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*Degree and accuracy of self-focused attention to body  
state and mind-state information in anxiety*

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## **OVERVIEW**

Part One of this thesis presents a literature review, in which limitations of self-regulation accounts of anxiety are discussed, and possible solutions to addressing these, suggested. Specifically, it is argued that the concept of self-focused attention (SFA) may be usefully fractionated into self-focus directed toward body-state information and self-focus directed toward mind-state information. A further distinction could be that between degree of self-focused attention the habitual tendency to engage SFA (or degree) and the precision with which this mechanism operates (or accuracy). Part Two is the empirical paper which quantitatively examines the value of the above distinction in high trait anxiety. Finally, Part Three offers a critical appraisal of some of the methodological choices that had to be made over the course of the research, and their wider theoretical and clinical implications.

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## **Part I: Literature Review**

### **A critical review of self-regulation accounts of anxiety**

## **Abstract**

Heightened self-focused attention (SFA), a tendency to direct awareness to internal, self-referent information, has been implicated in a number of psychological disorders. This review concentrates on the theoretical and empirical validity of attempts to extend normative models of SFA (e.g. Duval & Wicklund, 1972; Carver & Scheier, 1978) to account for anxious states and anxiety disorders. It will be argued that existing models are too non-specific, with similar accounts having been put forward across different disorders, reducing the explanatory power of the framework. Therefore two novel distinctions will be put forward to attempt to meaningfully fractionate SFA. First, self-awareness may be directed to different parts of internal experience, in particular to body-state information or mental-state information, and therefore potentially maintain psychopathology in different ways. Second, a distinction can be made between the habitual tendency to engage SFA (or degree) and the precision with which this mechanism operates (or accuracy). Ways to validate these distinctions will be proposed and how such a model could potentially differentiate anxiety disorders from other forms of psychopathology considered.

## **1. Introduction**

Anxiety disorders are among the most common mental illnesses in the UK, with lifetime prevalence rates of 21 % (Singleton et al., 2001). The prevalence of anxiety that may not meet definitional thresholds for DSM-IV diagnoses in primary care practice settings is even higher. Once acquired, anxiety disorders tend to be chronic, and impose substantial costs to individuals and to the health care system. It is therefore important to explore factors that may be implicated in the maintenance of anxiety. One such factor may be disturbances in self-focused attention (or SFA).

SFA is a central construct in various approaches to psychology. The importance of focusing on and understanding internal motives, feelings, and thoughts is emphasised in most therapies (c.f. Freud, 1936; Rogers, 1951, Beck, 1976). Elsewhere, the virtues of self-focus were championed by philosophers such as Seneca and later Sartre who questioned leading an unexamined life (Sartre, 1965).

In the experimental literature, SFA, defined as awareness of self-referent information as opposed to external information, has been postulated to play a central role in how people select and maintain adaptive behaviour (Duval & Wicklund, 1972; Carver & Scheier, 1978; 1998). A mechanism has been proposed whereby such internally directed attention leads to self-evaluation in which the person makes comparisons of aspects of his or her internal state against a salient standard (Carver & Scheier, 1981). Negative affect is thought to ensue when the standard is either not met or is believed to be unachievable.

The central paradox in the literature is why SFA, while adaptive in the healthy populations, somehow becomes pathological and maintains negative affect in clinical states such as anxiety disorders (e.g. Ingram, 1990).

It has been argued that dysfunctional SFA could be key to a range of psychopathologies, including anxiety (Pyszczynski & Greenberg, 1987; Ingram, 1990). Elevated levels of SFA have been described in social anxiety, panic disorder, generalised anxiety disorder, test anxiety and other anxiety states (Ingram, 1990; Spurr & Stopa, 2002; Bogels & Mansell; Mor & Winqvist, 2002).

Therefore, it is of both theoretical and clinical importance to validate these models implicating SFA in anxiety disorders. The challenge is to better understand how the normally adaptive SFA mechanism is somehow going wrong in psychopathology.

This review will examine and evaluate SFA accounts of anxiety disorders. A brief outline of normative and anxiety self-regulation theories will be presented and then a critical evaluation of these models put forward.

A number of additional problems with SFA accounts will be highlighted, including uncertainty about whether it is a state or trait construct, an over-reliance on self-report measures of SFA, and a lack of specificity about whether disturbances in SFA are disorder specific or reflect generic trait anxiety.

Most crucially, it will be argued that to further clarify a link between SFA and anxiety, there is a need to draw two novel distinctions: between SFA directed to

mind or body, and between accuracy and extent of SFA. This is because SFA appears unlikely to be a unitary construct and different aspects of SFA may maintain anxious states in differing ways.

Some suggestions about how to address these shortcomings in future empirical work will be proposed. Specifically, it will be argued that SFA needs to be indexed more broadly: objective, performance-based measures should be included alongside with self report measures, looking at both body state and mental state. Finally, both trait and state SFA need to be examined.

## **2. Review of Normative Self-Regulation Theories**

### **2.1. Control theory development**

Self-focused attention (SFA) occurs when an individual's focus of attention shifts from the experience of events in the external environment to a concentration on internal aspects of that experience (Ingram, 1990).

The functions of self-focused attention were originally introduced in social psychology models of self-evaluation. A number of theories have considered how discrepancies between the self and some standard or goal may relate to emotional experiences (e.g., Duval & Wicklund, 1972; Carver & Scheier, 1978; 1998; Higgins, 1987; Pyszczynski and Greenberg, 1987; Ingram, 1990; Duval & Silvia, 2001).

For example, control theory assumes that people have representations of the self's features as well as representations of standards that specify features the self ought to have. Standards for the self are assumed to be diverse and idiosyncratic; they are often vague, perfectionistic, unattainable, and inconsistent with other standards (Duval & Silvia, 2001). Duval & Wicklund (1972) asserted that evaluating the self requires focusing on the self. Objective self-awareness – a state of attention focused on the self – initiates a self-standard comparison process in which people evaluate the self in relation to relevant standards. It is further suggested that discrepancies from standards generate negative affect (Mor & Winquist, 2002). This motivates changing own behaviour, changing the standard, or avoiding the situation (Duval & Lalwani, 1999).

Extending Duval and Wicklund's (1972) work, Carver and Scheier (1998) identified a role for self-focus in a self-regulating cycle in goal directed behaviour. They argue that an individual's current state is assessed in relation to a desired standard. If it is considered to be below the standard, behaviours intended to raise the individual's actual standard are selected, and the discrepancy is continually monitored until the desired standard has been achieved or until the target is abandoned as unreachable and the process ended. This is called a test-operate-test-exit (TOTE) cycle. Carver and Scheier (1998) theorise that negative affect can be the consequence of an individual's assessment that there is a low likelihood of her/his reaching the desired standard. This negative affect motivates the individual to make subsequent behavioural changes.

Further revisions to this model (Carver, Lawrence & Scheier, 1999) identified the rate of progress towards achieving a desired standard, rather than the discrepancy between the current and the desired performance, as a major factor in producing negative affect. They argue that negative affect occurs when the rate of progress towards a target standard is too slow.

Control theory has been silent about whether different types of discrepancies cause different types of emotions. The theory assumes that inconsistency between self and standards creates general negative affect (Duval & Silvia, 2001).

In contrast, self-discrepancy theory (Higgins, 1987), another theory of discrepancies and emotion, categorises standards as ideal or ought selves and assumes unique relationships between types of discrepancies and negative emotions. The theory posits three domains of the self: actual, ideal, and ought. The actual self is the representation of who he or she is currently. The ideal self is the representation of who he or she would like to become. The ought self is the representation of who a person feels he or she should become. According to the theory, discrepancies between the actual and ideal selves is associated with depressed mood; discrepancies between the actual and ought selves is associated with anxious mood (Higgins, 1987).

Mor & Winquist (2002), in their recent meta-analysis, systematically examined the relationship between SFA and emotional distress. The overarching relationship of self-focus and negative affect was found to be moderately positive, but this relationship was qualified by several important caveats. The effects were strongest



within clinical and subclinical ('analogue') populations relative to non-clinical samples.

## **2.2 Experimental Approaches Used in SFA Research**

A variety of methodologies have been used to examine the connection between emotional disorders and SFA. Researchers have typically used two broad paradigms.

The first paradigm often involves a correlational design, in which selected or unselected groups are examined to determine the association between SFA and negative affectivity, or a quasi-experimental design, in which groups with a priori differences in their level of negative affectivity (e.g., depressed and non-depressed) are compared on chronic self-focus tendencies (e.g., Smith & Greenberg, 1981).

Correlational designs have mostly employed self-report measures of SFA such as the Self-consciousness Scale (SCQ, Fenigstein, Scheier & Buss, 1975). The scale comprises three aspects of self-consciousness on which there is individual variation. Private self-consciousness identifies individuals who focus on themselves and their inner motives. Public self-consciousness identifies individuals who focus on themselves as social objects and are concerned with aspects of their public image, such as their physical appearance and the impression they make on others. Finally, social anxiety identifies persons who suffer some apprehension when interacting with others, thought to stem largely from a heightened concern with being negatively evaluated.

Other common self-report measures are sentence-completion tasks (e.g., Wegner & Giuliano, 1980); the extent to which participants choose to complete sentences with the word *I* or with other self-related words is assumed to reflect their tendency to self-focus.

In the second paradigm, the relationship between self-focus and negative affect are examined by manipulating either affect or SFA and examining their effect on each other (e.g., Salovey, 1992). This paradigm involves an experimental design and thus allows for causal examination of the relationship between SFA and negative affect.

For example, self-consciousness can be induced in the laboratory by exposing participants to a mirror or by instructions to focus on personal thoughts and feelings (e.g., Webb, Marsh, Schneiderman, & Davis, 1989). Other studies manipulate SFA by asking the participants to write an essay that included the words *I*, *me*, *mirror*, or *alone* (e.g., Pyszczynski, Holt, & Greenberg, 1987).

These measures look at the habitual degree of SFA and its consequences, but do not actually test the central TOTE function postulated in the models. Other methods need to be developed to do this.

### **2.3 Application to Psychopathology**

Aspects of the normative self-regulation theories outlined above have been applied to explain one of the possible mechanisms underlying mood disorders. For example, Pyszczynski and Greenberg (1985, 1986, 1987) demonstrated that depressives are

high on self-focus and attend particularly to negative aspects of themselves. They noted that with depressed participants (but not non-depressed participants) failure, rather than success, tended to trigger self-focusing. They then speculated that, once triggered, such self-focus is thought to contribute to the maintenance of the depressed state by intensifying negative affect, as well as impairment of problem-solving, decision-making, attributional and other cognitive processes. This SFA style initially develops in response to a specific negative life event but then generalises. These theoretical conjectures have received some empirical support (see Mor & Winquist, 2002, for a meta-analytic review).

Relatedly, it has also been argued that focusing on negative mood per se increases and maintains depression. Nolen-Hoeksema (1991) describes a ruminative self-focusing style, where individuals focus their attention on their depressive symptoms and the implications of those symptoms. Such self-focusing style is believed to represent a stable coping style employed across situations and is argued to constitute a trait vulnerability to depression. Hence it can increase the likelihood, severity and duration of depression even in the absence of a negative event (e.g., Nolen-Hoeksema & Morrow, 1991; Lyubomirsky & Nolen-Hoeksema, 1993; Nolen-Hoeksema, 2000).

In his seminal paper, Ingram (1990) extended disturbances to SFA to a wider range of psychopathologies. He reviewed several theoretical conceptualisations and the existing empirical evidence for a link between various disorders and an excessive degree of self-focused attention. Ingram (1990) concluded that SFA, particularly when rigid, sustained, and excessive (so called 'self-absorption'), is related to a wide

range of psychopathological conditions, including depression, anxiety, alcohol use. Given these findings, Ingram (1990) argued that self-focus lacks explanatory utility because it is associated with various forms of dysfunction. That is, models cannot differentiate between different disorders and do not explain the reasons for one person developing depression while another developing anxiety.

The author argues that extant theories (e.g., Pyszczynski & Greenberg, 1987) have failed to address this apparent conceptual dilemma because they do not typically examine specificity issues regarding the construct but instead appear to assume specificity. Ingram (1990) argued that what can differentiate between different disorders is the content of self-absorption which is likely to be determined by the dominant schema associated with a given condition. Further, Ingram (1990) discusses how SFA can act as both a vulnerability factor, placing individuals at risk for the onset of dysfunction, and as a maintenance factor, exacerbating and prolonging the condition.

### **3. Review of Self-Regulation Accounts of Anxiety**

The literature reviewed to this point suggests that SFA may be a component of various forms of psychopathology. Numerous theoretical approaches have proposed that anxiety states are characterized by increases in SFA (see Ingram, 1990 for a review). Although maintaining that self-focus is primarily related to depression, Pyszczynski, Hamilton, Greenberg, and Becker (1991) noted that self-focus can also be related to the experience of anxiety when one focuses on a potential feared loss as opposed to an already existing loss.

Cognitive biases, of which self-focused attention is one, have been discussed extensively as contributing to anxiety. Anxious individuals show attentional and judgemental biases, with evidence remaining mixed for memory biases (for a review, see Mineka, Rafeali-Mor, & Yovel, 2003). Such biases may serve as antecedents, concomitants, and consequences of emotional disorders. Several theoretical accounts of anxiety have incorporated concepts pertaining to self-focus (e.g., Clark, 1986; Clark & Wells, 1995). This review concentrates on one aspect of the cognitive models of anxiety, namely the role given to self-focused attention in the maintenance of anxiety. Unlike other cognitive biases in anxiety, research in SFA, has not been reviewed systematically. A limitation of much of the existing self-focus research is the failure to link the concept with information-processing models of anxiety. Moreover, much of this research has been limited to analogue populations (Spurr & Stopa, 2002).

Now theoretical conjectures about and evidence for a relationship between SFA and various anxiety conditions such as social anxiety, panic disorder, generalized anxiety disorder and test anxiety will be reviewed. These particular anxiety states have received most attention in the literature.

### **3.1 Social Anxiety and Phobia**

Social phobia is defined by DSM-IV as ‘a marked and persistent fear of one or more social or performance situations in which the person is exposed to unfamiliar people

or possible scrutiny by others. The individual fears that he or she will act in a way (or show anxiety symptoms) that will be humiliating or embarrassing' (American Psychiatric Association [APA], 1994, p. 416).

