes...your eyelids...even the muscles behind your eyes...relax, relax completely. Feel the relaxation move down your face to your jaw....Relax your lips, tongue, and throat...All the muscles within your face are relaxing...relaxing...relaxing further and further....

Relax the muscles of your chest....focus on your breathing for a moment...breathe easily and freely....in and out....Notice how the relaxation increases as you exhale....As you breathe out just feel; the relaxation increase....the further you relax, the more your breathing becomes free and easy...and regular...All the muscles within your chest relax....Allow the relaxation to proceed from your chest to your stomach....Let the muscles deep within your stomach loosen and permit them to relax....Relax the muscles deep within your stomach....Allow every organ, every fibre of your being to relax...from deep within your stomach all the way to the surface of your skin....Relax.

The relaxation then flows into the lower part of your body....Relax your hips. Allow this part of your body to relax completely....the relaxation flows down into your legs...Relax your thighs....Let all the muscles deep, deep within your thighs relax. The relaxation flows to your knees...your knees relax...the relaxation flows to your calves, deep within your calves...and then down to your ankles, and deep into your feet and toes....You feel very relaxed and comfortable....A warm, pleasant soothing feeling of relaxation beginning at the base of your heels...spreading across the bottom of your feet into your toes....A very comfortable, warm, pleasant feeling of relaxation....goes from your toes to the tops of your feet to your ankles....This comfortable, warm, pleasant feeling of relaxation flows from your ankles, to your calves...knees...thighs...and hips. Notice a pleasant, comfortable heaviness in the lower part of your body as you relax still further....Continue to enjoy this state of relaxation for the next few minutes...

...(2 minutes later). Now I am going to count back from 5, and when I am done, I would like you to slowly open your eyes. 5...4...3...2...1...

Appendix H: Study 2 Post-Mental Relaxation Questionnaire

Please circle the number that corresponds to how you felt during the situation you have just recalled, on each scale.

Shame (like embarrassed, mortified, humiliated, foolish)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Fear (like frightened, timid, afraid, scared)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Sadness (like depressed, miserable, dejected)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Happy (like enthusiastic, joyful, cheerful, delighted)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Anger (like irritated, annoyed, mad, sore)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Anxious (like apprehensive, nervous, jittery, uneasy)

1	2	3	4	5
Not at all	Slightly	Moderately	Very much	Extremely

Appendix I: Study 3 Consent Form

CONSENT FORM

Title of Project: **The relevance of the behavioural inhibition system in understanding social anxiety and response to cognitive behavioural treatment for social anxiety disorder**

1. I have read and understood the 'Information Sheet' for this project.
2. The nature and possible effects of the study have been explained to me.
3. I understand that the study involves an investigation of the effects that individual differences in personality have on treatment outcome for social anxiety disorder. It will involve my participating in a 12 week group therapy program. Prior to the commencement of the program, I will be required to attend an orientation interview. I will be required to sign consent forms and complete two personality scales and four different outcome scales. The outcome scales will also be completed at post-treatment. Each session will run for 2½ hours weekly. The program will involve education about social anxiety, explanation of the treatment rationale, identification and challenging of thinking errors associated with the anxiety and exposure to the feared social situations.
4. I understand that participation involves exposure to situations that will provoke anxiety as a necessary part of treatment. I acknowledged that this will be undertaken at a pace that is comfortable for me. I am aware that if I do experience an excessive level of anxiety, the procedures will be halted and reassessed. Referrals will be made for support and counselling if required.
5. I understand that all research data will be securely stored on the University of Tasmania premises for at least five years and will be destroyed when no longer required.
6. Any questions that I have asked have been answered to my satisfaction.
7. I agree that research data gathered from me for the study may be published provided that I cannot be identified as a participant.
8. I understand that the researchers will maintain my identity confidential and that any information I supply to the researchers will be used only for the purposes of the research.
9. I agree to participate in this investigation and understand that I may withdraw at any time without any effect, and if I so wish, may request that any data I have supplied to date be withdrawn from the research.

Name of Participant:

Signature:

Date:

Statement by Investigator

☐ I have explained the project & the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation

If the Investigator has not had an opportunity to talk to participants prior to them participating, the following must be ticked.

Name of Investigator

Signature of
Investigator

Name of investigator _____

Signature of investigator _____ Date _____

Appendix J: Study 3 Information Sheet

The relevance of the behavioural inhibition system in understanding social anxiety and response to cognitive behavioural treatment for social anxiety disorder

Dear Participant,

Hi, my name is Corina Ly. As part of my Doctor of Philosophy (PhD) in Clinical Psychology, I am conducting research under the supervision of Professor Rapson Gomez (Director of Clinical Training) at the University of Tasmania. I am inviting you to participate in this research study.