Recently, two excellent reviews of SFA in social anxiety have been published (Spurr & Stopa, 2002; Bogels & Mansell, 2004). Both conclude that all current accounts of the cognitive activity of individuals with social phobia emphasise heightened self-focus. For example, in Clark and Wells' (1995) model, social anxiety is thought to maintain the disorder as a result of excessive attention to one's own thoughts, physiological arousal, and performance. The model posits that self-focused attention increases the social phobic's awareness of interoceptive information that is likely to be taken as a sign that one is about to fail, or has failed, to convey an acceptable impression to others. As a consequence, it increases social anxiety. Clark and Wells (1995) also propose that socially phobic individuals construct a distorted impression of themselves, based on internally generated information.

The hypothesis that social phobia is associated with heightened SFA is well supported. Among others, Fenigstein, Scheier, and Buss (1975) reported a significant positive correlation between public self-consciousness and social anxiety – a finding that was replicated by Hope and Heimberg (1988). Patients with social phobia have repeatedly been shown to score higher on the public self-consciousness scale than patients with other anxiety disorders and non-patients (Bruch, Heimberg, Berger, & Collins, 1989; Bruch & Heimberg, 1994; Saboonchi, Lundh, & Ost, 1999).

More recently, Woody (1996) provided direct support for the anxiety-inducing effects of self-focused attention by showing that an experimental manipulation of self-focus increased the anxiety levels of patients with social phobia during a speech task. Moreover, Mellings and Alden (2000) found that high socially anxious individuals reported higher levels of self-focused attention than low socially anxious individuals.

However, Panayiotou and Vrana (1998) designed a study to test the effect of self-focused attention on the startle reflex and heart rate in socially anxious individuals and found no evidence of an increase in heart rate as a result of self focused attention. The authors argue that their results contradict Clark and Wells' (1995) model and challenge their assumption that self focused attention maintains social anxiety in that it shifts attention away from the environment because such a shift would have required an increase of heart rate and this was not observed.

### **3.2 Panic Disorder**

In the case of panic disorder, cognitive-behavioural theories propose that panic results from the catastrophic misinterpretation of internal cues such as autonomic arousal symptoms or other sensations unrelated to anxiety (e.g. Beck, 1988; Clark, 1986). It is argued that panic patients are hypervigilant for the experience of such sensations. Once panic attacks are established, the problem is maintained in part by selective attention to internal events such as bodily sensations.

Empirical work appears to support the view that self-focus may be an important variable involved in the initiation and maintenance of panic disorder. For example, Rachman et al. (1988) showed that intensified self-focus increased the opportunity for catastrophic symptom appraisals and thus anxiety in panic patients. In a different study, Wells (1990) demonstrated that a relaxation procedure requiring self focused attention exacerbated anxiety and panic attack frequency in panic disorder patients. Conversely, a procedure requiring effortful external monitoring eliminated panic attacks and reduced self-report anxiety.

A very common symptom in panic disorder are concerns about cardiac function (e.g. fears of having a heart attack), so researchers have attempted to look at the accuracy of cardiac monitoring in panic disorder. The evidence concerning a relationship between panic attacks and heightened physiological arousal, especially focusing on cardiovascular states, is mixed. Within the normal population, an inconsistent link between accuracy of heartbeat monitoring and anxiety has been recorded (Schaundry, 1981; Montgomery & Jones, 1984). Some earlier studies (e.g. Taylor, Telch, & Havvik, 1986) associated panic attacks with increased heartbeat, whereas more recent studies (e.g., Khawaja & Oei, 1999) have not found clear evidence in support of this association. It has been argued that these discrepancies are due to panic disorder patients' greater accuracy of heartbeat detection enabling them to detect small variations in heartbeat (Ehlers & Breuer, 1992). A recent reanalysis of this literature (Van der Does, Antony, Ehlers, & Barsky, 2000) concluded that although accurate heartbeat detection is more likely to be found in people who have continuous or frequent episodes of panic, it is not found in all individuals who



receive the diagnosis. Further, confounding variables, such as physical exercise, distraction, and medication often obscure the relationship between anxiety and cardiac monitoring.

### **3.3 Generalised Anxiety Disorder**

Generalised anxiety disorder (GAD) is a severe and chronic anxiety disorder characterised by uncontrollable worrying and somatic anxiety (tension, insomnia and hypervigilance). Generalized anxiety disorder has been called the ‘basic’ anxiety disorder, in the sense that generalised anxiety (or high trait anxiety) is, by definition, a component of other anxiety disorders. Models of anxiety suggest that the core processes in GAD are fundamental processes in all anxiety disorders (Barlow, 1988; 1991). Therefore it is important to understand the mechanisms that maintain the disorder.

Although cognitive models of GAD posit the importance of attending to internal sensations and the role of this self-focus in the experience and maintenance of GAD, very limited empirical work has examined self-focus in GAD. Moreover, most of this work has been carried out in subclinical anxious participants (i.e., normal individuals with high levels of trait anxiety).

Mor and Winkvist’s (2002) meta-analytic review has reported consistent links between SFA and generalised anxiety with the majority of studies demonstrating a positive correlation between private, but not public, self-focus and generalized anxiety (e.g., Wells, 1985).

Muraven (2005) argued that SFA alone may not be enough to lead to anxiety. Although SFA may contribute to it, it cannot explain why anxious individuals do not simply shift their attention elsewhere. The fact that individuals remain self-focused suggests that they may have a deficit in their ability to shift their focused attention. Accordingly, Muraven (2005) investigated the ability of participants with generalised anxiety to shift their attention away from themselves to an external stimulus. This measure of attentional flexibility was related to the degree of self-focus. Being low in attentional flexibility magnified the effects of private self-focused attention. Participants high in private self-awareness who could not stop thinking about themselves experienced more generalised anxiety than those lower in self-consciousness or those who could better regulate attention.

### **3.4 Test Anxiety**

Among the theories of SFA in test anxiety, Wine (1982) and Sarason (1988) have conceptualised self-focus as a factor producing performance decrements in high test-anxious subjects. However, they view self-focus as synonymous with worry. Conversely, for Carver and Scheier (1984; 1986) self-focus is thought to mediate the link between test anxiety and behavioural responses to stress via the intensification of task engagement or disengagement. Experimental work is consistent with these assertions (Scheier & Carver, 1977). Test-anxiety theories, in common with some other models of stress in which self-focus has been implicated, treat self-focus as a single undifferentiated construct.

Several studies examined whether test-anxious individuals experienced more self-focused attention when working on a task (Mandler & Watson, 1966; Neale & Katahn, 1968). For example, Deffenbacher (1978) found that high-anxious individuals in a high-stress condition spent less time generating task-relevant cognitions, reported more anxiety and task-irrelevant cognitive distractions, leading to poorer task performance, compared to no-stress condition. In another study, Slapion & Carver (1981) investigated the effect of self-focusing on test performance by exposing test-anxious and non-test-anxious participants to a self-focusing manipulation (mirror presence) on one of two testing trials. Test-anxious participants reported more self-focusing than did low test-anxious participants.

### **3.5 Summary of Anxiety Models**

To summarise, SFA has been implicated as a maintaining factor in a variety of forms of clinical anxiety. What these accounts fail to explain is the intrinsic paradox between normative and clinical accounts of SFA. On the one hand, as postulated within normative accounts (see section 2.1), SFA processes per se would seem unlikely to be maladaptive. While they explicitly talk about how detecting a discrepancy would trigger negative affect, it is assumed this will be helpful rather than unhelpful.

SFA is thought to play a major role in self-regulation via maintaining goal-directed behaviour and regulating affect. Indeed, research has supported some of its proposed benefits, showing that individuals high in self-consciousness have better articulated

self-schema, perceive more self-consistency, and possess more accurate self-knowledge than those low in the propensity to self-focus (Carver & Scheier, 1978). Conversely, psychopathology accounts argue that inappropriate application of this normally adaptive self-regulatory process may lead to mood disturbances, including anxiety (Pyszczynski & Greenberg, 1987; Ingram, 1990). Various studies have shown that a high level of self-focus is linked with a greater fear of negative evaluation, distortions in thinking about the actual causes of one's behaviour, lower levels of self-esteem and lower emotional stability (e.g., Monfries & Kafer, 1994). Such research paints a negative picture of self-focus. A clearer model of how SFA is going wrong is needed.

#### **4. Critique of Self-Regulation Accounts of Anxiety**

Models of anxiety that implicate SFA have now been described. Taken together, the majority of studies in the area offer support for the detrimental effects of chronic and heightened self-focus. Despite the contribution of self-regulation theories of anxiety, the review will raise a series of issues with these models and put forward possible solutions. In particular, it will be argued that insufficient examination of the contaminating effects of comorbidity have been conducted, and that the definitions of anxiety used are inconsistent, that is unclear whether they are conceptualising SFA as a state or trait phenomena, and that there has been insufficient work examining the links between SFA and negative affect. Most importantly, SFA accounts are too general to differentiate within the anxiety disorders and between anxiety disorders and other conditions. Two new distinctions will be drawn to aid

this process, fractionating SFA directed to mind and body and fractionating the accuracy versus degree of SFA.

#### **4.1 Anxiety versus depression**

The first problem with SFA work in anxiety is that inadequate controls have been made for the potential contaminating effects of comorbidity. Because depression and anxiety are so highly correlated, any study purporting to select anxious participants may be also selecting depressed participants and vice versa (see Mineka, Watson & Clark, 1998). Although all anxiety and mood disorders have unique symptoms, they also share many symptoms. For example, depression and generalised anxiety disorder have a high symptom overlap. The diagnostic criteria for both disorders include such symptoms as irritability, difficulty concentrating, and sleep disturbance.

Hence, any association found between particular self-foci and anxiety disorders may be confounded by their comorbidity with depression. For instance, the correlations between anxiety and public SFA and depression and private SFA may in fact be due to shared depression-anxiety variance rather than a true relationship between these constructs. This may be particularly true for the relationship between anxiety and private self-focus. Specifically, as was reviewed above, generalised anxiety but not social anxiety appears to be strongly related to private self-focus. Thus, the overall relationship between private self-focus and anxiety may be accounted for by generalised anxiety. This supposition would be consistent with the growing evidence that generalised anxiety disorder is more closely linked to depression than to other

anxiety disorders and that it is genetically indistinguishable from depression (see Mineka, Watson, & Clark, 1998).

One possible way to address this dilemma would be to look at the symptoms specific to anxiety and depression, rather than diagnostic categories. Theory and research suggest that anxious and depressed mood may be alternative manifestations of a non-specific factor of negative affect. For example, Clark and Watson (1991) have proposed a tripartite model of anxious and depressed mood to attempt to explain both the overlapping and distinct features of both emotions. The model posits that anxiety and depression share higher-order, nonspecific symptoms of negative affectivity, but that somatic hyperarousal (e.g. racing heart, sweating) appears unique to anxiety, and that anhedonia or low positive affect appears unique to be primarily associated with depression. The tripartite model has received extensive empirical support in recent years (e.g. Watson, Clark et al., 1995).

It has been argued that instruments assessing anxiety and depression tend to be highly correlated and even that those constructs cannot be assessed reliably by self-questionnaires. Bieling, Antony, & Swinson (1998) raised the possibility that the overlap results from item selection with the anxiety scale containing items also measuring depression, or the use of unidimensional scales such as the Spielberger trait anxiety questionnaire (STAI, Spielberger, 1983) when the constructs are multidimensional. Correspondingly, they have emphasised that any instrument designed to measure anxiety and depression alone should carefully consider avoiding overlap with content based on the other construct. It follows from the tripartite model that a measure of anxiety should assess both the general factor

corresponding to negative affect, as well as physiological arousal, which is more specific to anxiety. Accordingly, Watson and Clark (1991) have designed MASQ, the instrument measuring the factor of general negative affect in which nonspecific symptoms of depression (e.g., felt sad) are grouped separately from nonspecific symptoms of anxiety (e.g., felt nervous) because although both share an underlying construct of negative affect they involve subjective feelings that are perceived as distinct.

Thus, using MASQ may help to unpack the extent to which symptoms of anxiety (rather than depression) relate to a particular self-focus type.

#### **4.2 Anxiety: trait versus clinical**

The second problem with SFA models of anxiety relates to the lack of clarity in definitions of anxiety within the existing models. Specifically, it is not clear whether anxiety is thought of in the individual difference trait sense or the clinical disorder sense.

For example, Ingram (1990) refers to 'generalised anxiety' while reviewing a study where anxiety was assessed using the STAI rather than clinical interview (Hope & Heimberg, 1985).

Most studies draw conclusions about disorders on the basis of individual difference studies.

Although anxiety is heterogeneous and subsumes various constructs, it can be seen as a generic vulnerability to a range of psychopathology, but probably particularly anxiety disorders. However, it has been argued that a single specific factor – such as the anxious arousal or somatic anxiety component of the tripartite model – is insufficient to account fully for the diversity of symptoms subsumed by the anxiety disorders. Rather, it assumes a more limited role as the specific component of panic disorder (see Brown et al., 1997). Each of the anxiety disorders – with the possible exception of GAD, which clearly contains an enormous amount of general distress variance (e.g., Brown et al., 1997) – includes its own unique component that is differentiable from anxious arousal. An important task for future research is to specify the nature of these unique components more precisely. Therefore, it is necessary to examine more systematically the SFA patterns across different disorders in a single study to see whether SFA relates to a generic disturbance in anxiety (akin to trait anxiety) or whether it is a disorder specific impairment. This can be explored by simultaneously measuring trait anxiety and employing disorder specific scales in a single study.

#### **4.3 SFA and Negative Affect: Cause, Consequence or Concomitant?**

The third problem is that central to the link between SFA and psychopathology is the assumption that heightened SFA leads to negative affect (sadness in depression, anxiety in anxiety disorder). The existing literature provides mixed support for this conjecture. Therefore, more work is needed to unpack the direction of the relationship between SFA and mood.



Several self-focus researchers have examined the issue of causality in the relationship between self-focus and negative affect. In their meta-analysis, Mor and Winquist's (2001) concluded that self-focus can be either an antecedent, concomitant, or consequence of disordered affect. Some researchers have demonstrated that negative affect leads to an increase in self-focus (e.g. Salovey, 1992). According to Pennebaker (1982), distress leads to a change in thinking, from concrete levels to broad, abstract, and self-reflective thinking. Others have indicated that a self-focusing tendency primes individuals to experience negative affect (Ingram, Cruet, Johnson, & Wisnicki, 1988). The relationship between self-focus and negative affect has also been described as reciprocal and cyclical (Greenberg & Pyszczynski, 1986; Nolen-Hoeksema & Morrow, 1993). For example, it has been shown that self-focus can increase awareness of, and intensify, somatic and emotional experiences. In turn, self-focus can itself result from these intensified internal responses. Gendolla et al (2005) argued that self-focused attention is necessary but not sufficient key to symptom experience. Specifically, the authors suggest that to foster the experience of somatic symptoms, both negative affect and self-focus are necessary. Hence, self-focus is not thought to result in a chronic and invariant accessibility of physical aspects of the self. Rather, negative affect will only facilitate enhanced experience of somatic symptoms when attention is simultaneously in a negative mood.

Therefore more work is needed to examine relationship between SFA and negative affect. Clearer picture may emerge when looking at both state and trait SFA relationships and if considering degree and accuracy of SFA to both mind and body.

#### **4.4 SFA as state versus trait concept**

The fourth problem is that SFA has been conceptualised both as a state in which we all can be found at times in response to particular circumstances and as an individual difference variable that reflects the degree to which individuals tend to focus on themselves and their attributes across situations (for a review see Mor & Winquist, 2002). Accordingly, individuals may be characterised as high on the trait of self-focus or can be induced to experience temporary states of heightened self-focus. In objective self-awareness theory, a person's attention is regarded as a transient state. Attention is directed either at the internal self (internal self-awareness) or at objects in the environment (external self-awareness) (Duval & Wicklund, 1972). Similarly, Pyszczynski and Greenberg (1987) describe a self-focusing style adopted by depressed individuals in response to either success or failure. In contrast, Fenigstein, Scheier, and Buss (1975) argue that some persons constantly self focus, whereas others more constantly focus on the external environment. Thus, Fenigstein et al (1975) are concerned with stable individual differences in SFA. Extending this to psychopathology, Ingram (1990) construes SFA as chronic, inflexible self-focusing style thought to constitute general vulnerability to psychopathology. Self-regulation theories of anxiety do not explicitly specify whether they view SFA as a state, trait or mixed phenomenon.

Hence, it is recommended that measures of both trait and state SFA are included in experimental studies. This can be achieved by combining manipulation studies (to look at state effects) and correlational with trait measure studies (to look at trait effects) in the same population.

SCS (Fenigstein et al., 1975), described in the earlier sections, has been the most frequently used measure of trait self focus and the findings lend empirical support to the relationship between heightened SFA as measured by the SCS and anxiety states. On the one hand, the scale has been demonstrated to be relatively reliable (Fenigstein et al., 1975), to have both discriminant and convergent validity (Carver & Glass, 1976). On the other hand, this measure has been critiqued for the low validity and reliability of its subscales, and its factor structure has been questioned and alternative factors have been proposed (Burnkrant & Page, 1984). Another difficulty in measuring self-focused attention is reactivity. Duval and Wicklund (1972) noted, measuring self-awareness can increase self-awareness because responding to the questions promotes thinking about the self (Silvia & Gendolla, 2001). In fact, some researchers manipulate self-awareness by having people complete self-report scales (Osberg, 1985). Several alternative measures have been developed to address shortcomings of the SCS (e.g., Burnkrant & Page, 1984)

Furthermore, studies of interoception in healthy volunteers have generally shown there is little correlation between self-report and performance indices of body-monitoring accuracy (e.g. Dworkin, 2000). It cannot therefore be assumed that self-report measures of SFA will reliably predict judgment accuracy of self monitoring. Therefore, a comprehensive assessment of SFA in anxiety requires measurement of both subjective self-report and objective performance based indices of SFA to both body-state and mind-state.

#### **4.5 Specificity of SFA accounts**

Finally, and perhaps most importantly, the major problem relates to the lack of specificity of exactly how SFA is disturbed in anxiety.

One of the major debates in the field involves the specificity of self-focus in psychological disorders. Ingram's (1990) critique of the existing conceptualisations of SFA stressed the wide range of psychopathological states that seem to be associated with self-focus. As a result, Ingram (1990) has questioned its value as an explanatory mechanism in pathology.

The only attempt to do this has been the questionable distinction drawn between private and public SFA.

As described earlier, private self-focus has been defined as attention to internal experiences, such as thoughts or moods, while public self-focus has been defined as attention to social or public aspects of one's self (such as one's appearance; e.g., Fenigstein, Scheier, & Buss, 1975).

There is evidence for strong correlations of private self-focus with depressive symptoms, and public self-focus with anxious symptoms. Mor and Winquist (2002) suggested that differential association patterns of private and public self-focus with anxiety and depression are in line with Higgins' self-discrepancy theory (e.g., Higgins, 1987). Focus on public self-aspects is likely to activate 'ought' discrepancies (by calling attention to the self as visible to others), perhaps leading to

increased negative affect, which plays a part in both depression and anxiety. In contrast, focus on private self-aspects is likely to activate 'ideal' discrepancies (by calling attention to the individual's wishes, plans, and goals), perhaps leading to decreased positive affect, a unique feature of depression (cf., Clark & Watson, 1991). Although private self-focus and ideal-self guide do not refer to identical psychological constructs, they both refer to self-aspects that do not involve other people. Similarly, public self-focus and the ought-self guide both refer to self-aspects in which others are taken into account. However, ideal and ought discrepancies did not differentially predict depression and anxiety in other studies (e.g., Bruch, Rivet, & Laurenti, 2000).

Moreover, the individual anxiety disorders appear to be differentially related to these two aspects of self-focus. The most robust finding is a significant positive correlation between public, but not private, self-focus and social anxiety in both clinical and analogue samples (Bruch, Heimberg, Berger, & Collins, 1989; Bruch and Heimberg, 1994). Social phobics have also been shown to score higher on the public self-consciousness scale than patients with other anxiety disorders and non-patients (Saboonchi, Lundh, & Ost, 1999; Mellings & Alden, 2000). Interestingly, generalised anxiety, like depression, has been repeatedly shown to be associated with private, but not public, SFA (Muraven, 2005, but see Mor & Winqvist, 2002). This is perhaps unsurprising considering the evidence suggesting a common genetic diathesis for generalised anxiety and depression (Kendler, 1996). The limited pool of studies that examined anxiety prevent a firm conclusion regarding the association between private and public self-focused attention and anxiety. Moreover, despite the

scarcity of studies that have looked at diagnosable anxiety conditions, conclusions are often made about clinical populations.

One way to address this conceptual dilemma would be to fractionate self-focus so that it is construed as a number of constructs with different self-foci accounting for different disorders.

## **5. Possible solutions: Fractionation of SFA**

### **5.1 Self focus to Mind vs Self focus to Body**

One solution to address the specificity problem in the literature would be to further fractionate self-focus. For example, awareness of thoughts, attitudes and emotions could be separated from awareness of internal perceptual events; distinguishing awareness of mental-state from awareness of body-state. This is apparent in the original definition of SFA put forward by Carver and Scheier (1979). 'When attention is self-directed it sometimes takes the form of focus on internal perceptual events, that is, information from those sensory preceptors that react to change in bodily activity. Self-focus may also take form of an enhanced awareness of one's present or past physical behaviour, that is, a heightened cognisance of what one is doing or what one is like. Alternatively, self-attention can be an awareness of the more or less permanently bits of information that comprise, for example, one's attitudes' (p.1255, Carver & Scheier, 1979).

The interlock account of depression proposed in *Interacting Cognitive Subsystems* (ICS, Teasdale & Barnard, 1993) argues that negative schema are maintained by altered feedback from both the body and from negative automatic thoughts. ICS proposes two qualitatively different levels of meaning representation. The propositional level encodes specific and conceptual meanings that can be represented in language. The implicational representation is a holistic, higher order framework that incorporates sensory and proprioceptive information about schematic models of the world. It generates non-verbal emotional beliefs or feelings, rather than intellectual thoughts. Information is passed from one code to another and patterns of activity across each code are stored in memory. A consideration of these activity patterns across the two levels is necessary for a complete understanding of a person's experience. The authors suggest that the focus of awareness in depression tends to be at the level of thoughts rather than the body. In anxiety the converse may be true, where focus of attention is more directed to body than mind.

A distinction drawn between mind and body is also supported by recent cognitive models of psychopathology. Mind versus body distinction is implicit in existing anxiety accounts reviewed above. The cognitive models of panic emphasise self-focused attention to body-state (e.g., Clark 1986) while accounts of GAD (e.g., Wells, 1997) and social phobia (e.g., Clark & Wells, 1995) describe self-focused attention to both body- and mind-state.

Most studies into SFA have not differentiated between SFA directed primarily on body-state, and SFA directed primarily on mental-state. In general, studies into SFA in depression have tended to concentrate on mental-state, whereas studies in anxiety

have concentrated more on monitoring body-state (Dunn, 2001). This is because in anxiety the somatic symptoms have been paid greater attention than in depression.

The only empirical test to explore mind versus body divide in SFA has been carried out by Dunn (2001) who conducted a series of studies of SFA in depression (analogue and clinical). As predicted, both analogue and clinical depression were characterised by elevated self-focused attention to mental-state, in line with the existing self-focus literature on depression (see Ingram, 1990 for a review). Both subjective and performance measures of SFA were employed. Unexpectedly, there was evidence for elevated awareness of body-state in the depressed but not analogue group. The latter demonstrated reduced self-focused attention to body-state. It was suggested that unexpected finding of elevated awareness of body-state in the depressed group may have reflected the high degree of anxiety symptomatology (and comorbid anxiety disorders) in that sample.

To date there has not been systematic investigation into SFA in anxiety to establish if heightened anxiety relates to focusing on body-state or mental-state alone, or to both. This could be significant, as different directions of attention could suggest different mechanisms for triggering and maintaining negative affect in anxiety, which could consequently require different clinical interventions.

It will be argued in the following two sections that the focus of such attention (body vs mind) may be implicated in modulating emotional experience. Specifically, the rumination literature suggests that negative affect is maintained via self-focused attention to mind-states while the interoception literature has linked negative affect



to self-focused attention to body-states. Furthermore, there is some evidence that these foci may differentially pertain to different mood disorders.

### **5. 11 Self-Focused Attention to Mind-State: Maintenance of Negative Affect by SFA to Mind via Rumination**

One of the ways in which SFA to mind-state may maintain negative affect is via rumination. Ruminative responses, defined by Nolen-Hoeksema, Morrow, & Fredrickson (1993, p.20) as ‘behaviours or thoughts that focus an individual’s attention on his/her depressed mood, and on the possible causes and consequences of that mood’ may be an important mechanism for maintaining negative affect in SFA directed at mental state. Ruminative focus can be characterised as repetitive, unproductive and excessively focussed on mood, especially negative mood, and likely to impede any goal-directed coping strategies. As such it may be distinct from other self-focus types in process and content. Lyubomirsky and Nolen-Hoeksema (1993) characterise rumination as a style of thought rather than any specific negative content, and as such argue that it is different from automatic negative thoughts. Mor and Winquist (2002) in a meta-analysis found that negative affect could be more strongly linked with ruminative self-focus than with other self-focus types. They also identified that although SFA could be linked with negative affect in samples of clinical and sub-clinical populations, it most strongly related to heightened negative mood in those already experiencing significant levels of negative affect. The role of rumination in maintaining depression has been examined by many theorists. In a response style theory, Nolen-Hoeksema (1991) argues that ruminative responses enhance the effects of negative mood on cognitive processes, and thereby prolong

depressive states through preventing an individual from adopting a problem solving approach directed at coping with the negative mood or its causes. It is further argued that depression is not promoted in non-dysphoric individuals by SFA as they are less attentive to perceived negative personal attributes and negative affect.

Although rumination has been discussed mostly in the context of depression, and worry in the context of anxiety, the distinction between rumination and worry is not always clear. The overlap between these two constructs is perhaps unsurprising, given the extent of comorbidity between anxiety and depression (Mineka, Watson, & Clark, 1998). Segerstrom, Tsao, Alden, & Craske (2000) found that self-report measures of worry and depressive rumination were correlated across individuals, mainly due to their shared variance with a global measure of repetitive negative ideation.

### **5.12 SFA to body may maintain negative affect via interoception**

The rumination literature reviewed above has looked at awareness of mind-state and its role in maintaining negative affect. It has been argued that negative mood may be maintained in heightened SFA through a different process – interoception (sensitivity to stimuli originating inside of the body).

Since James (1884) suggested that the perception of bodily responses comprised the experience of an emotion, and that there could be no emotion without bodily sensation, many psychophysiological theories have stressed the importance of self-perception of visceral activity in emotional experience. Although James

acknowledged a role for appraisal in emotions, especially higher order emotions, he maintained that bodily changes had to occur before any appraisal could be experienced as an emotion.

Lange, more specifically, theorised that changes in the cardiovascular system were indicators of emotional experience. The James-Lange model of 1894 was a synthesis of these theories.

As a result of the issues raised about the James-Lange model, it was revised in the 1960s. Schachter & Singer (1962) demonstrated that the level of physiological arousal determined the intensity of an emotional experience, and that its quality was defined by cognitive labelling; consequently, 'emotionality is positively related to physiological arousal'. In their study, participants were injected with epinephrine (a drug which increases visceral system activity) and saline and were then exposed to a social situation designed to elicit euphoria or anger. The participants were either told nothing about the effects of the drug, informed fully about the physiological side effects of the drug, or completely misinformed about the effects of the drug (told it was a vitamin pill). Those who were misinformed or uninformed experienced a more extreme emotional reaction than participants who were warned that the drug would induce arousal. Participants on placebo experienced no elevated emotional response.

Finally, physiological arousal could act as a form of crude signal from the periphery influencing the way emotions are felt, usually at a non-conscious level. Such feedback may not in itself be sufficient to determine different emotions. The 'somatic marker hypothesis' (Damasio, 1994) has argued that such crude emotional

biasing signals arising in the body shape decision-making in situations of uncertainty or complexity. Damasio (1994) has applied this account to emotion perception.