3. 'What is the purpose of this study?'

The purpose of the study is to investigate the effects that individual differences in personality have on treatment outcome for social anxiety disorder.

2. 'Why have I been invited to participate in this study?'

We are aiming to reduce your anxiety and ultimately to improve your quality of life as well as others. The fact that you are an adult with a diagnosis of social anxiety disorder makes you eligible to participate.

4. 'What does this study involve?'

This is a treatment study that will involve you participating in a 12 week group therapy program. Prior to the commencement of the program, you will be required to attend an orientation interview that will provide an opportunity for you to ask any questions you may have. You will be required to sign consent forms and complete two personality scales and four different outcome scales. We will ask you to also complete the outcome scales at pre and post-treatment.

The treatment is a well-established group program designed specifically for the treatment of social anxiety disorder. It is based on the premise that social anxiety develops largely as a result of fundamental thinking errors and that socially anxious individuals must face their anxieties in order to combat them. Each session will run for 2½ hours weekly. The program will involve education about social anxiety, explanation of the treatment rationale, identification and challenging of thinking errors associated with the anxiety and exposure to the feared social situations.

It is important that you understand that your involvement in this study is voluntary. While we would be very happy to have you participate, we respect your right to decline. There will be no consequences to you if you decide not to participate. If you decide to discontinue participation at any time, you may do so without providing an explanation. Please be assured that all individual data will remain with the investigators. All information will be treated in a confidential manner and will be stored securely with the UTAS School of Psychology.

5. Are there any possible benefits from participation in this study?

By participating in this research, you will be receiving treatment for your anxiety at no cost. Further, your participation will be contributing to new research that will advance the understanding of the influences of personality on treatment outcome for social anxiety

disorder. Information collected will also provide support for a new theory combining personality and cognitive models.

6. Are there any possible risks from participation in this study?

There are no physical risks anticipated with participation in this study. As a necessary part of effective treatment, you will be exposed to situations that will provoke anxiety. However, this will be undertaken at a pace that is comfortable for you. If you do experience an excessive level of anxiety, procedures will be halted and reassessed. You can immediately terminate your participation if you feel this is necessary. Referrals will be made for support and counseling if required.

7. What if I have questions about this research?

If you would like to discuss any aspect of this study, please feel free to contact either myself on ph (03) 6226 7110 or email ccly@utas.edu.au or Prof. Rapson Gomez on ph (03) 6226 2887 or email Rapson.Gomez@utas.edu.au. Either of us would be happy to discuss any aspect of the research with you. Once we have analysed the information, a summary of our findings is available. You are welcome to contact us at that time to discuss any issue relating to the research study.

This study has been approved by the Tasmania Social Science Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study should contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 7479 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. You will need to quote ethics reference number: H10128.

Thank you for taking the time to consider participating in this study.

Appendix K: Study 3 Advertisement

Do you get really **anxious in social situations?**

Speaking in public? Interacting with **other people?**

Performing some act (e.g. eating, writing) in front of others?

Do you often worry about embarrassing yourself **in front of others?**

Are you very self-conscious?

If any of the above applies to you, we are providing treatment at no cost.

Hi, my name is Corina Ly. I am a PhD student and provisional psychologist conducting research on social anxiety and personality with my supervisor, Prof. Rapson Gomez.

We are looking for adults who have significant issues with social anxiety. You may or may not have been diagnosed with social phobia (or social anxiety disorder). Either way, we are interested in having a chat with you.

The treatment we are offering is a well-established, very effective group therapy program. It involves education about social anxiety, identification and challenging of thinking errors associated with social anxiety and opportunities to face the situations that make you anxious. The program will consist of 12 weekly 2½ hour sessions. Participation will also involve completing some questionnaires.

There are no physical risks associated with this research. You have the right to withdraw from the study at any time without consequence and all matters are treated with strict confidence.

All participants will receive \$50 reimbursement for travel and related costs.

If this interests you, give me an email or a call to have a chat. You are in no way obliged to participate if you then decide that this treatment is not for you.

I understand that contacting us may be anxiety-provoking for you – please be assured that I am sensitive to this and will endeavour to make it as comfortable as possible. Don't let this be the reason not to make contact!

My email: ccly@utas.edu.au | **My phone:** 0405 688 034 (03) 6226 7110

Thank-you for your time!
Warm Regards,
Corina Ly

This study has been approved by the Tasmania Social Science Human Research Ethics Committee. If you have any questions for the committee, you can contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 7479 or email human.ethics@utas.edu.au. Quote reference number: H10128.