Evidence for the somatic marker hypothesis derives from the performance of patients with lesions to the ventromedial prefrontal cortex. These patients show intact performance on most tests of cognitive functions and social knowledge and yet are severely impaired in decision-making in real life (e.g., Damasio, 1979). Experimentally, these patients fail to show the normal autonomic system response to affective stimuli, compared to neutral stimuli (Damasio, Tranel, & Damasio, 1990), and this correlates with deficits on a novel gambling task (Bechara et al., 1994).

Although a number of criticisms have been voiced against Damasio's (1994) somatic marker hypothesis, his work is broadly in line with the emotion literature in proposing that information from mind and body interact when we process events in the environment.

To summarise, if SFA is not a unitary concept, it may be useful to separate its different aspects: SFA to mind versus SFA to body. SFA to body could maintain psychopathology via a Jamesian mechanism whereas SFA to mind could maintain psychopathology via rumination. It is possible that the balance between these two mechanisms varies in different forms of psychopathology associated with elevated SFA.

## **5.2 Accuracy versus Degree of SFA**

The following section will address the issue of accuracy of SFA and its role in maintaining anxiety. A further distinction that can be usefully drawn to clarify the field is that between the degree and accuracy of self-focused attention.

Normative self-regulation models reviewed earlier postulate that individuals regulate own goal directed behaviour by assessing the discrepancy between their current state and a salient standard. It would appear important whether self-focus accurately informs or inaccurately distorts this appraisal process. If self-focus leads to altered, rather than accurate perception, then we have a strange self-regulating system. It follows from normative self-regulation models that SFA and judgement accuracy are positively correlated in the normal population, i.e., the more people self-focus, the more accurate their judgements on a given task (the 'perceptual accuracy hypothesis', Silvia & Gondolla, 2001).

The paradox therefore is why extreme elevations of SFA in clinical states appear to be unhelpful rather than helpful. According to the perceptual accuracy hypothesis, individuals with depression and anxiety should be able to regulate their behaviour as they spend so much time engaged in SFA. This does not seem the case, since both disorders are characterised by non-optimal self-regulation. One way to explain this apparent contradiction is to draw a distinction between the habitual tendency people have to engage the SFA mechanism (degree of SFA) and the accuracy with which they make actual-ideal comparisons (accuracy of SFA). Elevations in degree of

SFA may be helpful if it is associated with accurate actual-ideal comparisons (in healthy populations) and unhelpful if it is associated with negatively biased, inaccurate actual-ideal comparisons (in clinical populations).

The anxiety interoception literature seems to have implicitly accepted the perceptual accuracy hypothesis, as seen in the interoception section earlier. However, the cognitive models of panic and social phobia, for example, both describe catastrophic misinterpretation of bodily sensations. These theories assume that SFA enhances awareness of physical symptoms. In turn, high self-focus to body state feedback is accompanied by inaccurate (catastrophic) thoughts about body-state, serving a foundation for panic attacks and various phobias (see Wells & Mathews, 1994). Conversely, self-regulation theories of depression have been silent about the question of accuracy (e.g., Pyszczynski & Greenberg, 1987).

The issue raised here pertains to methodological concerns emerging from the existing work. The self-report measures described earlier index the tendency to self-focus but not the accuracy with which people are focusing. Also, although the paradigm involving manipulation of either SFA or affect takes care to index the degree to which people report SFA and assess the consequences of SFA, it does not assess the judgment accuracy with which people are monitoring any discrepancy between the current and ideal state. Furthermore, as discussed in the review of the interoception work earlier, accuracy of self-focus to body has been typically measured using a heart monitoring paradigm. It has proven more of a challenge to measure accuracy of self-focus to mind.

To address this methodological challenge, Silvia and Gendolla (2001) recommended that judgement accuracy is best measured using tasks that can be categorically classified on the basis of both performance (completed correctly, completed wrongly) and judgement (judged accurately, judged inaccurately) (cf. Hastie & Rasinski, 1988). Judgement however may potentially be confounded by task difficulty. One way of dealing with this is to ensure that participants perform at their ceiling by completing around half of the trials correctly and half incorrectly. This may preclude any potential imbalance between success and failure rates from affecting judgements.

The first attempt to address the issue of judgement accuracy was in depression. A study by Dunn (2001) examined the accuracy with which dysphoric and clinically depressed individuals make judgments about their performance in the absence of external feedback, and the extent to which it relates to trait SFA. Relative to objective criteria, both groups showed a positive judgement bias, overestimating the number of trials they had performed correctly. Relative to controls, both dysphoric and depressed participants showed reduced positive bias in that they judged error trials more accurately and correctly performed trials less accurately. While the dysphoric and depressed groups both reported elevated trait SFA, this did not correlate significantly with accuracy of self-judgement on the performance-monitoring task.

To summarise, it is argued here that heightened SFA may only be problematic when its accuracy is also biased while being adaptive at other times. While measuring accuracy of SFA to mind has presented a methodological challenge, it is clear that

more empirical work decompartmentalising what aspect of SFA is disturbed in anxiety is needed.

## **6. Tentative clinical implications of these distinctions**

If these distinctions between different forms of SFA are supported it could potentially be of some clinical relevance.

Clarifying the profile of SFA may potentially lead to some benefits. It may be beneficial to teach people a form of self-focus that provides the adaptive benefits of increased self-awareness and improved self-regulation, whilst avoiding the maladaptive effects of self-focus on maintaining negative affect.

The distinctions proposed in this review raise further tentative implications if supported. Specifically, SFA may only be problematic if it becomes locked at one level of representation (mind or body). It may be the case that altered feedback from the body can explain some of the emotional difficulties seen in mood disorders.

Historically a range of bodily symptoms have been identified in mood disorders such as anxiety and depression, however they have tended not to be regarded as connected with maintaining the disorder, rather with its severity. Intervention may have to be focused on redirecting attention to other parts of system (from mind to body in depression; from body to mind in anxiety). Clarifying the profile of SFA in psychopathology may help reveal the effective ingredients of existing treatments.

For example, mindfulness may work by shifting attention from mind to body, given



the range of body state monitoring that make up early meditation practice in the treatment.

Further, SFA may be problematic if inaccurate/biased and thus maintaining the dominant anxious and depressed schema. Intervention would therefore need to focus on changing the accuracy of the SFA mechanism, rather than how often it is engaged in the first place. In the case of depression for example, the more accurate judgements reached at times of success could lead to better problem solving and lessened negativity. However, the reduced accuracy of all judgements of depressed individuals, and their overall tendency to evaluate events negatively, even if they seem to be successful, suggest that self-focus may not be a useful clinical tool in this context. A more productive clinical intervention could be to try to establish and maintain an external focus in hope of achieving greater accuracy of judgement.

## **7. Conclusions and Directions for Future Research**

The evidence has now been reviewed demonstrating how self-focus may maintain negative affect in anxiety. Elevated SFA has been linked to a variety of anxiety states, both theoretically and experimentally.

The review has highlighted a number of areas that warrant further investigation.

First, the notion that self-focus is a unitary concept has been questioned. For example, there is evidence for strong correlations of public self-focus with anxious symptoms and private self-focus with depressive symptoms. It has been argued that to elucidate our understanding of the relationship between anxiety and self-focus, it

may be useful to further fractionate self-focus. The need to draw a distinction between self-focus to mind and self-focus to body has been highlighted. While the interoception literature indicates that somatic disturbance may be of particular concern in anxiety, this supposition is yet to be linked directly to self-focus.

Second, while it has been repeatedly demonstrated that there are elevations in subjective, self-report of self-focused attention in anxiety, there has been little examination of what impact this has on the accuracy of internal monitoring processes in anxiety. The normative literature construes self-focus to be central to self regulation and hence assumes it is accurate, as does (albeit implicitly) the anxiety interoception literature. However, this review raises concerns about the validity of such an assumption. Whether elevated self-focus leads to more accurate insight remains an open question. The issue is complicated by the apparent methodological difficulty in measuring accuracy of self-focus to mind.

Third, further methodological issue addressed in the review relates to the need to consider both self-report and performance-based measures of both mental-state and body-state in anxiety. Concerns have been raised about the over-reliance on the poorly validated SCS as a measure of SFA.

Fourth, it is argued that more work is required to elucidate the precise mechanism of the impact self-focus is assumed to have on negative affect generally, and anxiety more specifically.

Finally, high comorbidity between anxiety and depression has meant that any relationship found between the fractionated SFA and anxiety may be confounded by co-morbid depression. One possible resolution to this dilemma, identified in the review, is to conceptualise trait anxiety as a general vulnerability factor underlying different disorders and to look at the relationship between SFA and anxiety symptoms (as measured by the MASQ) rather than diagnostic categories of various disorders.

It is hoped that the above considerations will help to better clarify cognitive information processing in anxiety which in turn could pave the way for the development of targeted cognitive interventions to modify or take account of specific self-focusing style.

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## **Part II: Empirical Paper**

**Degree and accuracy of self focused attention to body-state  
and mind-state information in anxiety**

## **ABSTRACT**

The current study examined self-focused attention in anxiety. Cognitive models of anxiety in which self-focus has been implicated treat self-focus as a single undifferentiated construct that may maintain anxious states. This lack of specificity reduces the explanatory power of the framework. To address this issue, two distinctions, first suggested by Dunn (2001) in the context of depression, were explored to see if they could better model SFA disturbances in anxiety. First, between self-awareness directed to different parts of internal experience, in particular, to body-state information or mental-state information. Second, between the habitual tendency to engage SFA (or degree) and the precision with which this mechanism operates (or accuracy). High and low trait anxious participants showed equivalent accuracy of body-state awareness, indexed by mental tracking paradigm whereby participants are asked to count their heartbeats. However, a curvilinear relationship was found between anxiety and body awareness. Accuracy of mental state awareness was indexed by asking participants to make self-regulatory judgements about their performance in the absence of external feedback. Compared to low trait anxious participants, high trait anxious participants demonstrated a negative judgement bias, underestimating the number of trials they had performed correctly. Surprisingly, however, relative to objective criteria, high trait anxious participants showed a positive judgement bias, overestimating the number of trials they had performed correctly. Finally, heightened degree of SFA to mind and body reported by the high trait anxious group did not correlate significantly with accuracy of self-judgement on the performance-monitoring task and body monitoring task, respectively. Theoretical and clinical implications of an attempt to fractionate SFA are discussed.



## **INTRODUCTION**

Anxiety disorders are common and often chronic, imposing both individual and health care costs. Epidemiological studies suggest lifetime prevalence rates of 21% (Singleton et al., 2001). Thus, identifying the factors that potentially influence the development and maintenance of anxiety is of high clinical importance. One such factor may be disturbances in self-focused attention (or SFA), where attention is directed inwards towards the self rather than outwards towards the environment.

SFA is postulated to play a central role in how people select and maintain adaptive behaviour in a range of normative theories (Duval & Wicklund, 1972; Carver & Scheier, 1978; 1998). When individuals become aware of the self as an object, they measure themselves up against certain standards. This process of self-evaluation constitutes a feedback cycle intended to regulate behaviour by identifying discrepancies and approximating the match between the existing and desired states. In an instance where the individual falls short of the ideal standard, self-focus is assumed to produce negative affect, with the individual attempting to either reduce the discrepancy or avoid self-focusing stimuli.

Disturbances in this self-regulation system, where SFA becomes sustained and excessive, have been implicated as a causal and/or maintenance factor in a variety of forms of psychopathology, including anxiety (Pyszczynski & Greenberg, 1987; Ingram, 1990). Several theoretical accounts of anxiety have incorporated concepts pertaining to self-focus (e.g., Clark, 1986; Clark & Wells, 1995). For example, in Clark and Wells' (1995) model, social anxiety is maintained as a result of excessive

attention to one's own thoughts, physiological arousal, and performance. Clark and Wells (1995) further propose that socially phobic individuals construct a distorted impression of themselves, based on internally generated information. Similarly, in panic disorder, cognitive-behavioural theories propose that panic results from the catastrophic misinterpretation of internal cues such as autonomic arousal symptoms or other sensations unrelated to anxiety (e.g. Beck, 1988; Clark, 1986). It is argued that panic patients are hypervigilant for the experience of such sensations. Cognitive models of generalized anxiety disorder (GAD) also discuss the importance of attending to internal sensations and the role of this self-focus in the experience and maintenance of negative affect (Wells, 1995).

In support of these theoretical models, a wide range of studies have demonstrated increased levels of self-reported SFA across different anxiety disorders. Elevated levels of self-reported SFA have been demonstrated in social anxiety, panic disorder, generalised anxiety, test anxiety and other anxiety states (Wine, 1982; Sarason, 1988; Ingram, 1990; Spurr & Stopa, 2002; Bogels & Mansell, 2001; Mor & Winquist, 2002).

While elevations of SFA in anxiety disorders are a relatively robust finding and of clear heuristic clinical value, it is important to note a number of limitations with existing theoretical accounts of the role of SFA in anxiety disorders and the evidence gathered to support them. The first major issue is that cognitive models of anxiety in which self-focus has been implicated treat self-focus as a single undifferentiated construct that may maintain anxious states. This, according to Ingram (1990), poses a conceptual problem in that the apparent lack of specificity of self-focus

significantly reduces its explanatory power. Ingram (1990) has suggested that self-focused attention is a 'non-specific process' that is common across psychopathologies (p.173). This means SFA models struggle to account why one individual may develop depression when they self-focus and another individual may develop anxiety when they self-focus for example, clearly limiting the utility of such frameworks. It would be a useful advance to somehow fractionate self-focus into a number of constructs with different aspects of SFA accounting for different disorders.

Accordingly, to further clarify a link between SFA and psychopathology, Dunn et al. (Dunn, 2001; Dunn, Dalgleish, Lawrence, & Ogilvie, a, b, submitted) proposed two novel distinctions: between SFA directed to mind or body, and between accuracy and extent of SFA.

The first distinction is that awareness of thoughts, attitudes and emotions could be separated from awareness of internal perceptual events: distinguishing awareness of mental-state from awareness of body-state. To date there has not been systematic investigation into SFA in anxiety to establish if heightened anxiety relates to focusing on body-state or mental-state alone, or to both. This could be significant, as different directions of attention could suggest different mechanisms for triggering and maintaining negative affect in anxiety, which could consequently require different clinical intervention. Specifically, the rumination literature suggests that negative affect is maintained via self-focused attention to mind-states. Ruminative focus can be characterised as repetitive, unproductive and excessively focused on mood, especially negative mood, and likely to impede any goal-directed coping

strategies (Lyubomirsky & Nolen-Hoeksema, 1995). As such it may be distinct from other self-focus types in process and content. On the other hand, the interoception literature has linked negative affect to self-focused attention to body-states. Peripheral feedback theories have suggested that feedback from the body is implicated in higher order information processing (James, 1884; Lange, 1885; Damasio, 1994).

Recent cognitive models of psychopathology support a distinction drawn between mind and body. For example, the interlock account of depression proposed in Interacting Cognitive Subsystems (ICS, Teasdale & Barnard, 1993) argues that negative schema are maintained by altered feedback from both the body and from negative automatic thoughts. ICS proposes that the focus of awareness in depression tends to be at the level of thoughts rather than the body. Conversely, Clark and Watson's (1991) tripartite model of mood disorders argues that anxiety disorders are uniquely characterised by physiological hyperarousal, suggesting level of awareness may be at the level of body rather than mind in anxiety disorders.

Given the range of bodily symptoms present in many anxiety disorders, suggesting that the experience of intense negative emotions may be related to elevated SFA to body, it is surprising that most of the SFA work has defined self-focus only in terms of mental-state and has neglected awareness of body state. On the other hand, a number of studies within the general interoception literature, have looked at monitoring of the body in anxiety. Because people's ability to detect heartbeats correlates with their ability to detect changes in other autonomically innervated organs (Whitehead & Drescher, 1980), performance on heartbeat detection tasks has

been used commonly to index general sensitivity to visceral activity. A recent reanalysis of this literature (Van der Does et al, 2000) concluded that there appears to be an inconsistent link between anxiety and body monitoring accuracy in social anxiety (Panayiotou & Vrana, 1998), panic disorder (Ehlers & Breuer, 1992), state or trait anxiety (Weisz, Balasz, & Adam, 1988; Okifuji, Harver, Katkin, & Reed, 1988).

A further distinction that can be usefully drawn to clarify the field is that between the tendency people have to engage the SFA mechanism (henceforth called 'degree') and the accuracy with which they make actual-ideal comparisons (henceforth called 'accuracy'). Normative self-regulation models reviewed earlier propose that individuals regulate own goal directed behaviour by 1) directing their attention internally, and 2) assessing the discrepancy between their current state and a salient standard (Carver & Scheier, 1981, 1998). For this process to be adaptive it is important to be able to appraise accurately current status and how much this deviates from ideal status, when external feedback is not available (this process will henceforth be referred to as judgement accuracy). To date, however, most research in anxiety has focused on the degree to which people self-focus, relying on self-report measures of SFA (e.g., the Self-Consciousness Scale, SCS, Fenigstein, Scheier, & Buss, 1975) but has not examined the accuracy of judgments this induces.

There is a general assumption in the normative models of self-regulation that increasing levels of SFA raises the accuracy of appraisal, referred to as the 'perceptual accuracy hypothesis' (Silvia & Gendolla, 2001). This is because a

central feature of self-regulation models is that ongoing behaviour is calibrated on the basis of recent judgements. While the perceptual accuracy hypothesis would predict anxious individuals to have excellent ability to regulate their behaviour as they engage excessively in SFA, this contradicts the clinical presentation of anxious individuals who are characterised by non-optimal self-regulation. Heightened SFA may only be problematic when it is accompanied with negatively biased, inaccurate actual-ideal comparisons, while being adaptive when being accurate. Anxious individuals may demonstrate systematic biases in judgement accuracy similar to those that they exhibit in other domains of cognitive functioning (see Mineka, Rafeali, & Yovel, 2003, for a review of information processing biases in anxiety). Any such biases could potentially play an important role in maintaining anxiety, with consequent implications for therapeutic interventions.

To examine the true value of self-related anxious judgements, it is necessary to establish an objective reference with which anxious cognitions can be compared. However, the increasing evidence that healthy individuals are not 'realistic' in assessing their performance but tend to over-estimate it, showing a positive bias, (e.g. Baumeister, 1989; Taylor & Brown, 1998; Mezulis, Abramson, Hyde, & Hankin, 2004). Consequently, comparing the performance of anxious individuals with that of healthy controls to establish whether there is a significant difference between the judgement accuracy of anxious and non-anxious groups may not represent such an objective reference.

Accordingly, a differentiation between discrepancy and distortion analyses of cognitive tasks may be usefully applied (Dobson & Franche, 1989). Discrepancy analysis relates the judgement accuracy of anxious participants in a cognitive task to

the performance of controls. Distortion analysis relates the judgement accuracy of anxious and non-anxious participants to objective measures of task performance. Cognitive models of anxiety would expect both discrepancy and distortion analyses of anxious participants' performance to display a negative bias (an under-estimation of correct judgements and an over-estimation of errors). Furthermore, Silvia and Gendolla (2001) recommended that judgement accuracy is best measured using tasks that can be categorically classified on the basis of both performance (completed correctly, completed wrongly) and judgement (judged accurately, judged inaccurately) (cf. Hastie & Rasinski, 1988). Performance monitoring paradigms fit these criteria.

To date, the only empirical test to explore mind versus body and the accuracy versus degree distinction in SFA was carried out by Dunn (Dunn, 2001; Dunn, Dalgleish, Lawrence, & Ogilvie, a, b, submitted) who conducted a series of studies of SFA in depression. The authors looked at degree in terms of self-reported SFA and accuracy in terms of objective performance based measures. Further, body versus mind distinction was examined using two different experimental paradigms and two different self-report measures. The Self-Consciousness Scale (Fenigstein, Scheier, & Buss, 1975) and Body Consciousness Questionnaire (Miller et al., 1981) were employed to measure subjective awareness of mind and body (degree of SFA), respectively. Accuracy of SFA to mental state was examined by asking participants to make judgements about their performance on a novel task about which they should have little a priori meta-cognitive knowledge – a spatial span working memory task. No external feedback was given. Accuracy of SFA to body- state was measured using an amended version of the Schandry (1981) mental tracking task

(Ehlers & Breuer, 1992), which indexes awareness of the heartbeat. In terms of accuracy of SFA to mental state, it was found that, relative to objective criteria (distortion), both depressed and dysphoric groups showed a positive judgement bias, overestimating the number of trials they had performed correctly. Relative to controls (discrepancy), both dysphoric and depressed participants showed reduced positive bias (a reduction in the extent of this positive bias) in that they judged error trials more accurately and correctly performed trials less accurately. Overall, while there was a clear alteration in degree and accuracy of SFA to mind, the findings on body-state awareness were less clear with depression being associated more with mental state than body state alterations.

To further our understanding of how self-regulation may be going wrong in anxiety states, Dunn et al.'s (Dunn, 2001; Dunn et al., a, b, submitted) work can be usefully extended to anxiety states.

Accordingly, the study reported here was designed to investigate the relationship between self focused attention to mind and body, using both subjective self-report and objective performance measures (see Dunn, 2001, Dunn et al., a, b, submitted) and to examine the degree to which these are associated with anxiety. Cognitive theories of anxiety predict that anxiety would differentially affect self-focus to body-state and mind-state with the former being more pronounced than the latter. A further aim was to examine the accuracy of self-regulatory judgements in anxiety states. Cognitive theories of anxiety predict that anxiety will be characterised by impaired accuracy of mental state monitoring and superior accuracy of body-state monitoring.



Finally, the study tested the perceptual accuracy hypothesis that predicts a positive correlation between the accuracy of self-focused attention to body and to mind and the subjective sense of bodily and mental awareness, respectively.

As a preliminary investigation of these issues, the present study tested an analogue population of people showing particularly high or low self-report of trait anxiety, as measured by Spielberger Trait Anxiety Inventory (STAI, Spielberger, 1971).

The following hypotheses were investigated:

1. degree of SFA - subjective measures

1.1 High trait anxious participants will report elevated levels of SFA to both body and mind, compared to low trait anxious participants.

1.2 High trait anxious participants will show higher subjective awareness of body relative to mind, whereas low trait anxious participants will show equivalent subjective awareness of body and mind.

2. accuracy of SFA - objective performance measures

2.1 High trait anxious participants will demonstrate *superior* (more accurate) body-state monitoring, operationalised as performance on the mental tracking paradigm (cf. Ehlers et al., 1996), relative to low trait anxious participants.

2.2 High trait anxious participants will demonstrate *impaired* (less accurate) mental-state monitoring on both between-group discrepancy (relative to low trait anxious participants) and within-group distortion (relative to objective criteria) analyses (judging that they performed worse than they actually did).

3. relationship between degree and accuracy of SFA

There will be a positive correlation between accuracy (objective measures) and degree of SFA to both body-state and mind-state (subjective measures).

## **METHOD**

### **Power calculation**

Based on the original Dunn (2001) studies, the target sample size aimed for in the current project was 26 participants in each group. This was felt to ensure adequate power in the study without placing unnecessary logistical pressures on the project.

### **Participants**

The experiment was conducted at the MRC Cognition and Brain Sciences Unit (CBU) in Cambridge. Ethics approval had been granted by the local university research ethics committee in Cambridge.

The participants were healthy volunteers from the CBU Participant Panel. This holds contact details about the people in Cambridge who are happy to be contacted about helping with research at the CBU. All participants were between 18 and 65 years of age, fell within the normal intelligence range (estimated IQ > 70) and had no reported history of learning disability). Other exclusion criteria included a history of brain injury and psychosis.

Originally 51 participants were recruited. One participant was excluded due to a diagnosis of schizophrenia. 23 people with a trait Spielberger Trait Anxiety Inventory (STAI, Spielberger, 1971) score greater than 45 comprised the High Anxiety Group. 23 people with a trait STAI score less than 40 comprised the Low Anxiety Group. To maximize the difference between the groups, participants with scores of 45 or more on the STAI were designated as high anxious, and those with lower scores as low anxious. Analyses were repeated using a more commonly used above/below 40 split (e.g., Mathews & Mackintosh, 2004; Wood, Mathews, & Dalgleish, 2001; Richards & French, 1992) and produced similar results. Groups were matched for age, gender and estimated IQ according to the National Adult Reading Test (NART; Nelson, 1982). Four participants who scored between 40 and 45 on the STAI were included in the correlational analyses.

Four participants in the high trait anxious group were taking anti-depressant medication. Two of those had been diagnosed with clinical depression by their general practitioners and one had been diagnosed with panic disorder.

Participants were telephoned to invite them to take part in the experiment and outlining what it will involve. At the start of the experimental session, participants read the study information sheet, and had an opportunity to discuss the study with the experimenter (and withdraw if they so wish).

All participants signed a written consent form prior to the experiment, and were reimbursed 5 pounds per hour for their time.

## **MEASURES**

### **Self-report measures**

#### Degree of SFA to mind

The Self Consciousness Scale (SCS; Fenigstein et al., 1975) is a 23-item personality measure intended to measure three distinct aspects of self-consciousness: (i) private self-consciousness (e.g. 'I am always trying to figure myself out'); (ii) public self-consciousness (e.g. 'I am concerned about the way I present myself'); and (iii) social anxiety (e.g. 'Large groups make me nervous'). All items are answered on a 0 (extremely uncharacteristic of you) to 4 (extremely characteristic of you) Likert-type scale. The scale has good internal consistency (Cronbach's alpha = 0.75), test-retest reliability ( $r = 0.76$ ), and discriminant validity.

#### Degree of SFA to body

The Body Consciousness Scale (BCQ; Miller et al, 1981) was used to index self-awareness of body-state. The BCQ is a 15 item self-report scale measuring 3 aspects of tendency to focus on bodily state. Private body-consciousness is attention to internal bodily sensations (e.g., "I am sensitive to internal bodily tensions"), public body-consciousness is focus on observable aspects of body (e.g., "When with others, I want my hands to be clean and look nice"), and body competence is the perceived efficacy of bodily actions (e.g., "For my size, I'm pretty strong"). Participants rate to

what extent a series of statements about body awareness are characteristic of them, rated on a scale from 0 (extremely uncharacteristic) to 4 (extremely characteristic). The questionnaire has good internal consistency (Cronbach's alpha = 0.70), test-retest reliability ( $r = 0.85$ ) and discriminant validity.

#### Other self-report measures

The Spielberger State-Trait Anxiety Inventory (STAI; Spielberger et al, 1971). The STAI is one of the most frequently used measures of anxiety symptoms. It comprises two forms that generate a trait (stable propensity to experience anxiety) and a state (current experience of anxiety) measure. Each form contains 20 statements requiring participants to rate how they feel on a four-point scale generally (trait) and over the past two weeks (state). The scale has high reliability and validity (Bieling, Antony, & Swainson, 1998).

The Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). This 21-item self-report instrument is in widespread use as a measure of depression severity. Each item is rated on a 4-point Likert scale and possible scores range from 0 to 63. Support for the BDI's validity and reliability has been demonstrated with samples from various populations (e.g., Beck, Steer, & Garbin, 1988).

## **Objective measures**

### **Accuracy of SFA to body-state: Body Monitoring Task**

Accuracy of body monitoring was measured using the Schandry mental tracking task (Schandry, 1981), which requires participants to monitor cardiovascular activity.

On each of six trials, participants were asked to state how many heartbeats they felt over certain measured periods of time and these data were then compared with heartbeats measured using an electrocardiogram (Schandry, 1981; Ehlers & Breuer, 1996).

Before the trials, details of the participants' physical condition were recorded as these factors are known to influence task performance (Ehlers & Breuer, 1996).

Details of any medication were noted. Participants' were asked about their height and weight, and their Body Mass Index (BMI) calculated (by squaring the product of weight in kilos divided by height in metres). Participants completed a physical activity inventory, and were interviewed about their levels of physical activity at work, during leisure time and during exercise periods, and results rated on a 7-point scale, as in Ehlers & Breuer (1996). Participants were asked to remove their watches, and not to try to measure their pulse using their fingers or to hold their breath. In addition, participants were asked to relax for three minutes. Their heart rate was then recorded in order to ensure that differences in resting state heart rate were not the cause of any differences in heartbeat monitoring.

Participants performed six heartbeat estimation trials in total (2X35s, 2X25s, 2X45s). In order to ensure that an ability to estimate time periods should not confound heartbeat monitoring, participants also performed three trials in which they

estimated the duration (in seconds) of a time period (1X23s, 1X56s, 1X40s). In a fixed sequence, participants completed three heartbeat trials, then three time trials, then three heartbeat trials.

All trials followed the same procedure. An 800Hz tone, lasting 100ms was used to warn participants to prepare for the trial. This was followed three seconds later by a 1000Hz tone, lasting 50 ms which indicated that participants should begin counting heartbeats or estimating time. After the prescribed time of each trial, an identical tone was used to indicate that participants should stop counting heartbeats or time.

Heart rate was recorded using a BIOPAC™ MP 100 unit and an ECG 100B amplifier (BIOPAC, 1997), with data collected at a sampling rate of 200 samples per second (providing a temporal resolution of 5ms). The ECG amplifier gain was set at x 2000, the R-wave detector was switched on, and the filter was switched off.

Disposable electrodes attached by snap fasteners to shielded leads were placed on the topside of each wrist. The specifications for ECG recording were based on published research guidelines for recording heart rate (Jennings, Berg, Hutcheson, Obrist, Porges, Turpin, 1981; Brownley, Hurwitz & Shneiderman, 2000). The MP 100 was connected via the Comm port to a pentium 300 computer, which recorded the amplifier output using the Acqknowledge™ 8.0 software. The body-monitoring task was presented on a separate Pentium 300 computer. This communicated with the digital input ports of the MP100 through the parallel port of the computer, marking with a digital pulse the duration of each heartbeat counting trial.

To calculate heartbeat perception error, the number of counted heartbeats was subtracted from the actual number. This figure was then divided by the actual number of heartbeats and multiplied by 100 to express the inaccuracy as a percentage.  $([\text{actual beats} - \text{counted beats} / \text{actual beats}] \times 100)$ . The average error of three trials before the baseline and the three trials after the baseline were used to calculate the mean error scores (cf Schandry, 1981; Ehlers & Breuer 1996). Time estimation accuracy was similarly expressed as a percentage error score: actual duration of trial (seconds) minus the estimated number of seconds, divided by the actual number of seconds and multiplied by 100  $([\text{actual seconds} - \text{counted seconds} / \text{actual seconds}] \times 100)$ .

#### Accuracy of SFA to mental-state: Performance Monitoring Task

A performance monitoring task was used to measure accuracy of SFA to mental-state (cf Dunn et al., submitted). Participants were asked to perform a random array spatial working memory task similar to the Corsi block-tapping paradigm (Milner, 1971), in which they were shown up to eight blocks which changed colour one by one in a specific sequence. The participant had to remember the sequence and repeat it using a computer mouse.

To ensure that the performance judgement was equally difficult for all participants, the span length of each trial was kept close to each participant's maximum capacity using a titration approach. Moreover, titration was calibrated to provide around 50% success across all trials for each participant (Dunn et al. a, submitted).

The trial always started with five blocks. If the sequence of changes was remembered successfully, the span was increased by one, and decreased by one after



each failure (to a maximum of eight blocks and a minimum of one block).

Participants were not informed about this aspect of the trials, and when questioned after the experiment, none reported having observed a relationship between span length and performance accuracy. The underlying intention was to make mental monitoring difficult for the participant through keeping the level of difficulty of the task near to the participant's maximum capability, thereby ensuring that judgement accuracy was not confounded by underlying span performance.

Participants completed two practice trials and 20 experimental trials. After each trial they were asked to assess if they had completed the task successfully or not. As no external feedback was given concerning task performance, a form of internal performance monitoring must have taken place.

The accuracy of task performance and the accuracy of performance evaluation were recorded. Trials which had been performed correctly and evaluated as correct by the participant were classified as 'correct – correct' (CC). Correct trials which were wrongly assessed as incorrect were classified as 'correct – wrong' (CW). Trials performed wrongly, but evaluated as correctly-performed were classified as 'wrong – correct' (WC). Unsuccessful trials which were judged to be incorrect were classified as 'wrong – wrong' (WW). Both performance accuracy and judgement accuracy were analysed.

## **PROCEDURE**

Participants were screened and completed the NART, the SCS, the BCQ, the Physical Activity Questionnaire, the STAI, and the BDI. Measures of depression as

well as anxiety were included since these conditions are often comorbid with one another.

The psychophysiology electrodes were then attached and participants completed the rest task followed by the experimental tasks looking at bodily and mental awareness. These were counterbalanced and before the body monitoring and the mind monitoring tasks, self-report state measures of awareness to body (BCQ) and mind (SCQ) were administered, respectively.

The study was completed over a single session, lasting up to 90 minutes. Testing took place in a quiet, softly lit room, with participants seated in a comfortable chair facing the computer monitor. All experimental tasks were programmed in Microsoft Visual Basic 6.0 (Microsoft, 2000) and presented on a Pentium 300 computer with a 15" monitor.

## **RESULTS**

### **Group Comparison**

Table 1 reports mean demographic and clinical variables for participants in each group. Independent sample t-tests confirmed that high trait anxious participants had significantly greater scores than the low trait anxious group on the STAI trait anxiety scale,  $t(44) = 12.65, p < .01$ , STAI state anxiety scale,  $t(44) = 5.96, p < .01$ , BDI,  $t(44) = 8.46, p < 0.01$ .

As intended, the groups were comparable in terms of age,  $t(44) = 0.74$ ,  $p = 0.47$ , and NART estimated intelligence,  $t(44) = 1.26$ ,  $p = 0.22$ , physical activity,  $t(44) = 1.77$ ,  $p = 0.08$ , and had similar gender ratios (83% and 78% in the high trait anxious and low trait anxious, respectively).

There were no significant differences in resting state heart rate,  $t(44) < 1$ , or heart rate variability,  $t(44) < 1$ .

TABLE 1

Demographic and clinical characteristics of participants

Variable	Low Anxiety	High Anxiety
Age (in years)	43.6 (13.6)	46.7 (14.4)
NART Verbal IQ	114.9 (6.6)	117.1 (5.0)
% Female	78	83
Physical Activity	2.7 (1.0)	2.1 (1.0)
STAI – Trait	31.0 (5.6)	52.7 (5.6)
STAI – State	28.4 (5.2)	40.3 (8.0)
BDI	2.8 (2.4)	15.4 (6.7)

## Self-report measures of SFA

### HYPOTHESIS 1.1

Table 2 reports mean scores on the SCS and BCQ questionnaires for each group.

TABLE 2

Self-report measures of awareness of mind and body (SCS and BCQ)

Variable	Low Anxiety	High Anxiety
SCS Private	17.7 (8.7)	25.4 (6.7)
SCS Public	11.1 (6.0)	16.7 (5.2)
SCS Social Anxiety	8.3 (4.6)	16.3 (5.2)
BCQ Private	11.2 (4.3)	15.2 (4.5)
BCQ Public	7.7 (4.2)	11.1 (4.1)
BCQ Competence	8.3 (2.8)	9.1 (3.4)

### Degree of SFA to body

On the BCQ, independent sample t-tests found that, compared to the low trait anxious group, the high trait anxious group reported higher subjective levels of bodily awareness on both the private factor,  $t(44) = 3.12, p < 0.01$  and public factor,  $t(44) = 2.82, p < 0.01$ . There was no difference between groups on the competence factor,  $t(44) = 0.90, p = 0.38$ .

Further, there was a significant positive correlation between STAI trait and both private and public factors on the BCQ (Pearson's  $r = 0.47$ ,  $p < 0.01$  and  $r = 0.38$ ,  $p < 0.01$ , respectively). There was no correlation of STAI trait and the competence factor of BCQ, Pearson's  $r = 0.09$ ,  $p = 0.53$ .

The analysis was repeated using BDI score as a covariate and produced an identical pattern of results, suggesting that the findings could not have been due to the presence of depression in the high trait anxious group.

#### Degree of SFA to mind

On the SCS, independent sample t-tests found that, compared to the low trait anxious group, the high trait anxious group reported higher subjective levels of awareness to mind-state on both the private factor,  $t(44) = 3.35$ ,  $p < 0.01$ , public factor,  $t(44) = 3.40$ ,  $p < 0.01$ , and social anxiety factor,  $t(44) = 5.49$ ,  $p < 0.01$ .

Further, there was a significant positive correlation between STAI trait and private, public, and social anxiety factors on the SCS (Pearson's  $r = 0.51$ ,  $p < 0.01$ ,  $r = 0.51$ ,  $p < 0.01$ , and  $r = 0.70$ ,  $p < 0.01$ , respectively).

The analysis was repeated using BDI score as a covariate and produced an identical pattern of results.

## HYPOTHESIS 1.2

To compare degree of SFA to body and to mind, all the questionnaire factor scores were converted into z-scores. Repeated measures ANOVA with Mode (mind, body) and type (private, public, social anxiety/competence) as within subjects factors and Group (high and low trait anxiety) as the between subjects factor was run. A significant main effect of Group was revealed,  $F(1, 43) = 25.82, p < 0.01$ . There was a significant Mode by Group interaction,  $F(1, 43) = 8.17, p < 0.01$ . Post hoc tests revealed that, in line with hypothesis 1.2, high trait anxious participants showed higher subjective awareness of body relative to mind ( $t(22) = 6.76, p < 0.01$ ), whereas low trait anxious participants showed equivalent subjective awareness of body and mind ( $t(22) = 0.76, p = 0.58$ ).

### Objective measure of body awareness – body-monitoring task

## HYPOTHESIS 2.1

The mean error score on the time estimation and heartbeat estimation components of the body monitoring task for the high and low trait anxious groups is shown in Table 3.

To analyse monitoring accuracy ANOVA compared the two groups on the mean percentage error score on the time and heartbeat monitoring components of the task. Two way repeated measures ANOVA with Task (heartbeat, time) as the within subjects factor and Group (High Anxiety, Low Anxiety) as the between subjects

factor found a significant effect of Task,  $F(1, 43) = 4.9, p < 0.05$ , with participants having a lower error rate on the time estimation task than the heartbeat monitoring task. There was no Task by Group interaction,  $F(1, 43) = 0.28, p = 0.6$ , and no main effect of Group,  $F(1, 43) = 0.66, p = 0.42$ .

Exploratory analyses found that the groups showed comparable error scores on heartbeat trials,  $t(44) = 0.83, p = 0.41$ , and time trials,  $t(44) = 0.33, p = 0.75$ . In addition, there was a significant correlation between the two (Spearman's  $r = 0.39, p < 0.01$ ). To make sure that heartbeat trials measure interoception rather than general monitoring ability and use of a time estimation strategy to approximate heart beats on the task, the heartbeat analysis was repeated co-varying the time error score. There was no effect of Group,  $F(1, 43) = 0.01, p = 0.94$ . The high trait anxious group did not differ from the low trait anxious group on heartbeat estimation.

However, there was a significant curvilinear relationship between STAI and error scores on the heartbeat estimation trials,  $F(1, 46) = 3.44, p < 0.05$ . The mean R squared for the quadratic regression fit was 0.13 with a mean of  $P = 0.04$ . The results indicated that moderate levels of anxiety were associated with elevated accuracy monitoring while the opposite was true for low and high levels of anxiety.

TABLE 3

Performance on the Body-monitoring task

Variable	Low Anxiety	High Anxiety
Mean Error Score on Heart Beat Task	37.1 (15.7)	35.5 (17.9)
Mean Error Score on Time Task	31.3 (19.9)	27.2 (13.2)

Objective awareness of mind – judgement accuracy

HYPOTHESIS 2.2

The means of performance and judgement accuracy measures are shown in Table 4.

The performance levels of the groups was comparable, with no significant differences emerging for mean memory span,  $t(44) = -1.89, p = 0.85$ . Further, both groups performed around half of the trials correctly, suggesting that the task titration was successful,  $t(44) = 0.35, p = 0.73$ .

Judgement *discrepancy* was indexed by calculating the proportion of trials judged as correct, regardless of actual performance  $([CC \text{ trials} + WC \text{ trials}] / \text{total trials})$ . High trait anxious participants demonstrated a negative judgement bias on the discrepancy index, relative to low trait anxious group,  $t(44) = 3.35, p < 0.01$ , supporting hypothesis 2.2.



Judgement *distortion* was indexed by comparing the proportion of trials actually performed correctly with the proportion of trials judged by participants to have been performed correctly, using a paired sample t-test for each group separately. There was a significant difference between estimated and actual performance in the low trait anxious group,  $t(22) = 9.45, p < 0.01$ , with low trait anxious participants overestimating the number of trials they performed correctly (a positive distortion). Contrary to the distortion aspect of Hypothesis 2.2, the high trait anxious group also overestimated the number of trials they had performed correctly,  $t(22) = 4.34, p < 0.01$ , indicating that high trait anxious participants also demonstrated a positive distortion bias. To measure if the magnitude of this positive distortion varied across the groups, the proportion of spans performed correctly was subtracted from the proportion of spans judged as correct and this difference was analysed using between group t-test. This revealed that the low anxious group had a significantly greater positive bias than the high anxious group,  $t(44) = 3.15, p < 0.01$ .

In addition, to examine further Hypothesis 2.2, this time using continuous mood measures, STAI trait was also correlated with the performance monitoring task variables. There was a significant negative association between STAI trait scores and judgement discrepancy (proportion of trials judged as correct regardless of actual performance),  $r = -0.50, p < 0.01$ . Consistent with the discrepancy results of the between-groups analysis, this suggests that individuals become increasingly negative in their performance judgements as anxiety increases. A similar result emerged after partialling out the BDI,  $r = -0.42, p < 0.01$ , suggesting that the findings are not due solely to the effects of depression.

TABLE 4

Performance-monitoring task data

	Low Anxiety	High Anxiety
Mean span	5.5 (0.52)	5.5 (0.61)
Proportion of trials performed correctly	0.52 (0.33)	0.52 (0.05)
Discrepancy: Proportion of trials judged as correct	0.80 (0.14)	0.66 (0.15)
Distortion: Proportion of trials judged as correct minus proportion of trials performed correctly	0.28 (0.14)	0.14 (0.16)
Proportion correct trials judged accurately	0.95 (0.09)	0.89 (0.12)
Proportion wrong trials judged accurately	0.36 (0.25)	0.59 (0.24)

### HYPOTHESIS 3

#### Relationship between subjective and objective measures of awareness of body and mind

##### BCQ

To test Hypothesis 3, Pearson's bivariate correlations were conducted to examine the association between error scores on the heartbeat estimation trials and subjective awareness of the body (BCQ factors). The significance criterion was set at  $p < 0.01$  to partially control for multiple comparisons. No correlations were significant at this level.

##### SCS

To further test Hypothesis 3, that there would be an association between subjective awareness of mind and judgement accuracy, bivariate correlations looked at the relationships between the key monitoring task variables (discrepancy and distortion) and the SCS factors. Again, the significance criterion was set at  $p < 0.01$ . No correlations were significant at this level.

## DISCUSSION

The study aimed to explore self-focused attention to body-state and mental-state information in anxiety, using both subjective self-report and objective performance measures. Both the habitual tendency to engage SFA (or degree) and the precision with which this mechanism operates (accuracy) were examined.

Relative to low trait anxious participants, high trait anxious participants reported significantly greater scores on both the body and mind awareness questionnaires, indicating that they have elevated self-focused attention to body-state and mental-state. This was more pronounced in self-focused attention to body-state information. The findings support hypotheses 1.1 and 1.2 and are consistent with the existing literature on SFA in anxiety (Ingram, 1990) and general cognitive accounts of anxiety (Clark & Watson, 1991) that differentially implicate somatic concerns in anxiety disorders.

Hypothesis 2.2, that predicted more accurate body-state monitoring in high trait anxious participants relative to low trait anxious participants, was partially supported. No difference was exhibited between the two groups on their heartbeat error rates. However, while there was no evidence of a linear relationship between anxiety and body monitoring accuracy on further correlational analyses, a curvilinear relationship with a significant quadratic trend was found between these variables. This suggests that moderate levels of anxiety are associated with superior accuracy, or ability to monitor body-state, but both low and high levels of anxiety are related to a reduction in accuracy, or reduced ability to monitor body-state.

Hypothesis 2.2, that high trait anxious participants would demonstrate negatively biased judgement accuracy concerning their task performance according to *discrepancy* analyses (where performance was contrasted with that of control groups, without consideration of objective performance measures), was supported. This finding is congruent with the assumptions of cognitive models of anxiety whereby it is characterised by a global negative bias. However, contrary to the prediction of cognitive models of anxiety, the high trait anxious group displayed a positive bias according to within-subjects *distortion* analyses (where judgement accuracy was contrasted with objective measures of task performance), over-estimating the number of trials that they had performed correctly.

Finally, Hypothesis 3, predicting a positive association between subjective and objective measures (degree and accuracy) of bodily awareness and mental awareness, was not supported. No significant relationship was found between self-report measures of bodily awareness and mental awareness, and accuracy of monitoring on the heartbeat task and judgement accuracy on the performance monitoring task, respectively. The present data provide, therefore, no support for the perceptual accuracy hypothesis.

The present data are equivocal in the support given to the fractionation of SFA to change in bodily activity and SFA to mind-state. The failure to find superior monitoring of body state in high trait anxious participants, compared to low trait individuals is contrary to cognitive theories of anxiety and theories implicating abnormalities in body-state processing in anxiety (for example, the tripartite model,

Clark & Watson, 1991). According to the cognitive model of panic, for example, increased cardiac awareness may increase the probability of anxiety-inducing bodily sensations triggering the vicious cycle of panic (Clark, 1996). Some authors have argued, however, that accurate heart rate perception is not a necessary assumption of the cognitive model (Ehlers et al., 1988). Empirical support has been mixed for superior cardiovascular perception in anxiety disorders (for a review see Van der Does et al., 2000). The finding of a significant curvilinear relationship between anxiety and body monitoring suggests more complex dynamics between these factors than the previous studies may have implied. From a clinical perspective, this could mean that self-focus might be a useful strategy for anxious individuals if they could be encouraged to self-focus at times of experiencing moderate levels of anxiety as these appear to be associated with enhanced accuracy.

The finding of a significant positive distortion bias in anxiety challenges cognitive models of anxiety that predict that anxious individuals should demonstrate an overall negative distortion bias (Mineka et al., 2003). Studies testing these models often compare anxious individuals with controls who may not serve as an objective comparison group. The present data therefore suggests the importance of distinguishing between discrepancy and distortion analyses.

Moreover, the findings present a challenge for models of self-regulation (Duval & Wicklund, 1972; Carver & Scheier, 1981, 1998), suggesting that healthy individuals routinely overestimate their performance and are, therefore, poor at evaluating their actual behaviour against their own standards, or internal model of behaviour. It is not clear how such inaccurate mechanism of self-regulation could adaptively

maintain goal-directed behaviour. One possibility is that anxious individuals' standards are unrealistically high and are often based on distorted beliefs and assumptions (e.g. social anxiety, Clark & Wells, 1995). In addition, the ought-actual comparisons that maintain goal directed behaviour may not be fully accessible to conscious introspection.

This study explored the accuracy aspect of the self-regulation mechanism and its relationship with degree of self-focus, i.e. how actual state is compared with the ideal state. Alternatively, other parts of the self-regulation mechanism may be impaired in anxiety. The present data suggest that although SFA may contribute to anxiety, it cannot explain why anxious participants do not simply shift their focus of attention elsewhere. The fact that they remain self-focused suggests a deficit in their ability to shift their focused attention. Indeed, the positive bias found in this study suggests that anxious participants should prematurely exit self-regulatory cycles, rather than becoming stuck in them. Hence, SFA alone may not be enough to lead to anxiety. After all, if someone finds self-focus aversive, all she or he need do is focus on something else. Heightened and inaccurate self-focus combined with the inability to shift one's focus of attention may lead to more anxiety than either one alone.

The data presented here found little consistent relationship between subjective self-report and performance based measures of self-focused attention. This is in line with the interoception literature that self-report of bodily awareness is often unrelated to the actual accuracy of the underlying monitoring processes (Dworkin, 2000). While much of the work on SFA has implicitly assumed that questionnaire measures of SFA provide an unbiased and accurate index of self-focus, the present data

highlights the importance of not inferring from high scores on self-report measures of SFA that a given group are actually more accurate in terms of how they process underlying information. Care needs to be taken to include both objective and subjective measures in SFA research.

If these findings prove to be replicable, there are a number of possible clinical implications to consider. Clarifying the processes that are implicated in self-regulation disturbances in anxiety is of high clinical relevance. The findings suggest that it is not just the degree of SFA that is important but also that the precise manner in which people attend to self-experience, or accuracy of SFA, that determines the consequences of self-focus. Intervention therefore may need to focus on changing the accuracy of the SFA mechanism, rather than how often it is engaged in the first place. To date, the primary emphasis in cognitive therapy has been upon identification and modification of negative cognitions by collecting evidence in order to assess their truthfulness (e.g., Wells, 1997). However, in those anxious individuals who exhibit a positive bias in their judgements, this 'reality-testing' approach could be counterproductive because it may be more likely to exacerbate rather than alleviate anxious mood.

It could be argued that the findings may be an artifact of the measures employed in the current study. The accuracy of heartbeat monitoring was measured by asking participants to count how many heartbeats they could feel over varying time intervals (cf. Schandry, 1981; Ehlers & Breuer, 1996). A limitation of this paradigm is that rather than measuring interoceptive accuracy, it may reflect beliefs about heart rate held by the participants (see Brener et al., 1995; Flynn & Clemens, 1988;



Phillips et al., 1999; Ring & Brenner, 1996; Windmann et al., 1999). As such, it may be solved by a participant who simply counts at a rate that just happens to be close to their ongoing heart rate. That is, the counts may not be based on any perception of discrete visceral events, but may reflect accurate guessing of ongoing rate. To rule this out, participants were interviewed about how they approached the task and what strategies they used (e.g. guessing, comparing to time, monitoring pulse in different parts of the body). No systematic variation in strategies was reported by low versus high trait anxious participants. In future studies, participants could be asked to rate their confidence in the accuracy of their heart beat estimations. This task would enable the participant's explicit awareness of heartbeat to be tested.

Furthermore, the heart rate monitoring task included a time estimation control condition (see Ehlers & Breuer, 1994). While heart rate monitoring was significantly confounded with time estimation, this cannot explain the results as identical pattern of data emerged after partialling out the time estimation variable. Moreover, both groups used time estimation in equal degree. Therefore, examining performance using other measures of interoception that are less sensitive to beliefs (e.g., the Whitehead task; Whitehead et al., 1977) may be indicated to assess differences in cardiovascular beliefs in anxiety.

The lack of a relationship between degree and accuracy of SFA may have been due to the differences in coverage of the subjective and objective measures. The self report measures covered broad aspects of SFA to body and mind, whereas the objective measures looked at cardiovascular and performance monitoring only.

Furthermore, it is possible that the performance task was more a measure of attention to task performance (and hence related to test anxiety) than attention to mental state. However, participants were asked to evaluate their performance in the absence of any external, experimenter-generated feedback, suggesting that the present study was likely to examine the internal aspects of self-regulation judgement accuracy, as intended. It remains a possibility that the unexpected finding of a positive bias in high anxious participants may be constrained to laboratory contingency situations. Consequently, a more ecologically valid measure of performance accuracy, capturing an iterative nature of self-judgements, needs to be developed.

Care must be taken when generalizing these results to populations with clinically diagnosed anxiety disorders. This research answers some questions about the self-regulatory processes of individuals characterised by high trait anxiety. One potential limitation of employing an analogue sample, is that the group high on trait anxiety may not have been homogenous and therefore likely to include individuals whose concerns ranged from bodily states to mental state, thus lacking sensitivity to differentiate between SFA to body and mind. Even more specifically, test performance and social performance may have been predominant focus of the participants' attention. Such heterogeneity may have limited the results of the study. Further research should therefore examine the questions posed in this study recruiting participants with specific anxiety diagnoses.

Another factor that may potentially obscure a clear interpretation of the data involves the report of high levels of depression symptoms by high trait anxious

participants. Nevertheless, the findings are unlikely to be an artefact of comorbid depression in the high trait anxious group, since similar results emerged when analyses were repeated partialling out the BDI scores. Interestingly, negative bias in discrepancy terms and positive bias in distortion terms found in anxious participants in the present study replicates an identical pattern of results in Dunn et al's (submitted) depression sample, suggesting that the effects of anxiety and depression are not easily separable from one another.

To conclude, the current results are equivocal with regards to body-state and mental-state fractionation of SFA in anxiety. On subjective measures of SFA, overall heightened SFA was more pronounced for body-state than mind-state information in high trait anxious participants, as expected. However, high and low trait anxious participants showed equivalent body-monitoring accuracy on the objective measure of SFA. The finding of a curvilinear relationship between body-monitoring accuracy and anxiety, suggests that the relationship between these factors is of more complex and dynamic nature. Furthermore, degree of SFA, did not correlate with the accuracy of SFA (objective measures of awareness of body and mind), contrary to the perceptual accuracy hypothesis, suggesting that degree and accuracy may constitute dissociable aspects of the self-regulation mechanism. The surprising finding of a positive judgement bias in high trait anxious participants challenges cognitive models of anxiety that describe anxious cognitions as globally negatively biased. These patterns of alterations in self-regulation processes in anxiety reflect the complex nature of SFA and clearly warrant further investigation. Overall, the current findings suggest that a more process-oriented view of self-focus may be

required for theories of anxiety, and in differentiating normal from dysfunctional varieties of self-attention.

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## **Part III: CRITICAL APPRAISAL**

## **1. Introduction**

The main theoretical, methodological and clinical implications of the present study have already been addressed in the discussion section of the empirical paper. The critical appraisal will therefore concentrate on a selected number of the following issues that arose over the course of this work. First, the rationale for some of the choices made in relation to selecting both subjective and objective measures of self-focused attention will be presented in relation to the findings. Second, a brief recourse to broader operationalisation issues related to the apparent lack of clarity in definitions of SFA will follow. Third, the rationale for and implications of the decision to run an analogue, as opposed to clinical, study will be discussed. Finally, the strengths and weaknesses of presenting only selected aspects of the work will be considered.

### **2.1. Methodological limitations**

As mentioned in the introduction, a number of methodological limitations have been raised in the discussion part of the empirical paper. Consequently, this section will be restricted to the questions that were left uncovered yet certainly merit attention. Specifically, reliability and validity of the subjective measure of self-focus to mind-state information and the objective measure of SFA to body-state will be discussed.

In the present study, subjective SFA to mind was measured using the Self-Consciousness Scale (SCS; Fenigstein, Scheier, & Buss, 1975). The rationale for this choice included a number of factors. First, it is the only measure of self-focus

that has been related to the objective measure of self-focus to mind employed in this study (Eisenberg, Lieberman, & Satpute, 2005). Second, it is close to how SFA has been conceptualised in normative models of self-regulation (Duval & Wicklund, 1971; Carver & Scheier, 1981, 1998). Third, its wide use makes it easier to interpret the present results with regards to other findings in the SFA literature.

However, the SCS has recently encountered intense psychometric scrutiny (e.g., Burnkrant & Page, 1984). The scale has several factors, which correlate inconsistently with each other and with other scales, and often fail to replicate certain self-awareness effects (e.g., Ingram, 1990). Therefore, alternative measures that have been developed to address shortcomings of the SCS (Burnkrant & Page, 1984) ought to be considered in future research.

The literature has conceptualised SFA both as an individual difference variable that reflects the degree to which individuals tend to focus on themselves across situations (as measured by the SCS) and as a state they may be in following a particular event (for a review see Mor & Winquist, 2002). It is possible that situational measures of self-focus might produce different results, as they indicate whether at the time of performance judgement the participant was engaged in SFA. It has been argued, however, that asking individuals to reflect on their current attentional style may actually induce self-focus (e.g. Osberg, 1985). In this study both trait and state measures of SFA to mind and body were included (although the empirical paper restricts its report to the trait measures; see section 2.4 in this appraisal). The analyses, however, yielded no difference in the pattern of results.

In relation to the objective measure of SFA to body-state information, the failure to find superior monitoring of body state in high trait anxious participants, compared to low trait individuals could be argued to also have been an artifact of the measure employed. Body monitoring accuracy was measured using an amended version of the Schandry (1981) mental tracking task (Ehlers & Breuer, 1992), which indexes awareness of the heartbeat. The strengths of the Schandry task are clearly that it is quick to administer and assess awareness. However, the use of mental counting has made the task difficult or impossible to validate since researchers may never be able to determine when the mental count is occurring and assess whether the count is related to visceral processes. There is still very little data available which consider reliability or validity of the task. This may be due to the difficulty of doing any direct test. The data suggest that very few participants are able to accurately reproduce counts of their ongoing heart rates, and several sources of data clearly shows that most participants underestimate their heart rate and amount of underestimation is often 30 to 40% below their actual heart rate (Ehlers & Breuer, 1992). Finally, it is not clear whether a single psychophysiological measure, such as heart rate, can provide an unequivocal index of the direction of attention.

## **2.2. Definitional issues related to operationalisation of SFA**

The issue of operationalisation of SFA exposes the multitude of ways in which SFA has been conceptualised in the literature. SFA has been alternately defined as self-awareness, self-consciousness, rumination, worry, self-knowledge, self-reflectiveness, and internal state awareness. Indeed, on a higher information processing level, it is not entirely clear whether the term should be regarded as a thought process or an attentional process (Mineka, Rafaeli, & Yovel, 2003).

The assumption underlying the present investigation was that a limited attentional capacity system focuses on mental-state at the expense of body-state and on body-state at the expense of mental-state. This means that an individual can only consciously focus on information within one level of meaning at any one moment in time. This view of SFA as an attentional process is echoed in the general literature on information processing biases that differentially implicate attentional biases in anxiety and memory biases in depression (Mineka et al., 2003).

It can be argued that an almost identical pattern of results on accuracy of SFA to mind-state between this study and the work of Dunn (Dunn, 2001; Dunn et al., submitted, Dunn et al., b, submitted) in depression reflect the lack of accurate and reliable measurement of a clearly identified construct. It is possible that the measures used in this study may not have captured the characteristics of SFA as conceptualised in anxiety. The present study employed a memory span task to measure judgement accuracy. It may well be that this measure tapped altered memory processes which would be more pronounced in depression, suggesting that

the findings may be primarily driven by the comorbid depressive symptomatology reported by high anxious participants.

If SFA is construed as an attentional phenomenon, measures of attention are needed in order to explore, for example, which part of the self-regulatory mechanism may be impaired in anxiety. This distinction also has clinical implications. For example, some kind of attention training may be recommended when self-focus becomes 'adhesive' and the anxious individual is having difficulty reorienting attention away from self-relevant processing.

Another definitional issue concerns exactly how accuracy and bias are conceptualised. The present study examined judgement accuracy on a performance monitoring task using neutral stimuli (participants were asked to estimate their performance on a spatial span memory task). In contrast, in the general literature on cognitive biases in emotional disorders, the term 'bias' is not usually intended to imply either accuracy or inaccuracy, but rather refers to a tendency to process information so as to favour certain types of emotional valence or meaning. Consequently, the surprising finding of a positive distortion bias in high trait anxious individuals (overestimating the number of trials performed correctly) may reflect the lack of distinction between discrepancy-relevant and –irrelevant affect. Therefore the valence of self-referential information may be an important variable to include in future studies. In addition, understanding the relationship between self-focus and anxiety requires considering other variables that may moderate this relationship.

### **2.3. Use of analogue sample**

The decision was made to run the analogue study to see if any interesting results were emerging, and only proceed to the clinical study if the data were promising. First, high trait anxiety is a generic theme across anxiety disorders and also there is often an overlap between analogue and clinical populations. Correspondingly, theoretical models are increasingly supporting dimensional, as opposed to diagnostic, models of anxiety disorder (Watson, 2003, 2005). Therefore analogue samples are arguably not so distinctly different from the clinical ones – just less extreme of the same continuum and therefore are valid models of anxiety disorders. Second, there are ethical and logistical advantages of starting investigation with analogue population. Research on a clinical sample is time consuming and places an additional emotional burden on patients. Other ethical advantages include the opportunity to refine the methodology before taking the issues under investigation to a clinical group. Fourth, analogue samples are less likely to be confounded by co-morbidity and problems of medication or treatment effects.

One potential limitation of employing the analogue sample needs to be examined. The group high on trait anxiety may not have been homogenous and therefore likely to include individuals whose concerns ranged from bodily states to mental state, thus potentially lacking sensitivity to differentiate between SFA to body and mind. The main aim of the present work was to examine the usefulness of fractionating SFA (mind vs body and degree vs accuracy). The rationale behind this was to address the apparent lack of specificity within the existing models of SFA where it has been



implicated in the development and maintenance of various psychopathologies. What can differentiate between different disorders is the content of self-focus which is likely to be determined by the dominant schema associated with a given condition. Accordingly, SFA to body-state information may be more relevant to panic disorder than, for instance, than to generalized anxiety disorder which can be arguably predominantly characterised by heightened SFA to mind-state information. Therefore the failure of the present study to demonstrate superior self-focus to body-state in high trait anxious participants may be due to the relative composition of various anxiety relevant concerns within the high trait anxiety group. A group comprising a higher proportion of participants with, for example, panic-related concerns may yield a very different pattern of results.

This distinction in the content of SFA brings to mind the definitional dilemmas identified earlier and the consequent importance of selecting appropriate measures of SFA. Specifically, SFA conceptualised as worry, may be more relevant to the exploration of self-focus processes in generalised anxiety disorder (GAD). On the other hand, SFA phenomena in depression may be more accurately and fully captured by examining ruminative self-focusing style.

It follows from the argument presented above that future research should therefore examine the questions posed in this study by recruiting participants with specific anxiety diagnoses. In an attempt to partially address this issue with the present, non-clinical sample, specific anxiety disorder questionnaires were administered.

Among others, these included Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) and Fear of Negative Evaluation questionnaire (FNE; Watson & Friend, 1969). However, when the analyses were rerun including the scores from these questionnaires, the pattern of results remained the same. Moreover, further analyses demonstrated that the above questionnaires correlated highly with each other, raising the question of their construct validity; that is whether they can reliably differentiate between concerns relevant to the various anxiety presentations that they purport to assess. For example, the PSWQ has been claimed to distinguish patients with GAD from other anxiety disorders (Brown, Antony, & Barlow, 1993).

#### **2.4 Reporting selected aspects of work**

Finally, important choices had to be made at the stage of writing up the work. In particular, while a wide range of measures had been collected, it was decided to report only selected aspects of the work. The main rationale behind this decision was the opportunity it would allow to present a more focused paper that addresses more distilled key arguments. On the other hand, presenting the complete complex picture paper would represent a truer reflection of the data and would follow more logically from the arguments and suggestions made in the literature review.

This choice also has broader philosophical implications in terms of what is a good model for the science to follow.

### **3. Conclusion**

The critical appraisal reflected on several issues that came to the attention of the author over the course of the work. First, in relation to methodology, it is concluded that particular care needs to be taken when construing and operationalising self-focused attention as this may lead to different theoretical and clinical implications. The study highlights the need to urgently develop new measures more precisely capturing aspects of SFA pertinent to anxiety states. Second, the discussion of the choice and subsequent ramifications of selecting an analogue versus clinical sample to examine patterns of altered self-regulation processes in anxiety raises a very important yet often ignored conceptual issue. Namely, the strengths and limitations of dimensional, as opposed to diagnostic, framework of understanding anxiety disorders warrant further examination in the context of SFA research.

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## **APPENDICES**

**Appendix 1 Copy of Ethics Approval Letter, Consent Form and  
Information sheet for volunteers**



*Karen Douglas*  
Secretary

Dr B Dunn  
MRC Cognition & Brain Sciences Unit



**UNIVERSITY OF  
CAMBRIDGE**

**CAMBRIDGE  
PSYCHOLOGY RESEARCH  
ETHICS COMMITTEE**

7 July 2005

Application No: 2005.32

Dear Dr Dunn

**Exploring the Impact of Body-State Feedback on Emotional Experience and Decision-Making  
in Mood Disorders**

The Cambridge Psychology Research Ethics Committee has given ethical approval to your research project: Exploring the Impact of Body-State Feedback on Emotional Experience and Decision-Making in Mood Disorders, as set out in your application dated June 2005.

The Committee attaches certain standard conditions to all ethical approvals. These are:

- (a) that if the staff conducting the research should change, any new staff should read the application submitted to the Committee for ethical approval and this letter (and any subsequent letter concerning this application for ethical approval);
- (b) that if the procedures used in the research project should change or the project itself should be changed, you should consider whether it is necessary to submit a further application for any modified or additional procedures to be approved;
- (c) that if the employment or departmental affiliation of the staff should change, you should notify us of that fact.

Members of the Committee also ask that you inform them should you encounter any unexpected ethical issues.

If you would let us know that you are able to accept these conditions, I will record that you have been given ethical approval.

Yours sincerely

Cc: I Stefanovitch

**CONSENT BY VOLUNTEERS TO PARTICIPATE IN A STUDY ENTITLED:**

**“Exploring the impact of body-state feedback on emotional experience and decision-making in mood disorders”**

I.....

Of.....

.....

.....

hereby fully and freely consent to participate in the above study.

I understand and acknowledge that the trial is designed to add to medical knowledge. I note that I may withdraw my consent at any stage in the investigation and I acknowledge that the purpose of the trial, the risks involved from any procedures, and the nature and purpose of such procedures have been explained to me by:

.....

and that I had an opportunity to discuss these matters with him/her.

I have received a written explanation of these matters, a copy of which is attached to this form. I understand that I may change my mind and withdraw from the study at any time without any effect upon my rights.

Signed.....

Date.....

I confirm that I have explained to the volunteers the nature and effect of these procedures (Member of project team acting on behalf of the person responsible for the project).

Signed.....

Date.....

Place.....

## Appendix A: Information Sheet for Volunteers Considering Participating In a Study Entitled:

### **“Exploring the impact of body-state feedback on emotional experience and decision-making in anxiety, depression and mania”**

Please read the information below to decide if you would like to take part in the project:

#### **What is the purpose of the study?**

When suffering from mood disorders such as anxiety, depression, and mania, people often report being aware of changes in how their body feels. The aim of this study is to investigate if such alterations in feedback from the body contribute to the emotional and decision-making disturbances found in these conditions. This issue is important because it may help us better understand what makes some people vulnerable to mood disorders, and possibly lead to the development of new or improvement of existing treatments for these conditions.

#### **Why have I been asked to take part?**

You are being asked to take part so we can measure whether differences in self-report of anxiety, depression, or mania symptoms in the general population relate to differences in body-state feedback, emotional responding, and decision-making.

#### **What will I have to do?**

If you decide to take part, you will be asked to attend a number of testing sessions at the Cognition and Brain Sciences Unit, , at a time of your convenience. We will reimburse your travelling expenses for getting to and from the unit and give you an honorarium of £5 an hour for your time. Each session will last up to 90 minutes and you may be asked back up to four times. In each session, you will be asked to fill in questionnaires asking you about symptoms of anxiety, depression, and mania you have recently experienced. You will then complete a range of computerised tasks measuring how aware you are of your body, how you respond to emotional material, and how you make decisions. The emotional tasks will involve you looking at slides and viewing videos similar to that you would see in news broadcasts or newspapers, which you may find upsetting. Further, we will you to think about and describe upsetting personal memories you have experienced. While you complete all the experimental tasks we will measure activity in your body in terms of how much your heart rate changes, how much you sweat through the finger tips, and how tense the muscles on your face are.

#### **Are there any risks in taking part?**

All of the tasks we will ask you to complete and equipment we use have been used safely in previous research. You may, however, find some of the emotional tasks upsetting to complete. If you become very upset during the film we will stop the experiment and you will have the opportunity to talk to a clinical psychologist about your reaction if you wish to.

#### **Other information**

This study has received ethical approval from the Ethics Committee of the University of Cambridge. The data we collect will be used in the strictest confidence, and no identifying will be stored with the data, to safeguard your confidentiality. The data will be stored in a locked filing cabinet, which only the investigators will have access to. Results from the study will be presented at conferences and written up in journals. Results will be presented in terms of groups of participants, so individual data will not be identifiable. You are free to decide not to take part in the study and can withdraw from the study at any time and for whatever reason. If you do decide not to take part or to withdraw you do not need to explain your reasons to us if you do not want to.

If you would like any further information about the project please contact Dr. Barney Dunn (tel:

reading this information sheet.

). Thank you for

## **Appendix 2 Body Cognitions Questionnaire**

## BCQ

Please indicate how true each of these statements is about you. Answer each item on a scale ranging from 0 (extremely uncharacteristic of you) through to 4 (extremely characteristic of you)

	Rating
I am sensitive to internal bodily tensions.	_____
When with others, I want my hands to be clean and look nice.	_____
For my size, I'm pretty strong.	_____
I know immediately when my mouth or throat gets dry.	_____
It's important for me that my skin looks nice....for example, has no blemishes	_____
I'm better coordinated than most people.	_____
I can often feel my heart beating.	_____
I am very aware of my best and worst facial features.	_____
I'm light on my feet compared to most people.	_____
I am quick to sense the hunger contractions of my stomach.	_____
I like to make sure that my hair looks right.	_____
I'm capable of moving quickly.	_____
I think a lot about my body build.	_____
I'm very aware of changes in my body temperature.	_____
I'm concerned about my posture.	_____

Subject:

Total 1:

Total 2:

Total 3:

### **Appendix 3 Self-Consciousness Scale**

## MCQ

Please indicate how true each of these statements is about you. Answer each item on a scale ranging from 0 (extremely uncharacteristic of you) through to 4 (extremely characteristic of you)

	Rating
I'm always trying to figure myself out.	_____
I'm concerned about my style of doing things.	_____
Generally, I'm not very aware of myself.	_____
It takes time to overcome my shyness in new situations	_____
I reflect about myself a lot.	_____
I'm concerned about the way I present myself.	_____
I'm often the subject of my own fantasies.	_____
I have trouble working when someone is watching me.	_____
I never scrutinise myself.	_____
I get embarrassed very easily.	_____
I'm self conscious about the way I look.	_____
I don't find it hard to talk to strangers.	_____
I'm generally attentive to my inner feelings.	_____
I usually worry about making a good impression.	_____
I'm constantly examining my motives.	_____
I feel anxious when I speak in front of a group.	_____
One of the last things I do before I leave my house is look in the mirror.	_____
I sometimes have the feeling that I'm off somewhere watching myself.	_____
I'm concerned about what other people think of me.	_____
I'm alert to changes in my mood.	_____
I'm usually aware of my appearance.	_____
I'm aware of the way my mind works when I work through a problem.	_____
Large groups make me nervous.	_____

Subject:

Total 1:

Total 2:

Total 3: