Attention Training, Self-Focus, and Stress-Vulnerability: The Influence of Self-Esteem, Self-Esteem Range, and Social Anxiety

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Abstract

Attention training (AT) is a therapeutic intervention developed by Adrian Wells that involves the training of attentional skills to treat emotional disorders (Wells, 1990). This study investigated whether the AT technique works as theorised to reduce anxiety and other symptoms by reducing self-focus. In a laboratory setting, seventy-one student participants were exposed to a single session of either an AT analogue or a control treatment to see if AT would reduce their self-focus and vulnerability to a subsequent stressor task. AT was not found to decrease self-focus or reduce vulnerability to the stressor. In addition, self-esteem (SE) and social anxiety were investigated as potential moderators of the relationship between AT and/or self-focus on vulnerability to the stressor. Prior research has shown that SE level and self-focus interact such that self-focus predicts vulnerability to anxiety in people with low SE, but not in those with high SE. In this study we also examined SE range, a measure we developed here to reflect the range within which a person's state SE fluctuates over time. The results indicated that self-focus is related to increased vulnerability in those with low SE or a large SE range, but decreased vulnerability in those with high SE or a small SE range. This supports theorising that self-focus activates people's self-beliefs, which then influence how they respond during potentially threatening experiences. The findings also support the recommendation that SE range be subjected to further evaluation.

Introduction

The present research is an attempt to test the hypothesised mechanism underlying the effectiveness of Adrian Wells's attention training, a therapeutic procedure on which various components of attentional control are trained using auditory stimuli. Wells has asserted that attention training works by increasing externally-focused attention (Wells, 1990), which has the effect of reducing excessive self-focused attention—a problem theoretically and empirically linked with psychological disorder. This proposed mechanism has not been tested experimentally, however.

In addition to testing the effects on self-focus, we seek to explore the relationship between self-focused attention, vulnerability to threat, and a number of potential moderating variables, including self-esteem, self-esteem range, and social anxiety.

To begin this task, we will outline the theoretical and empirical context within which the present study's methods and findings are grounded. We start by exploring the dominant theories relating self-focus to affect. We then look at studies assessing dispositional variables that moderate the relationship between self-focus and affect. Next we explore the self-esteem and self-esteem stability literature that contributes to the research design and the interpretation of our findings. Following this, we outline the attention training procedure, its theoretical rationale, and the research that supports its effectiveness.

As this research involved physiological assessment of stress and anxiety, we also summarise the mechanisms underlying the electrodermal system and the rationale for its use in emotion assessment.

Self-Focused Attention and Affect

Early psychological and sociological writing on the topic of the self explored the fact that the self can be conceptualised in two ways: the subjective observing self and the objective observable self (e.g., Cooley, 1902; James, 1890; Mead, 1934). Likewise, people are able to focus their attention not just on their external environment, but also on themselves—one can simultaneously be the subject and the object of attention. Cooley (1902) argued that this ability to focus attention on the self was unique to humans[1]. These early writers largely relied

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[1] Later research, however, has demonstrated aspects of self-awareness in apes (Gallup, 1970), dolphins (Reiss & Marino, 2001), magpies (Prior, Schwarz, & Güntürkün, 2008), an elephant (Plotnik, de Waal, & Reiss, 2006), and possibly in octopuses (Mather, 2006).

on introspective research methods, which have limited scientific validity. Since the early 1970s, however, the ability to focus attention on the self has been examined rigorously with experimental methods (e.g., Duval & Wicklund, 1972). A series of theoretical models have been developed since Duval and Wicklund's work, which have attempted to explain the nature of self-focused attention and its role in emotions and a range of related psychological phenomena.

Contemporary psychologists conceptualise self-focused attention as the act of focusing attention inwards, such that the one becomes consciously aware of aspects of oneself. The focus may be on self-aspects observable to others, such as appearance and behaviour, or on unobservable internal experiences, such as thoughts and feelings. Later researchers such as Carver and Scheier (1981, 1982; 1998), Buss (1980), Ingram (1990), and Wells and Matthews (1994) have developed models detailing relationships between self-focused attention and other phenomena, including affect, motivation, approach and avoidance behaviour, and psychological disorders. Though these theories derive from Duval and Wicklund's original theory, they extend this work and challenge a number of its assumptions.

The expansion of research on self-focused attention has led to the use of a number of different terms to explain essentially the same phenomena. *Self-awareness* is a commonly used term to refer to the self-focused state, whilst *self-consciousness* is commonly used to refer to a trait reflecting dispositional self-focusing tendencies. These terms have some limitations, however, as they are employed in everyday language to refer to concepts different from those discussed here. Consequently, the terms *self-focus* and *self-focused attention*, which are frequently employed in the literature, will be used in this report.

Duval and Wicklund

In 1972, Duval and Wicklund published a volume outlining their objective self-awareness (OSA) theory, which describes the nature of self-focused and externally-focused attention, the conditions that induce self-focus, and the purpose and consequences self-focus[1]. Central to OSA theory is a strong relationship between self-focused attention and negative affect.

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[1]The term "objective self awareness" was used to refer to what is now more commonly called self-awareness or self-focus. Duval and Wicklund used the term "subjective self awareness" to refer to an externally focused state. These terms reflected whether the self was the object or the subject of conscious experience. These relatively cumbersome terms were later abandoned (Wicklund, 1975) and have not been used by other authors.

Duval and Wicklund asserted that conscious attention may be directed either inward toward the self or outwards towards the environment, but not both at the same time. Therefore, the contents of consciousness, at any given moment, are limited to entirely internal or entirely external information—though a rapid oscillation between the two states may mimic a state of divided attention. The proportion of time engaged in self-focus differentiates highly self-focused individuals from less self-focused individuals.

Duval and Wicklund suggested that the externally focused state is the natural state for people to be in when there are no stimuli or events prompting self-focus. Stimuli that might induce self-focus include seeing one's image in a mirror, hearing one's voice on a recording, or social situations in which one is the centre of attention. Any stimulus or event that reminds people of themselves is likely to induce self-focus.

The central proposition in Duval and Wicklund's OSA theory is that a switch to the self-focused state is immediately and invariably followed by an evaluation of the self on a salient dimension. The individual comes to evaluate themselves according to how their perceived current state on a particular dimension, such as academic ability or social competence, meets their perceived ideal state on that dimension. The particular dimension being appraised may be any feature of an individual's attitudes, abilities, or behaviour. What dimension becomes salient is determined either by the nature of the individual's current environment, such as expectations regarding appearance or social norms, or aspects of the self that the individual has idiosyncratic concerns about, such as appearing anxious or having body odour.

OSA theory asserts that people typically fall short of their ideals and that awareness of a discrepancy between their current and ideal selves invariably results in negative affect. The degree of negative affect experienced is a function of the size of the discrepancy. On rare occasions, a person will meet their perceived ideal, but the authors assert that extended periods of self-focus will always uncover a discrepancy as different dimensions of the self become salient. Consequently, negative affect resulting from the detection of discrepancies, will be the outcome of any extended period of self-focus. Duval and Wicklund surmise that self-awareness is therefore necessarily an aversive state and that people who engage in more self-focus will experience more negative affect. Wicklund (1975) later conceded that positive discrepancies—where an individual exceeds their standard—may induce positive affect. Such experiences will quickly elevate the comparison ideal, however, and a negative discrepancy will be recreated.

The purpose of self-focused attention, according to Duval and Wicklund, is to enable people to self-regulate—the negative affect that results from discrepancy detection, motivates

people to change their behaviour to reduce the discrepancy. Over time, this process should lead to increasingly adaptive behaviour. An alternative response is also available, however; a person may deliberately avoid stimuli that trigger self-focus, thereby avoiding the associated self-evaluation and negative affect.

Duval and Wicklund (1972) suggested some ways to combat excessive self-focus. The proposed that such individuals, who will experience a lot of negative affect, could improve their situation by engaging in activity that requires externally-focused attention. In situations such as parties, where self-focus triggers are abundant, high self-focus people could do things, such as helping the host serve appetisers, which demands external-focus, in order to allay self-evaluation and negative affect. Wicklund (1975) asserted that the success of therapies that do encourage self-focus is consistent with his theory, as these activities lead to discrepancy reduction, not just enhanced self-focus.

A number of studies are consistent with Duval and Wicklund's theory, in that participants conform more to salient ideals or standards when self-focused. Typically, mirrors, audio recordings, or audiences are used to induce self-focus in one group of participants, who are then contrasted with a control group, who are not exposed to these stimuli.

For example, in Wicklund & Duval (1971), participants were asked to work quickly on a clerical task. Half of the participants did this in front of a mirror to induce self-focus. These participants conformed more closely to the instructions to work fast (the salient standard). This demonstrated self-focus leading to behaviour aimed at reducing a current–ideal discrepancy. In another study, male participants were required to 'punish' a female student for errors during a learning task (Scheier, Fenigstein, & Buss, 1974). Participants who were exposed to mirrors or an audience making eye contact conformed more closely to the implicit standard of not harming women.

Other studies have found that manipulating salient standards in different directions can have opposite effects on participants' behaviour. For example, studies have made self-focused participants to be both more (Carver, 1975) and less (Scheier, Fenigstein, & Buss, 1974) likely to inflict punishment, by emphasising different standards.

Carver and Scheier

Charles Carver and Michael Scheier (e.g., 1981, 1998; Carver, 1979, 2006) extended the work of Duval and Wicklund with the development of their self-regulation theory of

behaviour and emotion. In Carver and Scheier's model, the relationship between self-focus and affect is more complex than that of OSA theory.

Carver and Scheier assert that self-evaluation is only one of many possible processes that occur during self-focus; they argue that self-evaluation occurs only when the salient aspect of the self relates to a behavioural ideal or standard. Discrepancy reduction is construed as goal directed behaviour. Ideals are seen as goals towards which individuals wish to progress.

Carver and Scheier also assert, however, that when self-evaluation does occur, it will invoke some form of affect and will influence behaviour. The detection of a discrepancy does not automatically induce negative affect, however. Only when the person judges that they cannot reach the standard, or fails to progress after attempting to change, do they experience negative affect and withdrawal. Carver and Scheier assert that a discrepancy may actually induce positive affect if the individual is confident that they can readily progress toward the goal. A positive expectation of progress will sustain discrepancy-reducing behaviour. In the Duval and Wicklund model, there is no capacity for positive affect to result such a negative discrepancy.

The self-regulatory process of self-evaluation and behavioural change is conceptualised as a self-regulatory system using a test-operate-test-exit (TOTE) mechanism. In this process, self-focus acts as a *test* phase, in which the current state is compared with the goal state. The outcome of this will guide attempts to modify the current state, if necessary, which occurs during the *operate* phase. The comparison between current and goal states is then made again in another test phase. This may prompt another operate phase, or if a match has been achieved, the self-regulatory process will be exited. In addition to such discrepancy reducing feedback loops, discrepancy enlarging feedback loops exist, which function to increase the gap between the current state and a specific undesirable 'anti-goal' state. With discrepancy enlarging feedback loops, the TOTE mechanism is exited once a sufficient distance between current and anti-goal states has been achieved.

Carver and Scheier assert that expectations about progress determine whether the comparison process will motivate behavioural engagement or withdrawal (Carver & Scheier, 1981). If a person detects a discrepancy they believe they can reduce at a sufficient rate, then they will attempt to do so and will not experience negative affect. If the individual thinks they cannot reduce the discrepancy at a sufficient rate, then negative affect and withdrawal will occur. Behavioural withdrawal is re-construed as disengagement from goal pursuit, rather than avoidance of self-focus.

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The affective consequences of self-focus in Carver and Scheier's model are more explicit than those of OSA theory. Rather than negative affect being an automatic consequence of discrepancy detection, the affective response is determined by the rate of progress towards the goal. When attempting to reduce a discrepancy, a person evaluated their rate of progress, comparing it with their desired rate of progress—a progress-rate standard.

This comparison forms a second layer of TOTE systems, effectively assessing the *operate* function of the first TOTE layer against its own progress-rate standard. When a person's progress in reducing a discrepancy matches their desired progress rate, no particular affect is produced. Progress below the desired rate produces negative affect. Progress above the desired rate produces positive affect.

In the self-regulation model, affect is seen as a signal to adjust the effort being put into goal pursuit. Negative feelings alert the individual that the rate of progress is too slow and needs to be hastened. Neutral feelings indicate that progress is proceeding steadily and does not need to be adjusted. Positive feelings alert the individual that progress is greater than is needed, and effort can be put into other areas.

Carver and Scheier's model makes explicit the emotions experienced as a result of self-regulatory activity (Carver & Scheier, 1998). These reflect whether the salient goal or standard is part of a discrepancy-reducing feedback loop (an approach goal) or a discrepancy enlarging feedback loop (an avoidance goal). For approach goals, the emotion caused by exceeding the progress standard is happiness or elation, whereas falling below the progress standard produces sadness or anger. For avoidance goals, exceeding the progress-rate standard results in calmness, whereas falling below the progress-rate standard produces fear and anxiety. The intensity of the emotion is a result of the degree to which the actual progress-rate varies from the desired progress rate.

This two-layered TOTE system relates affect directly with action—the affect loop has a motivating influence on the action loop. Affect serves as a signal to increase or decrease the effort put into pursuing different goals. Carver and Scheier suggest that some people are characterised by high goal pursuit, others by little active goal pursuit; some people are characterised by heightened 'anti-goal' avoidance, while others are less avoidance-oriented.

A substantial volume of supporting evidence has been gathered for Carver and Scheier's self-regulation model. In one study of goal pursuit versus withdrawal, Carver & Scheier (1981) had participants complete two tasks that ostensibly assessed intelligence. The first task was set up so that all participants performed poorly, establishing a discrepancy between actual performance and desired performance. The second task was a test of persistence,

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designed to assess the amount of effort participants put into the task. Expectancies were manipulated so that some participants would think they could do better on this task, whereas others would think they could not. The results showed that self-focus interacted with this information. Self-focused participants who thought they could improve their performance (i.e., reduce the discrepancy) persisted for the longest time. Self-focused participants who thought they could not improve, persisted for the least amount of time. Non self-focused participants were between these two. This supports Carver and Scheier's assertion that self-focus activates a feedback process and that motivation is determined not merely by the presence of the discrepancy, but by the perceived potential to reduce the discrepancy.

Duval, Duval, & Mulilis, (1992) found that the size of the discrepancy also affected persistence. Even self-focused individuals who were confident that they could improve their performance abandoned a task in which the discrepancy was large. If the discrepancy was smaller, participants persisted. Here too, it is an appraisal of the likelihood of matching self to standard that determined persistence, rather than the mere presence of a discrepancy.

Carver (2004) tested the theory's implications for affective response differences in individuals high or low on approach tendencies and those high or low on avoidance tendencies. As predicted, those high on approach tendencies reported more sadness in response to frustrative non-reward, more anger in a hypothetical scenario, and more anger following the terrorist attacks of September 11, 2001. Participants high in avoidance-tendencies were more likely to report nervousness and anxiety.

Carver and Scheier's self-regulation theory provides a more comprehensive and nuanced model for relating self-focus to affect. Self-focus is involved in the current–ideal comparison phase of discrepancy-reducing or discrepancy-enlarging feedback loops. Affective responses are determined by a second comparison process comparing current rate of progress in goal pursuit with the desired rate of progress. This determines whether positive or negative affect is experienced and the type of goal determines the form this affect takes.

Buss

Arnold Buss's theory of self-consciousness also attempts to explain the nature and function of self-focused attention. Buss downplayed the self-evaluative component of self-focus, instead focusing on features such as hightened awareness of thoughts and emotions, and a tendency to feel conspicuous and socially anxious. Buss asserted that there is an

important difference between public and private aspects of the self and that there is an important relationship between public self-focus and social anxiety.

Private aspects of the self are those that are experienced only by the individual, whereas public aspects are those that are observable to others. Buss asserted that these private and public forms of self-focus have different functions, precipitants, and consequences. This division of self-focus into public and private forms, demonstrated empirically in Fenigstein, Scheier, and Buss (1975), has been very influential in self-focus research.

Private aspects of the self include bodily sensations, thought processes, memories, feelings, moods, and motivations. Buss argued that the self-evaluation of OSA theory (Duval & Wicklund, 1972) is only one of many possible processes that can occur during private self-focus. He argued that intensification of affect, polarisation of attitudes, increased clarity of mental events, and increased awareness of personal attributes were more important consequences of private self-focus. Buss claimed that private self-focus arises naturally in situations not requiring external attention, or may be prompted by stimuli and events such as seeing one's face in a small mirror, diary writing, or meditating. Some individuals are more prone to spontaneous periods of private self-focus and may be more sensitive to stimuli that prompt private self-focus.

Public aspects of the self primarily relate to one's appearance and behaviour. When attending to public aspects of the self, individuals adopts an observer perspective, viewing the self as a social object. Buss asserted that public self-focus only occurs in the presence certain stimuli or situations, such as the presence of others or objective personal feedback from mirrors, cameras, or audio recordings. The presence of other people does not always induce public self-focus, but the presence of audiences, strangers, or too much or too little attention, generally will.

Buss asserted that public self-focus is more closely related to discomfort and social anxiety than private self-focus. Buss described social anxiety as acute discomfort experienced when self-evaluations of public aspects of the self are especially negative. This will occur when people have negative beliefs about their appearance or social skills. Buss asserted that most people find public self-focus somewhat aversive, however.

Gibbons (1990) reviewed research on the difference between private and public self-focus and concluded that the two are distinct processes. He suggested that public self-focus has many properties inconsistent with OSA's self-focus concept. Private self-focused attention has been linked with enhanced self-report validity, lead to more internal attributions, and behaviour more consistent with personal values (e.g., Duval & Wicklund (1973). Public

self-focus, in contrast, interferes with self-report validity, and can promote conformity to others' standards (Diener & Srull, 1979). In general, private self-focus leads to internally driven behaviour whereas public self-focus leads to externally driven behaviour (Gibbons, 1990).

Ingram

Like Buss, Ingram's information processing model of self-focused attention (Ingram, 1990; Ingram & Wisnicki, 1991) de-emphasises the role of self-evaluation, Furthermore, Ingram argues that there is not a strict dichotomy between self-focus and external-focus, attention may simultaneously be divided between the two. Ingram asserted that in most situations there is a balance of attention between the self and the external environment and that this will vary according to situational demands. Ingram asserted that dysfunctional self-focused attention is common in people with psychological disorders though the aspects of the self that are focused on differ in characteristic ways.

Individuals in states of high self-focus still retain some awareness of their environment, and individuals operating on their environment still retain some internal focus. Ingram suggested that optimum functioning will usually consist of a balance between internal and external focus as appropriate for the setting. Attentional shifts may result from automatic stimulus-driven processes, from deliberate voluntary processes, or from a combination of the two.

Ingram detailed three parameters of self-focus, which previous authors had not fully explicated. *Degree* of self-focus refers to the proportion of attentional resources allocated to self-related rather than non-self-related information at any one time. To be self-focused is to have more attentional resources allocated internally than externally, thus, a high degree of self-focus will equate to a low degree of external-focus. The *duration* of self-focused states is the second parameter. A shift to a highly self-focused state may persist for a relatively brief or a relatively prolonged period. The third parameter relating to self-focus is *flexibility*. This relates to how readily an individual can shift their attention from internal to external stimuli. Ingram asserts that inflexible individuals are not capable of rapid shifting between internal and external focus. An individual who is dispositionally self-focused, may be prone to focus a greater proportion of their attention internally, focus internally for longer periods, or be less able to redirect their attention outwards to meet the demands of their environment. Dysfunctional self-focus may relate to any or all of these variables.

Ingram claims that heightened self-focused attention is found in many individuals with psychological disorders, describing this tendency as "pathological self-absorption". Excessive, sustained, and rigid self-focused attention are the process components of pathological self-absorption. The content of self-focus varies between disorders, however. In depression, for example, the focus will be on sadness and memories of loss. In social phobia the focus will be on appearance and behaviour. In panic disorder the focus will be on bodily sensations.

There is a wealth of evidence supporting the claim that heightened self-focus has a role in a range of psychological disorders. A number of studies have shown increased and more prolonged self-focus in participants with clinical and sub-clinical depression (e.g., Lewinsohn, Hoberman, Teri, & Hautzinger, 1985). Depressed participants also show more self-focus after failures than non-depressed participants (Greenberg & Pyszczynski, 1986). Increasing self-focus can increase negative affect in depressed individuals but has a smaller effect in non-depressed individuals (Gibbons et al., 1985). Studies have also reported increased self-focus in anxiety states and disorders. There is an increased tendency to self-focus in test-anxious individuals whilst being tested (e.g., Wine, 1980). Individuals with social phobia were found to be higher in public self-focus (Hope & Heimberg, 1985). Self-focus is also heightened in panic disorder (Borden, Lowenbraun, Wolff, & Jones, 1993), schizophrenia (Morrison & Haddock, 1997), and psychopathy (Exner, 1973).

Summary

Self-focused attention, and its relationship with a variety of other psychological variables, has been studied empirically since the early 1970s. A number of theories have emerged that have attempted to explain self-focus and link it with emotion. This relationship has emerged in both social psychology and clinical psychology literatures. The influential early research by Duval and Wicklund (1972) posited that negative affect is a consequence of becoming aware of negative discrepancies between perceived actual and ideal states during self-focus. Carver and Scheier (e.g., 1981) argued that negative affect occurs only when people conclude that they are unable to reduce discrepancy at a satisfactory pace. They also argue that the form of negative affect depends on whether the discrepancy relates to an approach or an avoidance goal. Buss (1980) argued that self-focus, particularly when on the publicly observable features of the self, is involved in social anxiety by making individuals feel conspicuous and aware of their shortcomings. Ingram (1990) argued that intense,

sustained, and inflexible self-focus characterises individuals with a number of psychological disorders.

Although these theories propose competing mechanisms, they concur that self-focus can produce or intensify negative affect in certain situations. This process may occur by making current–ideal discrepancies more apparent (Duval & Wicklund, 1972), making individuals aware of a insufficient progress toward goals (Carver & Scheier, 1981), making individuals feel conspicuous (Buss. 1980), or through making individuals aware of negative self-referent information (Ingram, 1990).

Moderators of the Effects of Self-Focus on Affect

Empirical research has revealed that the effects of self-focus on affect are influenced by a number of individual difference variables in a relatively consistent fashion. The variables that moderate the effects of self-focus tend to relate in some way to a person's self-beliefs or self-image. Variables such as self-esteem, depression, and general negative affectivity have consistently been found to moderate the relationship between self-focus and affect in experimental and correlational studies (Mor & Winquist, 2002). These variables can be said to reflect the valance of self-beliefs, in the broad definition of such beliefs being internal representations of the self that can be more or less positive than those of others.

The moderating effects of a range of experimental setting variables have been discussed thoroughly in previous reports (e.g., Silvia & Duval, 2001). Here we will review empirical studies focusing on the influence of relatively stable individual difference variables.

Self-esteem

Brockner (1979) investigated the relationships between self-focus, self-esteem, anxiety, and task performance. His study looked at the effects of self-focusing versus task-focusing manipulations on performance and anxiety during a difficult laboratory task. Two experiments, conducted with student volunteers, produced consistent results. Participants in one group worked on the difficult task whilst sitting in front of a mirror—a commonly employed self-focus inducer. In the other condition, participants were given instructions to focus on the task itself, and no mirror was present. Objective performance and participant self-report indicated that the self-focus manipulation increased anxiety and impaired performance and in those with low self-esteem, but not in those with medium or high self-

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esteem. In the task-focus condition, self-esteem did not influence performance or anxiety—participants with low self-esteem were no different from those with medium or high self-esteem.

These results demonstrate that the effects of self-focus are not universally negative, as OSA theory posits, but are in fact moderated by variables relating to the positivity or negativity of people's beliefs about themselves. Brockner argued that self-focus attention led to the activation of negative beliefs in the low self-esteem participants, which resulted in greater anxiety and interfered with task performance. In the low self-focus condition, self-beliefs were not activated, and consequently did not influence anxiety levels or performance.

Sedikides (1992) conducted an experiment to determine whether the effects on self-focus and 'other-focus' inductions on mood would be moderated by the valence of participants' self-conception. Sedikides's participants were selected for scoring in the lowest quartile or the highest quartile on a self-conception valence measure (essentially a measure of self-esteem) given to a larger group. Participants were randomly assigned to write a story either about themselves to induce self-focus, or about George Washington to induce other-focus. Afterwards, participants completed questionnaires assessing their current mood.

Significant interactions were consistent with predictions. In individuals with a negative self-conception, self-focus led to a lower mood than other-focus. In those with a positive self-conception, self-focus had no effect on mood.

Sedikides's findings further support the notion that people's beliefs about themselves influence what effect self-focused attention has on their mood.

Self-Discrepancies

Phillips and Silvia (2005) conducted an experiment to test competing hypotheses from an updated OSA theory (Silvia & Duval, 2001) and Higgins and colleagues' self-discrepancy theory (Higgins, 1987). These theories both attempt to link actual–ideal self-discrepancies with negative affect. OSA theory posits that in the right conditions, awareness of discrepancies invokes negative affect but does not attempt to link types of discrepancy with particular emotions. Higgins and colleagues, in contrast, have argued for specific relationships between types of self-discrepancy and types of negative emotion. They argue that if the discrepancy is between an actual state and an ideal or desired state, then the negative emotions will be of "dejection" (i.e., sadness and depression). If the discrepancy is

between an actual and an "ought" state—what one 'should' be—then the emotions will be of agitation (i.e., anxiety and tension).

In Phillips and Silvia's (2005) experiment, undergraduate student participants completed questionnaires relating to actual–ideal and actual–ought discrepancies, and then questionnaires relating to current emotions of dejection or agitation, and general positive and negative affect. Participants were randomly assigned to high self-focus (mirror manipulation) or low self-focus conditions when completing the questionnaires. In participants in the high self-focus condition, both actual–ideal and actual–ought discrepancies predicted higher scores on the full range of negative emotion measures, with nine out of 10 possible correlations being statistically significant. There were no significant differences between actual–ideal and actual–ought discrepancies in the emotions they predicted. Phillips and Silvia argued that these findings provided no support for the specific relationships outlined by Higgins and colleagues' self-discrepancy theory.

Phillips and Silvia (2005) interpreted this finding as indicating that self-focus moderated the relationship between self-discrepancies and affect. An equally valid interpretation, however, is that the effects of self-focus, as the manipulated independent variable, on affect were moderated by the extent of participants' perceived self-discrepancies. Self-focus resulted in negative affect in those with high self-discrepancies but not for those with low self-discrepancies. In the low self-focus group, self-discrepancies did not have a moderating effect and these participants showed little negative affect.

As high self-discrepancy scores reflect beliefs of not living up to one's standards, they constitute a measure of negative self-beliefs. Consistent with the studies discussed above, high self-focus in this study negatively affected those with negative self-beliefs, but had no effect on those with positive self-beliefs.

Social Anxiety

Social anxiety is commonly linked to self-focus, with an emphasis placed on heightened awareness of appearance and behaviour. Clark and Wells's cognitive theory of social anxiety disorder places a central role on self-focused attention in maintaining the social anxiety (Clark and Wells, 1995). Their model posits that self-focused attention contributes to social phobia by increasing access to negative thoughts and emotions, interfering with social performance, and preventing the individual from witnessing behavior in others that would contradict their distorted beliefs. Rapee and Heimberg's (1997) cognitive model states that in

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addition to excessive self-focus, individuals with social anxiety disorder are vigilant for cues in the external environment that support their fears, such as disapproving facial expressions in others. Other writers on social anxiety have also cited self-focus as an important causal or maintaining factor (e.g., Buss, 1980; Schlenker and Leary, 1982).

Correlational links between trait self-focus and social anxiety are well established (e.g., Hope & Heimberg, 1988). In addition, a number of studies have investigated whether the effects of self-focus manipulations in the laboratory are influenced by social anxiety. The findings have been mixed and inconclusive, however. Some studies find that experimentally increasing self-focus has a greater negative effect on high socially anxious people than low socially anxious people (e.g., Woody, 1996), but the differences are typically small and are not found on all outcome measures. Some studies find no moderating effects of trait social anxiety. For example, Bögels and Lamers (2002) compared the effects of self-focusing versus task-focusing on social anxiety during an imagery task. Three different populations were compared: high versus low socially anxious participants, high versus low blushing-anxious participants, and social anxiety disorder patients versus other anxiety disorder patients. Self-focused attention led to greater social anxiety than task-focused attention in all of the groups. This effect was not greater for the socially anxious, blushing-anxious, or social anxiety disorder participants. These conflicting findings illustrate that the relationship is likely to be complex and dependent upon environmental variables. It would appear, however that the relationship between self-focus and social anxiety is present in most people.

Spurr and Stopa (2002) and Schultz and Heimberg (2008) reviewed the research relating self-focus and social anxiety and came to the conclusion that the evidence is in favor of a link but that the research is not well developed enough to make any solid claims about the nature of the relationship..

The mixed evidence with regards to a moderating effect of social anxiety on the relationship between self-focus and negative affect—particularly anxiety—demands further study.

Depression

Cognitive theories of psychological disorders assert that many psychological problems are caused and maintained by negative and often 'irrational' beliefs (e.g., Beck, 1972; Ellis, 1961). For example, Beck (1972) theorised that depression is the result of the activation of negative beliefs about the self, the world, and the future. Negative self-beliefs in depression

typically follow themes of being worthless, incompetent, and unlovable. If depressed people have negative self-beliefs, then self-focus should increase access to these and influence cognition and behaviour in a consistent fashion. A number of empirical studies have shown that participants with depression are more negatively affected by self-focus manipulations than control participants.

Nix, Watson, Pyszczynski, & Greenberg (1995) predicted, from the self-regulatory perseveration theory of depression (Pyszczynski & Greenberg, 1987) that depressed participants' mood could be improved by inducing external-focus. The self-regulatory perseveration theory postulates that depression results largely from maladaptive self-regulatory processes, including the sustained activation of negative self beliefs.

Two studies with depressed and nondepressed student participants tested this prediction. In both studies, participants were exposed to either a self-focus or an external-focus story writing exercise. Nix and colleagues predicted that in depressed participants, the external-focus manipulation would lead to a less negative mood state than the self-focus manipulation. Study 1 confirmed this: depressed participants in the external-focus condition reported a less negative mood state than depressed participants in the self-focus condition. For nondepressed participants, there was no difference in mood between conditions. Study 2 demonstrated that the effect was due to the external-focus manipulation improving mood, rather than the self-focus manipulation worsening mood. Nix et al. (1995) concluded that these finding supported their conjecture that in depressed individuals, self-focus activates negative self-beliefs and maladaptive thought processes leading to negative mood states. The external-focus manipulation decreased the depressed participants' heightened self-focus, thereby reducing the activation of negative self-beliefs, resulting in improved mood.

As with the findings from other studies, Nix et al.'s (1995) findings support the postulate that the effects of self-focused attention on mood are influenced by individual difference variables which are related to people's self-beliefs.

Gibbons et al. (1985) conducted a study to examine with clinical populations what effect a standard self-focus induction would have on affect, attribution, and other variables. Hospital inpatient participants were randomly assigned to self-focus or control conditions and were asked to complete a series of questionnaires. Participants sat in front of a mirror in the self-focus condition but not in the control condition. Experiment 1 compared alcohol dependent inpatients and general psychiatric inpatients. Experiment 2 compared general medical inpatients with general psychiatric inpatients and depressed inpatients.

The effects of the self-focus manipulation on self-reported affective state varied between the different patient groups as expected. In the first experiment, patients in the general psychiatric group who were in the self-focus condition reported greater negative affect than those who were in the control condition. In the alcohol dependent group, negative affect levels did not vary between conditions. The authors argued that patients in the general psychiatric group were more likely to have negative beliefs about themselves than those in the alcohol-dependent group. In the second experiment, patients in the depressed group who were in the self-focus condition reported more anxiety, hostility, and depression than those who were in the control condition. In the nonpsychiatric group, however, levels of negative affect did not vary between self-focus and control conditions. These findings also support the notion that the effects of self-focus are influenced by individual differences in variables linked to negative self-beliefs.

Sakamoto (1998) also investigated the influence of depressive traits on the relationship between self-focus and mood. He compared the effects of writing self-focused versus other-focused material on participants' self-desirability ratings and ratings of positive and negative moods. Student participants were divided into 'depressed' and nondepressed groups via a median split on their scores on a Japanese adaptation of the Zung Self-Rated Depression Scale (Fukuda & Kobayashi, 1973; Zung, 1965).

Sakamoto's prediction was that in depressed participants, self-focus would produce lower self-desirability ratings than other-focus, along with higher negative mood ratings and lower positive mood ratings. He predicted that in nondepressed participants, self-focus would not influence ratings of desirability or mood. Sakamoto also predicted that there would be no difference between depressed and nondepressed participants in the other-focus condition. These hypotheses were based on the premise that self-focus activates self-beliefs, which in turn influence appraisal and emotional processes. Depressed individuals have negative self-beliefs and therefore should be negatively affected by self-focus. Nondepressed individuals do not have these beliefs and therefore should not be negatively affected.

The hypotheses were supported by the results. Depressed participants in the self-focus condition reported the lowest self-desirability ratings, and the least positive and most negative mood states. Depressed participants in the externally-focussed condition were not significantly different from the nondepressed participants.

Of note is that a median split was used in this study to differentiate the depressed and nondepressed groups. The differences between the groups were likely not as substantial as that between control participants and participants who meet criteria for major depressive

disorder. It is likely that a clinically depressed group would have reported lower self-desirability and mood ratings than nondepressed participants, in both conditions. The same interaction pattern would likely still be present, however.

Meta-Analysis

Mor and Winquist (2002) conducted a meta-analysis of studies relating self-focused attention and negative affect. They included experimental studies that manipulated self-focus and measured affect, studies that manipulated affect and measured self-focus, and correlational studies that measured both variables but manipulated neither. In addition to main effects, Mor and Winquist investigated the role of a range of moderating variables, including gender, trait negative affect, psychological disorder, and whether the experiment included positive or negative events.

From the experimental studies, 79 independent effect sizes were obtained with a pooled sample of 2444 participants. From the correlational studies, 226 independent effect sizes were obtained with a pooled sample of 28,095. The mean effect sizes for experimental ($d = 0.44$) and correlational ($d = 0.51$) studies were both in the medium range. Across all studies, self-focus was found to be significantly related to negative affect.

In the correlational studies, dispositionally self-focused female participants were slightly more prone to negative affect than dispositionally self-focused male participants—this was revealed by the slightly higher effect sizes in the correlational studies with a higher proportion of female participants. The same was not found in the experimental studies, however.

Mor and Winquist found (2002) found that the strength of the relationship between self-focus and negative affect varied across populations studied. Clinical samples (i.e., participants with psychological disorders) were compared with subclinical samples (i.e., high trait negative affectivity) and non-clinical samples. In correlational studies, self-focus related more strongly to negative affect in clinical samples ($d = 0.82$) than in subclinical samples ($d = 0.43$) and non-clinical samples ($d = 0.50$). In experimental studies, self-focus related more closely to negative affect in clinical samples ($d = 0.88$) and subclinical samples ($d = 0.94$) than in non-clinical samples ($d = 0.31$). These differences demonstrate that self-focus is more closely related to negative affect in those with high trait negative affectivity or psychological disorders. Participants in these groups likely had more negative self-beliefs than those in non-clinical samples, which when activated by self-focus, would contribute to negative affect.

A moderating effect was also found for the nature of the events preceding the affect measure. In the correlational studies, heightened self-focus was consistently associated with greater negative affect after a negative or unpleasant event ($d = 0.72$). After a positive or pleasant event, however, heightened self-focus was not significantly associated with negative affect ($d = -0.24$). Though this reverse effect was not statistically significant (due to a large range of scores), its reverse direction is noteworthy, as it suggests that in some circumstances, self-focus might have a positive effect on mood. In the experimental studies, heightened self-focus predicted negative affect after a negative event ($d = 0.37$), but not after a positive event ($d = 0.06$). If more studies involved positive events, it is possible that the relationship between self-focus and negative affect might be less substantial or even reversed.

Mor and Winquist (2002) found self-focus to be significantly related to all of the categories of negative affect they explored: negative mood ($d = .52$), depression ($d = .61$), and anxiety ($d = .43$). Another finding was that private self-focus was more closely related to depression ($d = 0.67$) than anxiety ($d = 0.08$), whereas public self-focus was more closely related to anxiety ($d = 0.74$) than depression ($d = 0.52$). These findings support Ingram's (1990) assertion that maladaptive self-focus is a common factor in emotional disorders but that the typical self-referent content differs between them.

Summary

The studies reviewed above all support the premise, included in many self-focus theories, that there is a relationship between self-focus and affect. They also demonstrate that this relationship is moderated by variables relating to people's self-image of self-beliefs, including self-esteem (Brockner, 1979; Sedikides, 1992), self-discrepancies (Phillips and Silvia, 2005), and depression (Nix et al., 1995; Gibbons et al., 1985; Sakamoto, 1998). These variables are all closely related to the valance of people's beliefs about themselves. The influence of social anxiety is less clear and warrants further investigation.

Self-Esteem

Though self-esteem is a concept recognised by everybody, a universally accepted definition of has not been established; it is generally agreed, however, that it reflects a person's appraisal of their self-worth. People's beliefs about their self-worth are central to

their self-concept and are a strong influence on behaviour and emotions in a variety of situations.

The nature of self-esteem has been a topic of psychological inquiry since at least William James's time. James (1890) asserted that self-esteem is "determined by the ratio of our actualities to our supposed potentialities" (p. 296) and that "our self-feeling in this world depends entirely on what we back ourselves to be and do" (p. 296). In James's view, a person's level of self-esteem is determined by how well they are meeting their perceived potential in the domains of life that are important to them. This is remarkably similar to modern conceptions of self-esteem.

Self-esteem can be conceptualised and measured as both a trait that is relatively stable in the long-term and as a state that can vary somewhat from day to day. A great deal of research has explored the causes and consequences of individual differences in self-esteem. The majority of research has focused on trait self-esteem: individuals with 'high' self-esteem are compared with individuals with 'low' self-esteem. Typically, trait self-esteem is measured with self-report questionnaires such as the Rosenberg Self-Esteem Scale (Rosenberg, 1965), although physiological indices have also been explored (e.g., Martens, 2008).

Self-Esteem Security

A number of researchers have argued that a full understanding of the nature of self-esteem requires a consideration of self-esteem facets other than whether it is simply high or low. Kernis and colleagues assert that the most important additional dimension is whether an individual's self-esteem level is stable or unstable over time (Kernis, Cornell, Sun, Berry, & Harlow, 1993). Crocker and colleagues, in contrast, argue that the most important factor is what domains of achievement an individual's self-esteem is contingent upon (Crocker & Wolfe, 2001). Other dimensions of self-esteem that have been emphasised include implicit versus explicit self-esteem (Bosson, Brown, Zeigler-Hill, & Swann, 2003), authentic versus false self-esteem (Deci & Ryan, 1995), global versus domain specific self-esteem (Dutton & Brown, 1997), true versus defensive self-esteem (Schneider & Turkat, 1975) and intrinsic versus extrinsic self-esteem (Schimel, Arndt, Banko, & Cook, 2004).

A feature that many of these researchers' models share is the concept that in addition to having an average self-esteem level, people may have relatively secure and genuine self-esteem; or relatively fragile and vulnerable self-esteem. They argue that this aspect of self-esteem is a separate dimension, which is at least partially independent from trait level of self-

esteem. Consequently, some high self-esteem people, who might appear psychologically well adjusted based on this attribute, are marred by self-esteem insecurity—which makes them vulnerable to a range of problem that do not challenge those with high and secure self-esteem. The traditional view of high self-esteem has been that it contributes to psychological health and wellbeing and is a protective factor against stress and environmental threat (Rosenberg, 1965). Many researchers argue however, that whilst high and secure self-esteem is a healthy attribute, high but insecure self-esteem is not healthy and correlates with negative behaviours such as defensiveness, narcissism, aggression, and self-handicapping (Kernis, 2005). They advised that measures of self-esteem security should be incorporated into research on the implications of individual differences in self-esteem. Measuring only trait self-esteem, which is the most common approach, may be hampering progress in the field and may be responsible for the inconsistent and sometimes contradictory findings that emerge from self-esteem research (see DuBois & Tevendale, 1999).

Self-Esteem Stability

Kernis and colleagues have argued that self-esteem stability is the most useful measure of self-esteem security. They do acknowledge, however, that self-esteem stability is only one dimension of an interlocking system incorporating unstable self-esteem, self-concept fragility, and heightened reactivity (Greenier et al., 1999). Self-esteem stability is a function of the frequency and amplitude of fluctuations of state self-esteem over time (Kernis et al., 1993). Kernis et al. (1993) suggested that while individual fluctuations in self-esteem might have a variety of causes, people with unstable self-esteem are characterised by generally fragile and vulnerable feelings of self-worth. Positive and negative events likely impact on these individuals' perceptions of self-worth more than they would stable self-esteem individuals (Greenier et al., 1999). The degree of self-esteem variability is at least partially independent from average level of self-esteem. Unstable self-esteem may fluctuate from very high levels to very low levels or may only move within the above average range or below average range. Individual fluctuations may be caused by positive or negative external self-relevant events or by uncued positive or negative self-reflections. Kernis (2005) suggested that factors contributing to the development of unstable self-esteem may be an over-reliance on evaluations and approval of others, an impoverished self-concept, excessive dependency, or harsh and controlling family environments.

Kernis and colleagues have shown in a number of studies that measures of self-esteem stability add predictive power over self-esteem level measures, and in some cases self-esteem stability has greater predictive strength than self-esteem level. Self-esteem stability is typically measures by having participants complete a modified Rosenberg Self-Esteem Scale twice a day for around a week, recording their current self-worth appraisals. The standard deviation of each participant's scores over that period provides a measure of their self-esteem variability.

Kernis, Grannemann, & Barclay (1989) found that college students' levels of self-reported anger and hostility could not be predicted by general self-esteem level alone, but could be predicted by an interaction between self-esteem level and self-esteem stability. Participants with high and stable self-esteem were the least aggressive and hostile, whereas those with high but unstable self-esteem were the most aggressive and hostile. Individuals with low self-esteem, whether stable or unstable, were intermediate. These findings are consistent with the proposition that stable high self-esteem is more psychologically healthy than unstable high self-esteem.

Kernis et al. (1998) found that self-esteem stability interacted with a measure of daily stressors to predict changes in depressive symptoms in college students over a four-week period. General self-esteem level did not predict the development of depressive symptoms, either as a main effect or in interaction with the stressor measure. Self-esteem stability, however, interacted with the stressor measure, to predict depressive symptoms. Participants with more unstable self-esteem became more depressed in response to stressors than those with stable self-esteem. Self-esteem instability also correlated with maladaptive attribution styles, such as the tendency to generalise from a single failure to overall self-worth and to attribute negative events to internal, stable, and global causes. These attribution tendencies are central to cognitive models of depression (e.g., Beck, 1972).

In a study of romantic relationship satisfaction (Kernis, Goldman, & Paradise, 2003), individuals with high and stable self-esteem reported the greatest satisfaction, whereas those with unstable high self-esteem reported the lowest satisfaction. Individuals with low self-esteem were intermediate between the two high self-esteem groups.

Taken together, these studies and others conducted by Kernis and colleagues demonstrate that self-esteem stability is an important component of the self-esteem system and is related to a number of areas of psychological functioning. High and stable self-esteem has consistently been found to be more psychologically healthy than high but unstable self-esteem. High but unstable self-esteem often predicted worse outcomes than low self-esteem.

Relying of self-esteem level as the sole self-esteem measure would have hidden many of the differences between groups. Consequently, further research on self-esteem would benefit from incorporate measures of self-esteem stability.

The S-REF Model and the Attention Training

The Self-Regulatory Executive Function Model

Wells and Matthews (1994) developed their self-regulatory executive function (S-REF) model in an attempt to reunite experimental cognitive research findings with cognitive models of psychopathology. The S-REF model was put forward to explain the dysfunctional information processing associated with emotional disorders. In the S-REF model, excessive self-focused attention, negative self-beliefs, and maladaptive appraisal processes are included as perpetuating factors in emotional disorder. Wells and Matthews' model underpins the rationale for a number of treatments, including the attention-modification intervention known as *attention training*.

In developing the S-REF model, Wells and Matthews (1994) argued that there was a need to incorporate new findings from information processing research into cognitive models of psychopathology. They stated that cognitive models of psychopathology were based on overly simplistic theories of cognition that were not in keeping with contemporary research. The S-REF model places greater focus on attentional processes, control of cognition, and the interactions between different levels of information representation and processing. It is based on a model of cognition, comprised of three interacting levels: (1) automatic, reflexively driven "low-level" processing units; (2) voluntary controlled processing; and (3) stored knowledge and beliefs. Within this architecture a number of different modes or configurations of processing may occur.

Self-regulatory executive functioning is a processing configuration proposed to be central to emotional disorders. It is a form of processing driven by self-beliefs. Associated processing tasks include appraisal of the significance of external events, signals from the body, or the significance of thoughts. S-REF processing occurs in the voluntary/controlled system and is affected by attention-resource limitations. It is guided by self-knowledge and self-beliefs. These beliefs take two forms: declarative beliefs, such as "I'm worthless" or "I'm incompetent"; and procedural plans—cognitive strategies for processes such as attention allocation, memory retrieval, and evaluation of thoughts. Examples of potentially problematic

procedural plans include rumination, worrying, and monitoring bodily sensations. Wells and Matthews outline a particular "cognitive-attentional syndrome" consisting of S-REF activity involving heightened self-focus, reduced processing efficiency, activation of negative self-beliefs and self-appraisal, attentional bias, and capacity limitations. They argue that this cognitive-attentional syndrome is central to the maintenance of many emotional disorders. Consequently, interventions that disrupt its components should have an alleviating effect.

S-REF activity is stimulated by intrusions from low-level processing units, which are associated with problem-congruent stimuli (e.g., phobic objects) or disorder-specific concerns (e.g., fear of negative evaluation). The S-REF also initiates actions aimed at reducing discrepancies, as detailed by Carver and Scheier (e.g., 1998). As goals and strategies are often unrealistic in people with psychological disorders, the goals are often not achieved. Negative emotions result from actual or expected failure to meet such self-regulatory goals.

In comprehensive treatment based on the S-REF model, known as metacognitive therapy, the aim is to modify S-REF activity by activating dysfunctional beliefs, enabling the processing of disconfirmatory information, and facilitating the modification of self-beliefs. Treatment aims to develop adaptive processing modes that substitute for the dysfunctional modes underlying the maintenance of the disorder.

Attention Training

Attention training is a streamlined treatment approach designed to enable people with emotional disorders to reduce their self-focusing tendencies and increase their control over attention (Wells, 1990). It is consistent with Wells and Matthews's S-REF model of emotional disorder as it attempts to modify excessive self-focus, a central component of the maladaptive information processing hypothesised to contribute to the maintenance of emotional disorders (Wells & Matthews, 1994).

Attention training is based on a simple procedure that takes around 15 minutes and consists of three phases in which different aspects of auditory attention are exercised. The procedure involves a therapist instructing a client to focus their attention on different sounds within the consulting room and in the near or far distance. Across the phases, focused, selective, alternating, and divided aspects of attention are trained. The degree of effort required increases throughout the procedure.

In the first phase, the therapist asks the client to focus selectively on a single source of sound, such as the therapist tapping on a desk, and to block out competing sounds. After a

short period, the therapist asks the client to shift their focus to another sound in the room, such a clock ticking or the noise from a computer. The focusing of attention on different sounds continues, and expands to include sounds outside of the room in the near and far distance. Attention is always focused on one sound at a time, however. In the second phase, the client is directed to rapidly switch their attention between sounds as they are named by the therapist, whilst continuing to ignore competing sounds. In the third and final phase, the client is asked to focus on as many of the sounds as they can at the same time. Attention training is taught in weekly sessions with a therapist and practiced between sessions in a similar fashion to breathing retraining or progressive muscle relaxation. The client is encouraged to practice the technique daily.

Attention training is intended to reduce self-focus, and increase control of attention. It may be used as a treatment in itself or incorporated into a more comprehensive programme, such as metacognitive therapy. Wells and Matthews (1994) suggest that the dysfunctional thought content may change as an indirect consequence of attention training, as reduced self-focus enables individuals to attend to belief-disconfirming environmental information. For example, a formerly highly self-focused person with social anxiety disorder may come to see that others are not scrutinising them and are in fact interested in what they have to say. This information would have previously been missed due to excessive self-focus.

Attention Training Effectiveness

Wells published the first account of the attention training technique in 1990, and examined its effectiveness using a single-case research design. The technique was developed to treat a client with panic disorder who experienced anxiety during traditional relaxation exercises. Wells predicted that increasing external-focus with attention training should decrease self-focus and reduce the client's anxiety and panic frequency.

In Wells (1990), an ABCB single-case experimental design was employed using daily panic attack recording and weekly reports of other symptoms to assess treatment effectiveness. ABCB single-case research designs are considered to be a valid demonstration of treatment effectiveness with acceptable internal validity (Barlow & Hersen, 2008). Treatment took place over 18 weeks. This involved a four week baseline recording period, followed by five weeks of attention training period, a three week reversal phase, and then a further six weeks of attention training. Panic attack frequency and general anxiety levels decreased during the first attention training phase from a relatively stable baseline. A reversal

phase featuring a form of autogenic relaxation training increased anxiety and panic for this patient. This was possibly due the self-focusing nature of this intervention. The panic and anxiety decreased again when attention training was recommenced. Panic attacks and problematic anxiety were virtually eliminated in this patient and appeared to be due to the attention training intervention.

Some problems can be noted with the Wells (1990) study. Across the short baseline phase, panic attack frequency had a declining trend. This is problematic in single-case research, as it is difficult to argue that further improvements were caused by the treatment and not the result of an existing process. An important limitation is that the changes in self-focus, purported to underlie the improvements in anxiety, were not directly assessed. A direct measure of changes in self-focus, particularly of long-term changes rather than within-session changes, would have added further support to the Wells's assertion. As with all single-case research, the ability to generalise the findings to other clients and settings requires repetition.

With these limitations in mind, the findings of this study are consistent with Wells's predictions and are consistent with the theoretical link between self-focus and negative affect in those with psychological disorders.

Wells, White, and Carter (1997) replicated Wells (1990) with a case series documenting the attention training treatment of two clients with panic disorder and one with social anxiety disorder. This study's methodology had improvements over that of Wells (1990). For all clients, anxiety and belief in irrational fears reduced during the attention training treatment phases and stayed low in subsequent baseline phases. As predicted, symptoms increased during a reversal phase for the social anxiety disorder client, but declined again when attention training was recommenced. The improvements were maintained at three and six month follow-up.

The effectiveness of attention training in Wells, White, and Carter (1997) demonstrated the treatment's generalisability. The clients were treated by different therapists and in different settings. None of the clients had reported relaxation-induced anxiety. Longer baseline assessment periods allowed for more reliable trend analyses, indicating that improvement was not due to spontaneous remission. In this study, attention training dramatically reduced general anxiety, eliminated panic attacks, and reduced belief in catastrophic fears. Change in self-focus, the purported mediator of treatment effectiveness, was again not directly assessed, however. The authors asserted that directly assessing self-focus would have negatively influenced the outcome of the treatment, by requiring clients to self-reflect.

A third replication was conducted by Papageorgiou and Wells (1998). Attention training was used to treat three older adults with longstanding hypochondriasis. Improvements were found in self report measures of anxiety and depression, time spent worrying about health, belief in illness related fears, symptom amplification, reassurance seeking, avoidance, bodily checking, and body-focused attention. The improvements were maintained at six month follow-up, and a diagnostic interview indicated that they no longer met DSM-IV criteria for hypochondriasis (American Psychiatric Association, 1994).

One strength of this study was that a measure of self-focus was utilised—the self-reported measure of body-focus—theorised by the authors to be the form of self-focused attention involved in hypochondriasis. Limitations of this study include the exclusive use of the less robust AB single-case experimental design, which does not feature a reversal phase, reducing internal validity. The clients' long hypochondriasis histories—between 11 and 35 years—suggests that spontaneous remission was unlikely to be responsible for their improvement, however. Whilst hypochodriasis is classified as a somatoform disorder in the DSM-IV, reclassification as an anxiety disorder has been suggested (Kroenke, Sharpe, & Sykes, 2007). Consequently this study does not extend the treatment effectiveness of attention training beyond the realm of problematic anxiety. The assessment of body-focus provides evidence that this changes with treatment, though does not confirm that it mediated symptom improvement—it may simply be a non-casual covariate of the other outcome variables.

Attention training was extended from the realm of anxiety related disorders to the treatment of recurrent major depression in Papageorgiou and Wells (2000). The same attention training technique was applied to treat a case series of four clients referred for treatment. Attention training was effective for all four clients, with improvements maintained at 12 month follow-up.

Therapeutic effects in Papageorgiou and Wells (2000) were found for measures of general depression and anxiety, as well as measures of negative automatic thoughts, ruminative thinking, and dysfunctional metacognition. Importantly, scores on the *Private Self-Consciousness* subscale of the Metacognitions Questionnaire (Cartwright-Hatton & Wells, 1997), decreased from pre-treatment to post-treatment, and remained low at follow-up. Decreases on the *Private Self-Consciousness* subscale, which assesses private self-focusing tendencies, indicated that self-focus decreases in response to treatment. Again, however, it does not provide information about causality.

Valmaggia, Bouman, and Schuurman (2007) reported on the adjunctive use of attention training to compliment cognitive-behavioural therapy with a client who had a diagnosis of schizophrenia. This client had received cognitive-behavioural therapy but distress in response to auditory hallucinations remained. After a course of attention training treatment there was further improvement in a number of measures relating to delusions and auditory hallucinations, and the changes had been maintained at two and six-month follow up assessments. In this study, however, attention training was coupled with a form of exposure to distressing stimuli. Rather than exercising attentional control only with innocuous stimuli, as with the original studies, the treatment progressed to include the client's own hallucinations as auditory stimuli. Consequently, the client gained some direct control over their distressing voices. This adds a distinct active treatment component, making the evaluation of the core attention training component difficult. The intervention was also delivered within a cognitive-behavioural framework adding further potential confounds.

Summary

The attention training technique, developed and tested by Wells and colleagues, focuses on process rather than content aspects of cognition. It aims to increase external attention, thereby decreasing excessive self-focus and the problems associated with this. The intervention is consistent with Wells and Matthews's (1994) S-REF model of emotional disorders. The self-focus reduction rationale is also consistent with earlier theories of self-focused attention.

A number of relatively small single-case research design studies have investigated the effectiveness of attention training as a stand alone treatment. These studies, which have all involved the developer of the treatment, have demonstrated substantial improvement in clients with a range of psychological disorders. No reports of the attention training in its original form have been published by independent research groups, limiting any claim for efficacy. No randomised controlled trials of attention training have been conducted.

Whilst Wells and colleagues assert that attention training works by reducing self-focus, the outcome studies have not consistently measured self-focus levels. The studies that did measure self-focus did not do so in such a way that would allow its proposed causal role to be tested. To determine whether attention training does work by reducing self-focus, administration of the procedure and assessment of its effects in a controlled experimental setting would be appropriate.

Electrodermal Activity

One window into people's emotions is through the physiological changes that take place during emotional responses. Electrodermal activity (EDA) is a physiological response system that has been investigated in psychophysiological research since the time of Charcot and colleagues in the late 1800s (e.g., Vigouroux, 1888). EDA refers to the electrical conductivity of the skin, which is determined by the amount of sweat secreted by the sweat glands, and changes in response to a range of stimuli. EDA has been utilised in research in the areas of perception, cognition, emotion, and psychopathology.

The Electrodermal System

Changes in the amount of sweat in the sweat pores on the outermost layer of skin produce increases or decreases in skin conductance. The outermost layer of skin is comprised primarily of dead skin cells, which are by themselves a poor conductor of electricity. When sweat fills the pores, electrical conductance is increased, however. Skin conductance is recorded by applying a constant voltage to two electrodes placed on the skin in different locations and measuring the current flow between them. Exposure to novel, surprising, important, or emotional stimuli or situations, typically increases EDA (Dawson, Schell, & Filion, 2007).

Sweat glands are located over most of the human body, but are concentrated in the palms of the hands and soles of the feet. Though the primary function of most sweat glands is the control of body temperature, those on the palms of the hands and soles of the feet may be more influenced by emotional factors than body temperature regulation (Edelberg, 1972). This may be an evolutionary adaptation related to enhanced survival in dangerous situations by improving grip (Edelberg, 1993). The inner surface of the tips of the first and second fingers show the greatest reactivity due to having the highest density of sweat glands (Freedman et al, 1994).

EDA is believed to be a function of sympathetic nervous system (SNS) activity (Shields, MacDowell, Fairchild, & Campbell, 1987). The SNS is the 'stimulatory' branch of the autonomic nervous system, which prepares the body for action and is associated with the fight or flight response. Along with elevated heart rate and breathing rate, SNS activation produces an increase in sweating in certain areas, particularly the palms of the hands and

soles of the feet. The SNS works in opposition to the 'inhibitory' parasympathetic nervous system which calms the body down enabling rest and less urgent processes such as digestion.

SNS activity is influenced by a number of brain areas. Excitatory and inhibitory influences have been identified in the hypothalamus, amygdala, premotor cortex, frontal cortex, and the reticular formation (Sequeira & Roy, 1994). Though the interactions and combinations of influences are complex, different forms of EDA are likely influenced by the different brain regions. Dawson et al. (2007) proposed a model which links the reticular formation with EDA relating to gross motor movements and increased muscle tone, the hypothalamus with thermoregulatory sweating, the prefrontal cortex with attention and orientation responses, the premotor cortex with fine motor control, and the amygdala with EDA activity relating to emotion.

EDA in Psychophysiological Research

The two basic components of EDA that are investigated in psychophysiological research are skin conductance level (SCL), which is the absolute level of skin conductivity at any given moment, and skin conductance responses (SCRs), which are discrete short-lived fluctuations in skin conductivity, that occur both spontaneously and in response to the presentation of specific stimuli. SCL typically decreases to a relatively stable baseline level during low activity non-stressful periods but increases in situations involving effort or emotion.

The amplitude of a SCR is typically only a fraction of the total SCL magnitude, but SCRs can be reliably observed on a printout or computer display. SCRs typically occur following the presentation of stimuli that are novel, unexpected, significant, or aversive. Habituation of SCRs typically occurs when an innocuous stimulus is presented repeatedly. Whilst research on responses to discrete stimuli tend to focus on SCRs, studies of longer-lasting stimuli or situations often focus on more sustained increases and decreases in absolute SCL.

Changes in SCL occur in response to a range of stimuli and situations. Emotional arousal, particularly in the form of stress, anxiety, fear, disgust, or anger, is associated with SNS activation, and thus with increases in SCL (Ax, 1953; Gross, 1998). The anticipation and performance of physical and mental exercises also increases SCL, which usually then decreases slowly during task performance (Lacey, Kagan, Lacey, & Moss, 1963; Munro, Dawson, Schell, & Sakai, 1987). Lacey et al. (1963) found that SCL increased in participants during the performance of eight different laboratory tasks, typically by about one

microSiemen (μS), a unit of electrical conductance, during anticipation and a further one or two μS during task performance. As SCL also increases during periods of stress and anxiety, there is debate as to whether the increases in SCL observed during laboratory tasks is due to the attention and effort involved in the task or whether it is a result of the stress experienced by participants engaging in the evaluative context. It is probable that both factors contribute (Dawson, et al., 2007).

SCL also tends to increase during social interactions (Schwartz & Shapiro, 1973). This again is likely due to both the heightened cognitive activity and affective reactions.

Advantages and Limitations of EDA

An advantage of using EDA to measure emotional arousal is that it bypasses the need for participants to self-report their emotional state. EDA measurement is not subject to self-report limitations, such as participants attempting to please the experimenter or enhance themselves to create a good impression. It also circumvents the variability in participants' awareness of internal states and interpretations of such terms as "stress" and "anxiety".

A limitation of using EDA to measure emotional arousal, however, is its lack of specificity. An increase in skin conductivity does not, by itself, allow researchers to determine what form of emotion is present (Boucsein, 1992, 1999). An appropriate solution to this problem is to utilise self-report measures alongside the physiological measures in order to provide convergent evidence for the purported emotional changes. Another problem is separating the contribution of emotional factors from attention and effort factors.

The Present Study

The research reported in this paper was designed to build on the existing literature around self-focused attention, self-esteem security, and the application of Wells's attention training. Specifically, the present study aimed to test a laboratory analogue of the attention training technique and see whether its effects on reducing vulnerability to a stressor are mediated by reductions in self-focus.

To explore these issues, the attention training analogue and control treatment were administered to a sample of university students. Self-focus was measured afterwards to determine if it had been reduced by the attention training. Participants were then exposed to a stressor task, and their emotional responses were measured with self-report and physiological

measures. It was expected that attention training would reduce the stress and anxiety experienced during this task, and that this would be mediated by changes in self-focus.

We also examined whether the effects of attention training and/or self-focus on anxiety would be moderated by self-belief related variables. Thus, at the outset of the study we measured social anxiety, self-esteem level, and self-esteem range, a novel measure of self-esteem variability over time. Self-esteem range taps into the same dynamic as Kernis's self-esteem stability measure, but focuses on the range parameter rather than the standard deviation of self-esteem fluctuation.

We predicted that participants with low self-esteem, a large self-esteem range, or high social anxiety, would be more vulnerable to the stressor when self-focused. In contrast, we predicted that those with high self-esteem, a small self-esteem range, or low social anxiety, would either be unaffected by self-focus, or would be positively affected. These expectations were based on the premise that self-focus activates self-beliefs, the valance of which then determines whether participants are more vulnerable or less vulnerable to the experimental stressor.

Method

Participants

Participants were 83 university students recruited through poster advertisements. Participants gave informed consent and were reimbursed with a seven dollar voucher for an on-campus café. The data provided by 12 participants was excluded for a number of reasons: suspicion regarding the experiment's rationale (n = 6), equipment malfunction (n = 2), non-cooperation with the experiment protocol (n = 2), experiment cessation due to participant discomfort (n = 1), and laboratory setting disturbance (n = 1). This left 71 participants (31 males, 40 females; mean age = 23.70 years) with viable data. The participants were randomly assigned to experimental and control conditions; the experimenter was blind to which group each participant was assigned[1].

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[1] Due to the method of random assignment, unequal sample sizes and gender distribution across groups occurred. There were 42 participants (22 males and 20 females) assigned to the experimental group and 29 participants (9 males and 20 females) assigned to the control group.

The laboratory in which the experiment was conducted was divided into two rooms by a partially closed adjustable partition. Each room was approximately three metres wide and five metres long. The first room contained a desk for the participant to sit at and a desk for the experimenter to sit at whilst giving instructions, as well as other items such as a filing cabinet and a freestanding washbasin. The second room contained a large desk, on which physiological recording equipment and a laptop computer were set up, and two empty desks. When seated at the desk with the recording equipment, the experimenter could not be seen by the participant due to the partition.

Materials & Equipment

Paper and Pencil Measures

Participants completed a number of pencil-and-paper measures during the laboratory session and a psychometric measure prior to arriving. The complete set of pencil and paper measures used can be found in Appendices, A to E.

Social Phobia Scale (SPS). The SPS (Mattick & Clark, 1989) was used before the experiment to measure participants' social anxiety. The SPS is a self-report questionnaire consisting of 20 items that are rated from 0 *(not at all characteristic or true of me)* to 4 *(extremely characteristic or true of me)*. The items are self-statements assessing the individual's susceptibility to experiencing anxiety in situations in which they are being observed by others, such as during public speaking or when eating while others are looking. Example items include "I can get tense when I speak in front of others" and "I am worried people will think my behaviour is odd". The questions focus on concerns about being observed by others rather than anxiety relating to social interactions. A total score from 0 to 80 is obtained by summing the items. The test title was changed from Social Phobia Scale to Beliefs and Attitudes Questionnaire for this study to partially disguise its purpose. Brown et al. (1997) found the SPS to be a reliable and valid measure of anxiety about being observed by others. Gore, Carter, and Parker (2001) found that SPS scores were predictive of anxious responding to a social challenge (role-playing the act of asking another 'participant' on a date).

Linguistic Implications Form (LIF). The LIF (Wegner and Giuliano, 1980; 1983) was used during the experiment to measure self-focus. The LIF is a measure of current self-focused attention designed so that its administration does not alert the participant to its purpose or directly alter the participant's level of self-focus. The LIF consists of a list of 20 sentences, which the participant must complete by selecting one of three pronouns (e.g., me, her, they) for each sentence. The pronoun options vary between sentences and are placed in different locations within each sentence. Each pronoun set contains one self-related and two other-related choices. All options make a grammatically correct sentence. The proportion of responses the participant selects that relate to the self (me, my, or I) is used as a measure of the degree of current self-focused attention. Several studies have demonstrated that participants' responses to the LIF are increased by standard self-focusing manipulations such as the use of mirrors and audiences (Silvia & Abele, 2002).

Modified Remote Association Task (mRAT). A modified (mRAT) was created for this experiment to be used as a social-evaluative stress induction. The original Remote Association Task (RAT; Mednick, 1962; Mednick & Mednick, 1967) consists of 15 sets of three words printed on a single page. The examinee is required to generate a fourth word that relates in some way to the three words in each set. For example, "book" would be the correct response for the word set, *shelf*, *read*, and *end*. Examinees are asked to find the solutions to as many word sets as they can in a certain time period. In the original RAT, some items are relatively easy whereas others are more difficult. The modification of the RAT for this experiment involved altering the word-sets so that it was impossible to obtain correct answers for all but three of the 15 items. For example, the new word sets "chamber, staff, box" and "bass, model, sleep" could only be solved with overly abstract responses, classified as incorrect. The three easily solvable word sets were included to allay suspicion that all of the items might be impossible.

Demographics Form. A demographics form was produced to obtain demographic information, information pertinent to the physiological recording integrity, and information about participants' self-esteem. The form has self-report items assessing participants' age, gender, ethnicity, vision, hearing ability, languages spoken, when participants last ate, and whether they had taken stimulant, anti-psychotic, or anxiolytic medications in the previous 24 hours. The form also included was a series of questions to assess different aspects of self-esteem and other variables. On scales from 1 (*very low*) to 5 (*very high*), were the following items: "On my *best* days my self esteem is…"; "On my *worst* days my self-esteem is…"; "Please estimate the average level of your self-esteem over the *past month*"; and "Please

estimate the average level of your self-esteem over the *past year*". A number of other questions were included enquiring about other aspects of self-esteem, anxiety, and beliefs about the self and others. These were included for exploratory data analysis and were not directly involved in this study[1].

Three important variables used in the study were generated from the questions on the demographics form. These are termed *self-esteem level*, *state self-esteem*, and *self-esteem range*. The self-esteem level variable was generated by summing each participant's response to the questions, "Please estimate the average level of your self-esteem over the *past month*" and "Please estimate the average level of your self-esteem over the *past year*", and dividing the total by two, resulting in possible scores ranging from one to five. The self-esteem level variable provides a measure of each participant's average or normal self-esteem level, with a slight increase in weight given to more recent average self-esteem.

The state SE variable consisted of participants' responses to the demographics form item: "Right now I have high self-esteem", answered 1 (*not very true*) to 5 (*very true*). This variable reflects participants' immediate sense of self-esteem at the beginning of the experiment. This is a measure of current self-esteem, as opposed to the self-esteem level variable, which is a measure of average self-esteem.

The self-esteem range variable was created by subtracting participants' responses to the question: "On my worst days my self esteem is…" from their responses to the question: "on my best days my self-esteem is…", resulting in scores ranging from zero to four. This provides a measure of each participant's range of self-esteem levels. This reflects individual differences in the amplitude of self-esteem fluctuations, a variable conceptually similar to Kernis's self-esteem stability concept. Low self-esteem range scores would relate to having stable self-esteem—a theoretically healthy attribute. Higher self-esteem range scores would relate to less stable self-esteem, considered to be a psychological vulnerability (Kernis et al,, 1993). Self-esteem range, therefore, serves as an index of self-esteem security, conceptually distinct from average self-esteem level.

Post-Stressor Questionnaire. A Post-Stressor Questionnaire (PSQ) was developed to measure participants' stress and anxiety level, as well as current self-esteem, during the stress induction task (the modified RAT). The PSQ consisted of two self-statements, rated from 1 (*not very true*) to 5 (*very true*). The items were "*During the previous task*, I had high self-esteem" and "*During the previous task*, I felt stressed or anxious". Participants' responses to

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[1] The exact questions can be seen on the Demographics Form in Appendix D.

the item "During the previous task, I felt stressed or anxious" were used as a self-report measure reflecting participants' subjective experience of stress or anxiety.

Electrodermal Activity

Differences in participants' average skin conductance level (SCL) between experimental phases was used as a measure of change in sympathetic nervous system (SNS) activity. As SNS arousal is a core component of stress and anxiety (Barlow, 2000), SCL was measured to provide an objective compliment to the self-reported assessment of this variable.

The variable reflecting changes in SCL used in this study was created by subtracting participants' mean SCL during a three-minute baseline phase at the beginning of the experiment from their mean SCL during the stressor phase later in the experiment. Subtracting the baseline SCL mean from the stressor phase SCL mean reduces some of the influence of individual differences in SCL unrelated to emotional arousal (Dawson, Schell, & Filion, 2007). SCL was measured in microSeimans (µS), a unit of electric conductance.

Participant's skin conductivity was measured with a computerised electrodermal activity (EDA) meter. The hardware and software for data analysis were produced by Biopac Systems Inc. Disposable Biopac EL507 EDA Isotonic Gel electrodes and a Biopac SS57L lead set were used to conduct and receive the signal. Each electrode has a circular contact surface with a diameter of 1 cm. A Biopac MP35 data acquisition unit was used amplify and digitise the signal. The digital signal was recorded using the software program Biopac Student Lab Pro 3.71, running on a Compaq Presario M2218AP notebook computer with the Windows XP operating system. A sampling rate of 200 Hz was used.

Audio Recordings

The attention training and control treatments were administered in this study using separate audio recordings played through headphones. Participants randomly heard one or the other. The recordings were made using Cool Edit Pro 2.1, a digital sound editor and multitrack mixing program produced by Syntrillium Software Corporation. Each recording was 9.5 minutes long. The first audio recording was developed as an attention training procedure and the second as a control procedure. Both recordings contained verbal instructions and various sound effects. Ten different sound effects, including bird sounds, horses galloping, calm instrumental music, and thunder, of varying lengths from five to 60

seconds were used. These were either created directly using Cool Edit Pro or obtained from The Freesound Project (Creative Commons, 2006). The verbal instructions were presented exclusively on the left channel; the sound effects were primarily presented on the right channel, though some were also presented on the left channel and some oscillated between the two channels.

The attention training recording and control recording contained the same initial instructions for the listener to sit as still as possible, keep their eyes open, and direct their gaze forwards whilst listening closely to the recording. The attention training recording gave additional instructions throughout the recording directing the listener to focus their attention selectively on the various sounds as they are presented. The control recording contained the same sounds but there were no instructions regarding the control of the listener's attention.

On the attention training recording, the additional instructions are given over four phases, based on the detailed description in Wells (2000). Instructions in the first phase direct the listener to focus their attention intensively on each of the sounds as they are presented in turn. Instructions in the second phase direct the listener to focus on certain sounds whilst ignoring simultaneously presented competing sounds. The instructions in the third phase direct the listener to switch their focus rapidly between sounds. Instructions in the fourth phase direct the listener to focus on as many of several simultaneously presented sounds as they can at the same time.

Whilst the control recording contained the same initial instructions for the listener, no additional instructions regarding control of attention were given. The sounds were presented in the same configuration as those in the attention training recording, so that the only difference between the recordings was the presence or absence of the additional instructions regarding attentional control.

Audio recordings used during the experiment were played back on the same notebook computer used to record skin conductance, with the program Nullsoft Winamp 5.13, and were heard by each participant through a set of Sony MDR-CD170 closed stereo headphones.

Procedure

Pre-experiment communication with participants was conducted via email. Before attending the laboratory for the experiment, participants were asked to complete a questionnaire which they collected from a tray outside the experimenter's office. The questionnaire was Mattick & Clark's (1989) Social Phobia Scale, but was retitled "Beliefs

and Attitudes Questionnaire" to make its purpose less obvious. Participants completed experimental trials individually. The timeline of the experimental procedure has been divided into eight phases for ease of explanation and later discussion.

Introductory phase. After a short greeting upon arriving at the laboratory, participants were asked to seat themselves at the desk in the first room, facing the entrance. The experimenter outlined what the participant would be doing, and described the ostensible purpose of the study. It was explained that the research is investigating how different kinds of thinking and their associated brain activity influence certain physiological processes. The experimenter explained that the different tasks the participant would be doing, elicit physiological responses that can be measured by minute changes in skin temperature.

The participant was then given an information sheet to read (see Appendix F), a consent form to sign (see Appendix G), and the Demographics Form to complete. While the participant completed the Demographics Form, the experimenter prepared the recording equipment in the other room. After the participant had completed the form, the experimenter set up two electrodes to enable recording of the participant's skin conductivity. The disposable self-adhesive electrodes were attached to the ventral surface of the tips of the participant's first and second fingers of their non-dominant hand. The clip-on lead set was then attached to these electrodes.

The participant was then told that the first task would involve listening to a 10 minute audio recording through a set of headphones and that they would need to sit still and remain quiet during this task and during baseline measurement periods before and after the recording. The participant was instructed to put the headphones on and sit with their arms rested on the arms of their chair.

First baseline phase. After the introduction, the experimenter then moved to the room with the recording equipment to begin the EDA recording. After one minute of acclimatisation, a three minute baseline measure was taken. The participant was asked to relax and sit quietly during this period. The experimenter remained outside of the participant's view during this time.

Attention training/control treatment phase. After the baseline measure had been obtained, the audio recording playback was commenced. A randomising function within the playback software determined which of two different recordings was played. This process led to the random allocation of participants into the experimental group (attention training recording) or control (control recording) group. Due to the use of headphones, the audio recording could

not be heard by the experimenter, who consequently was blind to each participant's group allocation until after the experiment.

Second baseline phase. When the audio recording playback finished, the participant was asked to remove the headphones and to sit for another three minutes to allow a second baseline measure to be obtained.

Self-focus measure. The experimenter then returned to the participant's room and explained that the first task was to complete a simple exercise on a piece of paper. The participant was given a copy of the Linguistic Implications Form and was asked to read and follow the instructions on the front page. This was to provide a measure of self-focus, expected to be lower in the attention training group than the control group. The experimenter moved to the other room and then returned to collect the form when the participant said that they had finished.

Stressor task phase. The participant was then told that the next task would require a little more effort and that they would need to sit with their arms rested on the arms of the chair and say his or her answers out loud to the experimenter. The participant was verbally instructed to solve as many of the items on the task as they could in three minutes. The participant was then given the modified RAT form and was asked to read the instructions on the cover page and indicate when they were ready to begin. When this was done, the experimenter started a stopwatch and asked the participant to begin. The experimenter remained seated at a desk in front of the participant. All participant answers were responded to with "incorrect" said in a neutral tone, except for the three easily answered items with were responded to with "correct" again in a neutral tone. After three minutes the task was ended and the form was collected.

Post-stressor assessment. The experimenter then gave the PSQ to the participant to obtain information about their stress and anxiety during the previous task. The experimenter left the room whilst this was completed.

Debriefing phase. The physiological recording was then ceased and the experimenter checked which of the two audio recordings was heard by the participant. The experimenter asked the participant a number of questions about their experience of the experiment and probed for any suspicion or awareness of the deception. The experimenter then debriefed the participant, answered any questions, and outlined the true purpose of the study, and the reason for the deception.

Results

Attention Training Effects on Response to the Stressor Task

This study's primary hypothesis was that participants in the attention training group would experience less stress and anxiety during the stressor task than participants in the control group. To confirm such a relationship, group allocation (i.e., attention training group versus control group) would need to have significantly predicted the amount of stress and anxiety experienced by participants whilst working on the modified remote-association task, which was used as the stress induction.

Two dependent variables were utilised in the investigation of this hypothesis. The first dependent variable was self-reported stress/anxiety, reflecting participants' subjective experience of stress or anxiety. The self-reported stress/anxiety measure consisted of participants' responses to the question on the PSQ, completed after the stressor task: "During the previous task, I felt stressed or anxious", answered from 1 (*not very true*) to 5 (*very true*).

The second dependent variable was the change in participants' mean SCL from the first baseline phase to the stressor task phase. SCL typically increases when individuals feel stressed or anxious (Dawson, Schell, & Filion, 2008). A SCL change variable was calculated by subtracting participants' mean SCL during the baseline phase from their mean SCL during the stressor task phase.

On the self-reported stress/anxiety measure, participants in the attention training group obtained a mean score of 3.38 (SD = 1.06), and participants in the control group obtained a mean score of 2.93 (SD = 1.31). To determine if the attention training group versus control group variable predicted self-reported stress/anxiety, the self-reported stress/anxiety variable was regressed onto the dummy-coded group allocation variable (attention training group coded as 1, control group coded as 2). Participants' group allocation was not found to significant predict self-reported stress/anxiety, $\beta = -.450$, *SE* = .281, *t* = -1.599, *p* = .114. This result does not support the prediction that participants in the attention training group would report less stress/anxiety than those in the control group. The non-significant trend was actually in the direction opposite to that expected—participants in the attention training group tended to report *more* stress/anxiety than those in the control group

On the SCL change measure, participants in the attention training group had a mean increase of 5.26 μS (SD = 2.78), whilst those in the control group had a mean increase of 4.77 μS (SD = 2.44). To determine if group allocation predicted changes in SCL, the SCL change

variable was regressed onto the dummy-coded group allocation variable. Again the group allocation variable was not a significant predictor, $p = .446$. This analysis provided no support for the prediction that the attention training group participants would show a smaller increase in SCL than those in the control group.

An investigation of whether the relationship between attention training and the measures of stress and anxiety was moderated by additional variables may reveal some important information not apparent in the main effects analyses. It is possible that the influence of moderating variables could conceal the effects of the attention training manipulation, resulting in non-significant main effects.

As attention training was developed for use with individuals with emotional disorders, it was hypothesised that attention training might reduce stress and anxiety only in individuals with scores indicating low trait self-esteem, low state self-esteem, a large self-esteem range, or high social anxiety. In addition, it was predicted that attention training could actually have the opposite effect among participants with, high trait self-esteem level, high state self-esteem, a small self-esteem range, or low social anxiety. These predictions were based on the premise that attention training decreases self-focus, which in turn decreases the activation or influence of self-beliefs—whether they be positive or negative. Consequently, in an evaluative situation, such as during the stressor task, individuals with negative self-beliefs will experience more negative affect when self-focused than when not self-focused. Individuals with more positive and protective self-beliefs will experience less negative affect when self-focused, and may actually experience positive affect due to the activation of positive self-beliefs.

The self-esteem level variable used for these analyses was generated by summing each participant's responses to the Demographics Form items: "Please estimate the average level of your self-esteem over the *past month"* and "Please estimate the average level of your self-esteem over the *past year"*, both answered from 1 (*very low*) to 5 (*very high*), and then dividing the total by two. Participants' scores ranged from 2 to 5 with a mean of 3.36 and a standard deviation of 0.70.

The state self-esteem variable consisted of participants' responses to the Demographics Form item: "Right now I have high self-esteem", answered 1 (*not very true*) to 5 (*very true*). This variable reflects participants' self-esteem at the beginning of the experiment.

The self-esteem range variable was created by subtracting each participant's response to the demographics form item: "On my worst days my self esteem is…" from their response to the item: "On my best days my self-esteem is…," both answered from 1 (*very low*) to 5 (*very*

high). This reflects individual differences in the amplitude of daily self-esteem fluctuations. Participants' scores ranged from 1 to 4 with a mean of 2.45 and a standard deviation of 0.79.

The social anxiety variable was comprised of participants' scores on the SPS[1]. The SPS questionnaire measures anxiety experienced in situations in which one's behaviour could be evaluated by others. It consists of 20 items, answered from 0 (*Not at all characteristic or true of me*) to 4 (*Extremely characteristic or true of me*). Participants' scores ranged from 1 to 63 with a mean of 20.20 and a standard deviation of 13.14.

A series of analyses were performed to determine whether these four variables moderated the effects of attention training on stress and anxiety experienced during the stressor task. Separate analyses were performed for each hypothesised moderating variable for both self-reported stress/anxiety and SCL change dependent variables. To determine whether a hypothesised moderating variable influences the relationship between an independent and a dependent variable, multiple regression is used. The moderation analysis involves testing a regression model with the independent variable, the hypothesised moderating variable, and their interaction (cross-product) term, as predictors of the dependent variable. If the interaction term is a significant predictor, then moderation can be said to have occurred and the pattern of the interaction can be analysed in detail. This further analysis involves looking at the relationship between the independent variable and the dependent variable at different levels of the moderating variable.

With the self-reported stress/anxiety dependent variable, we conducted four separate regression analyses, one for each potential moderator. We examined models with attention training, self-esteem level, and their interaction; attention training, self-esteem range, and their interaction; attention training, state self-esteem, and their interaction; and attention training, social anxiety, and their interaction. No statistically significant main effects or interactions emerged from these analyses, all $ps > .27$. As none of the interactions were significant predictors, moderation by these variables was not demonstrated.

With the SCL change dependent variable, we again conducted analyses for these four potential moderators. The moderation analyses for social anxiety, state self-esteem, and self-esteem range, produced no significant main effects or interactions, all $ps > .20$.

An examination of the model with attention training, self-esteem level, and their interaction, however, produced a near significant main effect for self-esteem level, $\beta = -2.271$, $SE = 1.366$, $t = -1.663$, $p = .101$, and a near-significant interaction, $\beta = 1.208$, $SE =$

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[1] Two participants missed out an item on the SPS questionnaire. To obtain consistent results, the item was completed using the median response on the other items from that participant.

.942, $t = 1.869$, $p = .066$. The near significant main effect revealed a trend for participants with a lower self-esteem level to show a greater increase in SCL than those with a higher self-esteem level. In addition, the near-significant interaction indicated possible self-esteem level moderation of the effects of attention training versus control treatment on SCL change. This warranted further investigation. Following recommendations regarding the interpretation of interactions in multiple regression by Cohen and Cohen (1983), and Aiken and West (1991), the relationship between group allocation and SCL change was analysed at two levels of self-esteem level variable: one SD above the mean and one SD below the mean. The analysis involves plotting separate regression lines at the two levels of the moderator and testing whether the regression lines are significantly different from zero. These regression lines can be seen in Figure 1.
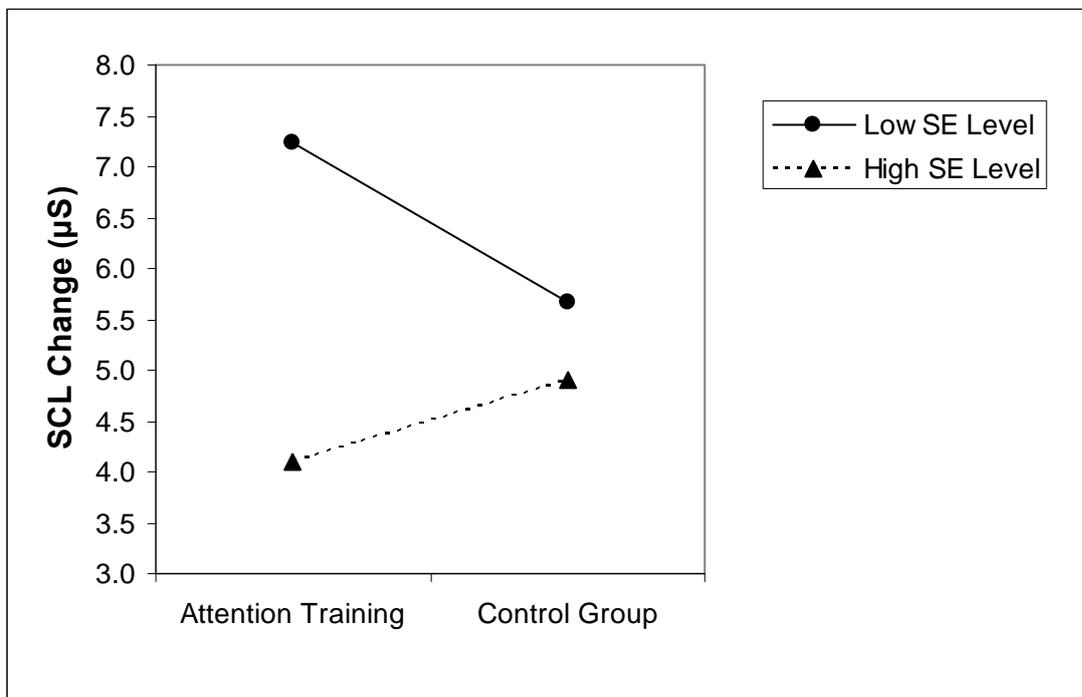
Figure 1. SCL change in attention training and control groups at two levels of self-esteem.

The simple regression slope at one SD above the self-esteem level mean was not significantly different from zero, $p = .380$; for these individuals, allocation could not predict change in SCL level. The simple slope at one SD below the self-esteem level mean did approach significance, however, $\beta = -.304$, *SE* = 167, $t = -1.820$, $p = .073$; for low self-

esteem individuals, group allocation came close to being a significant predictor of SCL change. As can be seen in Figure 1, the trend for participants with a low self-esteem level was for those in the attention training group to show a greater increase in SCL than those in the control group—this is counter to the prediction that attention training would reduce vulnerability in these participants.

The findings in the analyses presented above do not support the initial predictions of a main effect for attention training on participants' experience of stress and anxiety during the stressor task. In fact for one group—those with a low self-esteem level—the manipulation may have had a reverse effect. Two possible causes of these outcomes are identified and explored below. The first possibility is that attention training did not have the desired effect of reducing self-focus. The second possibility is that self-focus did not have the expected impact on vulnerability to stress/anxiety.

Attention Training Effects on Self-Focus

One possible reason for the absence of the expected attention training effect on stress or anxiety is that attention training did not reduce self-focus as expected. To determine whether this was the case, we looked at whether participants in the attention training group scored lower on the self-focus measure than participants in the control group.

The self-focus measure used in this study was the LIF, which was administered after the second baseline phase, which followed the attention training phase. Higher scores on the LIF reflect higher levels of self-focused attention. Participants in the attention training group obtained a mean score of 8.38 (SD = 2.66); participants in the control group obtained a mean score of 8.0 (SD = 3.20). To determine if group allocation significantly predicted self-focus, the self-focus variable was regressed onto the dummy-coded group allocation variable. Group allocation was not a significant predictor, $p = .587$. This finding does not support the prediction that the attention training exercise would result in a lower level of self-focus than the control exercise. The lack of difference in self-focus between groups may explain why, in most cases, group allocation did not significantly predict the amount of stress and anxiety experienced by participants during the stressor task.

Whilst there was no overall effect of attention training on stress and anxiety, as demonstrated earlier, there did appear to be an effect for participants with a low self-esteem level. Of these participants, those in the control group had a smaller increase in SCL than those in the attention training group. It is possible that for low self-esteem participants,

attention training had a reverse effect and actually increased self-focus leading to greater vulnerability to stress and anxiety. Consequently, we conducted a mediation analysis to determine whether the effect of group allocation on SCL level in these participants was mediated by changes in self-focus.

A low self-esteem level group was created by selecting only the participants with scores below the median of the self-esteem level variable. To confirm that attention training came close to predicting predicted SCL change in this group, SCL change was regressed onto the group allocation variable. The results showed that group allocation was a near-significant predictor of SCL change, $\beta = -.364$, $SE = .883$, $t = -1.994$, $p = .057$. In a mediation analysis, once the independent variable is found predict the dependent variable, the next step is to determine if the independent variable correlates with the hypothesised mediating variable, which in this case is self-focus. To determine if group allocation correlated with self-focus, the LIF score was regressed onto the group allocation variable. Group allocation was not a significant predictor of self-focus in this group, $p = .732$. The absence of a correlation here prevents us from stating that self-focus mediated the observed near-significant correlation in the low self-esteem level participants between group allocation and SCL change. The relationship may have been due to other factors or may be a chance outcome of the statistical analyses.

Relationship between Self-Focus and Response to the Stressor Task.

By utilising the LIF self-focus measure as an independent variable, we are still able to examine our theoretical model relating self-focus with vulnerability to anxiety, and test the potential moderating effects of self-esteem level, state self-esteem, self-esteem range, and social anxiety on this relationship. The rationale for attention training as a therapeutic procedure stems from the assertion that a reduction in self-focus reduces vulnerability to experiencing distress, in those with emotional disorders. This rationale is grounded in Wells's S-REF model of emotional disorder, which asserts that excessive self-focus activates and maintains negative self-beliefs in these individuals (Wells and Matthews, 1994). In the context of the present study, it was hypothesised that while a main effect may be present for self-focus on stress and anxiety, a stronger effect should be found for psychologically vulnerable individuals. Self-focus in psychologically healthy individuals could actually correlate negatively with stress and anxiety due to the activation of *positive* self-beliefs.

Of note, is that the relationships to be analysed here are correlational rather than definitively causal. The earlier attention training versus control analyses were based on an experimentally modified independent variable, thus they were exploring a causal relationship. Self-focus as an independent variable, however, was measured rather than modified; whilst any significant relationships may be postulated to be causal, they are not demonstrably so. Correlations between self-focus and other variables in this study may in fact be due to unmeasured third variables.

To determine if self-focus predicted subjective stress/anxiety as a main effect, the self-reported stress/anxiety variable was regressed onto self-focus. Self-focus was not found to be a significant predictor, $p = .723$. To determine if self-focus predicted SCL change, the SCL change variable was regressed onto self-focus. Again, self-focus was not a significant predictor, $p = .507$. These analyses provide no indication that self-focus alone predicted either self-reported or physiological components of stress and anxiety experienced by participants during the stressor task.

Further analyses were conducted to investigate whether the relationship between self-focus and the measures of stress and anxiety were moderated by self-esteem level, state self-esteem, self-esteem range, or social anxiety. As with the previous moderation analyses, we utilised multiple regression to test whether moderating effects were present.

To determine if self-esteem level moderated the relationship between self-focus and self-reported stress/anxiety, self-reported stress/anxiety was regressed onto self-focus level, self-esteem level, and the self-focus × self-esteem level interaction term. The main effect for self-focus and the interaction term were not statistically significant, $ps > .56$. The main effect for self-esteem level approached significance, however, $\beta = -.367$, $SE = .202$, $t = -1.816$, $p = .074$, suggesting, not surprisingly, that participants with higher self-esteem tended to experience less stress/anxiety during the stressor task. The non-significant interaction, however, provides no support for the moderation hypothesis.

To determine if self-esteem level moderated the relationship between self-focus and SCL change, we regressed SCL change onto self-focus level, self-esteem level, and the self-focus × self-esteem level interaction term. The main effects for self-focus and self-esteem level were not significant, $ps > .50$. The self-focus × self-esteem level interaction did approach significance, however, $\beta = -.201$, $SE = .192$, $t = -1.659$, $p = .102$. Though not statistically significant, this interaction, suggesting possible moderation, was further investigated. As with the earlier near-significant moderation analysis, simple regression slopes were calculated at two levels of the hypothesised moderating variable: one SD above the mean and one SD

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below the mean. These slopes are plotted in Figure 2. The end points of the simple slopes are at one SD above and one SD below the mean of the continuous self-focus independent variable. These non-arbitrary end-points were selected to aid visual interpretation.
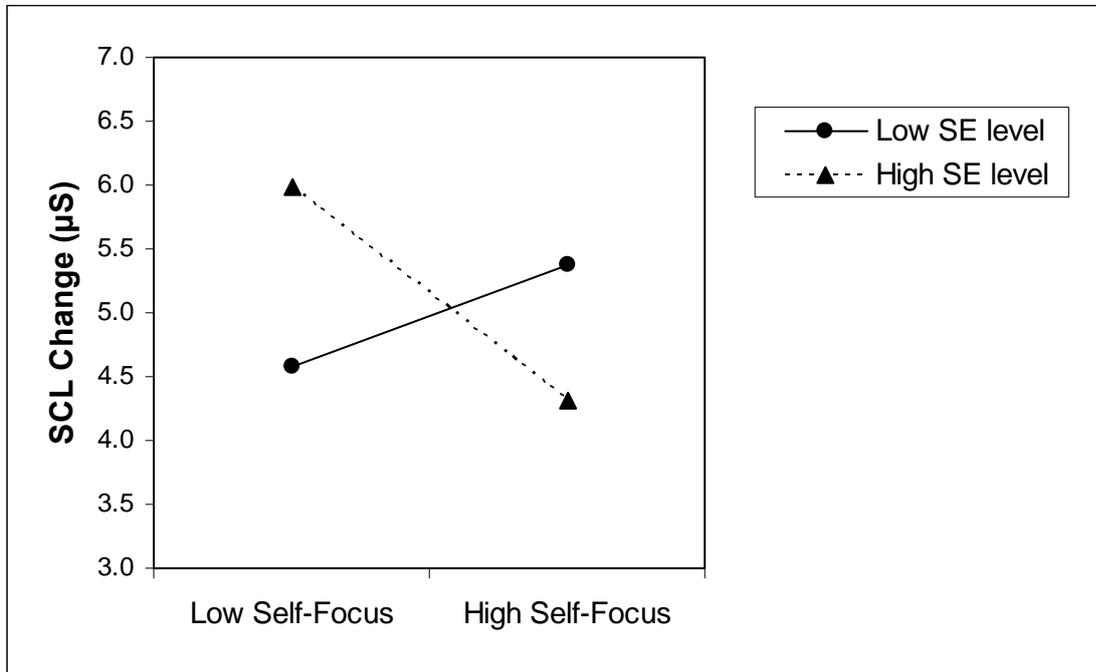
Figure 2. Self-Focus and SCL change at two levels of self-esteem.

The low self-esteem level regression slope was not significantly different from zero, $p = .405$. The high self-esteem level regression slope approached statistical significance, however, $\beta = -.311$, $SE = .188$, $t = -1.656$, $p = .102$. As can be seen, in participants with a high self-esteem level, those who were more self-focused tended to experience a smaller increase in SCL than those who were less self-focused. This is consistent with the hypothesis that psychologically healthy individuals would actually benefit from higher self-focus, due to the activation of positive and protective self-beliefs. The predicted effect for those with a low self-esteem level was not statistically significant, however.

To determine if state self-esteem moderated the relationship between self-focus and self-reported stress/anxiety, self-reported stress/anxiety was regressed onto self-focus level, state self-esteem, and the self-focus × state self-esteem interaction term. Neither of the main effects, nor the interaction term, were statistically significant, all ps > .28. To determine if state self-esteem moderated the relationship between self-focus and SCL change, we regressed SCL change onto self-focus level, state self-esteem, and the self-focus × state self-

esteem. Again, neither of the main effects, nor the interaction term, were statistically significant, all ps > .31.

To determine whether self-esteem range moderated the relationship between self-focus and self-reported stress/anxiety, the self-reported stress/anxiety variable was regressed onto self-focus, self-esteem range, and the self-focus × self-esteem range interaction term. The main effect for the self-esteem range variable approached significance, β = .205, *SE* = .172, *t* = 1.779, *p* = .080. This indicates that participants with a large self-esteem range (i.e., those with insecure self-esteem), tended to report higher stress/anxiety during the stressor task than those with a smaller self-esteem range (i.e., those with secure self-esteem). The self-focus × self-esteem range interaction term was clearly statistically significant, ß =.260, *SE* = .060, *t* = 2.263, *p* = .027, indicating that moderation occurred. To further investigate the interaction, regression lines were calculated at one SD above and one SD below the mean for the self-esteem range moderating variable. These regression lines can be seen in Figure 3 with endpoints at one SD above and one SD below the mean of the self-focus independent variable.
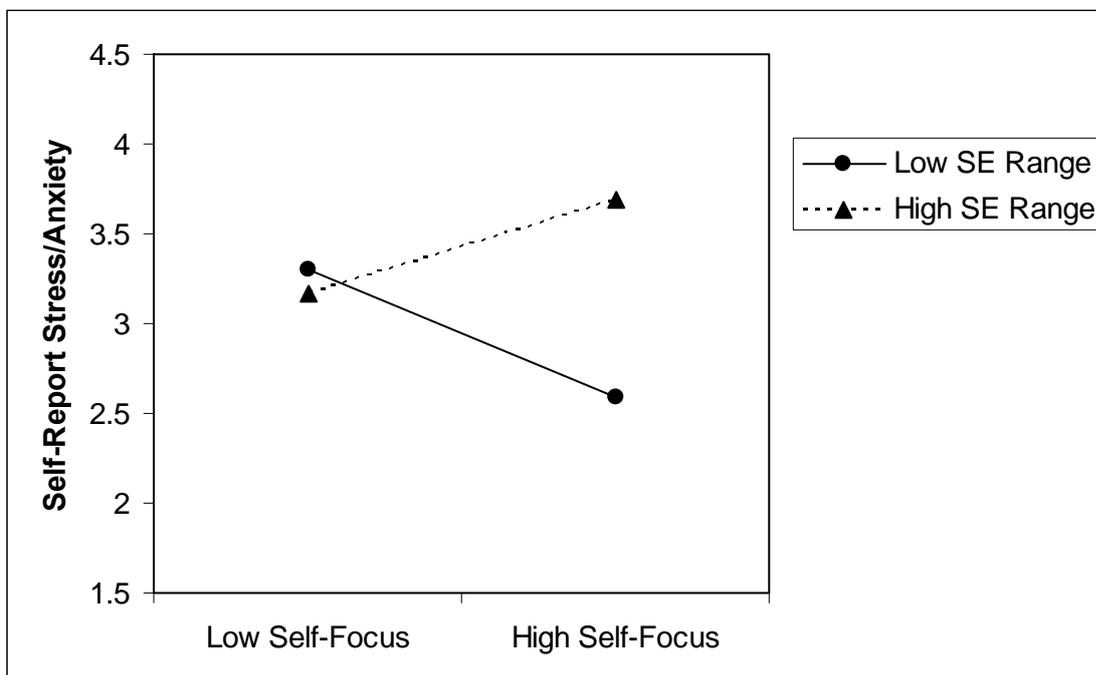
Figure 3. Self-focus and self-reported stress/anxiety at two levels of SE range.

The slope at one SD above the mean of the self-esteem range moderating variable was not significantly different from zero, ß = .221, *SE* = .166, *t* = 1.336, *p* = .186, though the

pattern suggests that among those with a large self-esteem range, high self-focus related to greater stress response. The slope at one SD below the mean, approached statistical significance, ß = -.303, *SE* = .160, *t* = -1.891, *p* = .063. This near-significant trend suggests that in participants with a small self-esteem range, those who were more self-focused reported experiencing less stress/anxiety than those who were less self-focused. This is consistent with the hypothesis that in more secure individuals, self-focus has a protective effect, possibly due to the activation of positive self-beliefs.

The pattern that can be seen in Figure 3 suggests that the significant difference between individuals high and low on the self-esteem range variable was most likely due to the difference in the high self-focus participants, rather than the low self-focus participants. It may be that when self-focus was low, participants were not as strongly differentiated, due to less activation of the self-beliefs.

The self-esteem range variable was also found to significantly moderate the relationship between self-focus and SCL change. This finding was obtained by regressing the SCL change variable onto self-focus, self-esteem range, and the self-focus × self-esteem range interaction term. The main effects for self-focus and self-esteem range were not significant, *p*s > .67. The self-focus × self-esteem range interaction term, however, was clearly statistically significant, ß = .336, *SE* = .138, *t* = 2.886. *p* = .005, indicating moderation.

To interpret this interaction, separate regression slopes were calculated at one SD above and one SD below the mean for the self-esteem range moderator. These are presented in Figure 4.
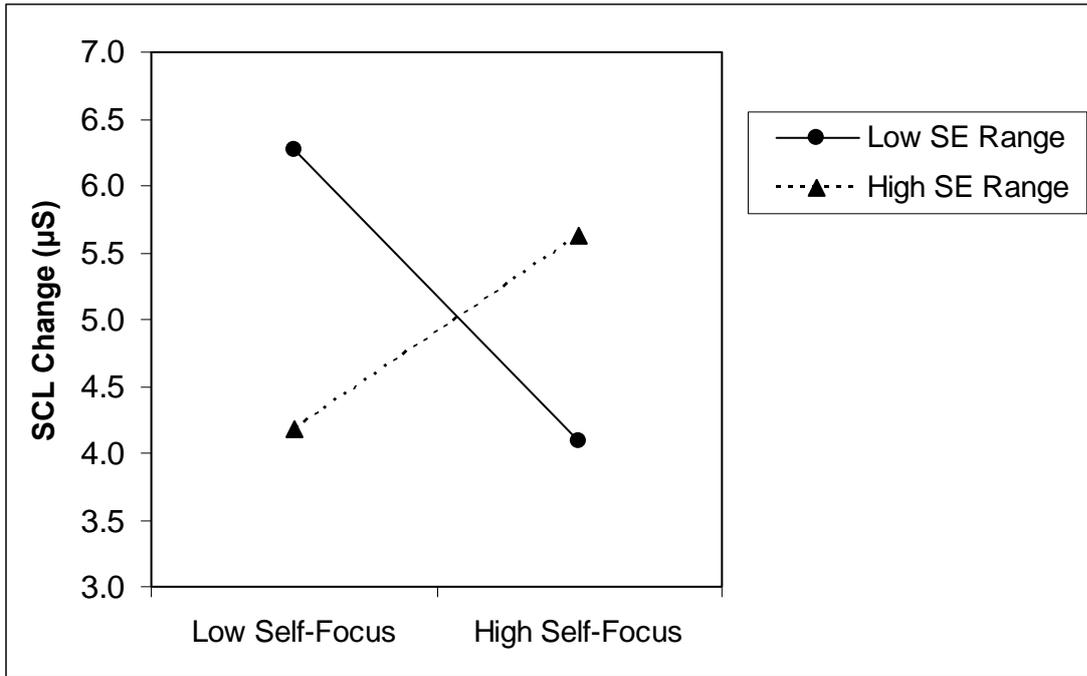
Figure 4. Self-focus and SCL change at two levels of self-esteem SE range.

The slope at one SD below the mean was significantly different from zero, ß = -.384, *SE* = .156, *t* = -2.458, *p* = .017. This means that in participants with a small self-esteem range, those high in self-focus had a smaller increase in SCL than those lower in self-focus. The slope at one SD above the mean approached statistical significance, ß = .279, *SE* = .170, *t* = 1.644, *p* = .105. This trend, suggests that in participants with a large self-esteem range, those high in self-focus likely had a larger increase in SCL than those lower in self-focus.

These analyses of self-esteem range as a moderating variable, suggest that in participants with a relatively small self-esteem range (i.e., secure self-esteem), heightened self-focus reduced vulnerability to stress and anxiety during the stressor task. In participants with a large self-esteem range (i.e., insecure self-esteem), self-focus increased vulnerability to stress and anxiety. These responses are consistent with the premise that the valance of self-beliefs determines the effect of self-focus on vulnerability to stress and anxiety.

To determine if social anxiety moderated the relationship between self-focus and self-reported stress/anxiety, self-reported stress/anxiety was regressed onto self-focus level, social anxiety, and the self-focus × social anxiety interaction term. Whilst the self-focus × social anxiety interaction terms was not a significant predictor, *p*s > .44, the social anxiety main effect did approach significance, β = .018, *SE* = .011, *t* = 1.611, *p* = .112. This would suggest, as would be expected, that those higher in social anxiety experienced more stress/anxiety

during the stressor task, which was essentially social-evaluative in nature. With SCL change as the dependent variable, both of the main effect and the interaction term were non-significant predictors, ps > .50. The prediction that social anxiety would moderate the relationship between self-focus and both self-report and physiological indices of stress and anxiety was not supported.

Results Summary

The first set of analyses looked at the effects of listening to the attention training recording versus the control recording on participants' emotional response to the stressor task. No findings indicated that attention training reduced vulnerability to stress or anxiety, either for all the participants grouped together, or for the more psychologically vulnerable participants only. One near-significant finding suggested that for individuals with a low self-esteem level, attention training may have actually made them *more* vulnerable to threat.

The second set of analyses revealed that the attention training recording did not create a lower state of self-focus than the control recording. This was counter to the purpose for which the attention training exercise was developed.

From the analyses of the relationship between self-focus and participants' stress and anxiety during the stressor task, several significant and near significant findings did emerge. A number of significant and near-significant main effects suggested that individuals with high social anxiety, low self-esteem level, or a large self-esteem range, were more vulnerable to the stressor. In a number of analyses no main effects emerged for the same variables however, suggesting that their direct influence was not robust or that statistical power was too low. Self-focus was not a significant or near-significant predictor as a main effect in any analyses.

Several significant and near-significant interactions emerged that were consistent with the hypotheses that self-esteem level and self-esteem range would interact with self-focus to influence participants' responses to the stressor. In each, the pattern of the interaction was consistent with the hypothesis that greater self-focus would lead to participants responding in a way that was more in line with their self-beliefs. Rather than exerting a main effect, self-focus interacted with self-esteem level and self-esteem range to predict participants' responses. Interactions were not found for all hypothesised relationships, however. Social anxiety and state self-esteem did not act as moderators in any analyses, and self-esteem level only acted as a moderator for SCL change and not self-reported stress/anxiety. No significant

or near-significant main effects or interactions were found in the opposite direction to that expected.

Discussion

The present study was conducted to examine whether an attention training analogue could reduce vulnerability to anxiety, in order to examine the process by which attention training works. Adrian Wells, the developer of attention training, has asserted that attention training works by increasing externally-focused attention, thereby decreasing excessive self-focus and the cognitive, emotional, and behavioural problems that stem from this (Wells, 1990). Given that excessive self-focus is found in individuals with a range of psychological problems (Ingram, 1990), and that theory (e.g., Ingram, 1990; Pyszczynski & Greenberg, 1987; Wells and Mathews, 1994) suggests that self-focus is a problem particularly for those with negative self-beliefs, attention training was expected to be particularly effective with individuals with low self-esteem, a large self-esteem range, or high social anxiety. To examine this, we administered an attention training analogue to student participants, measured their self-focus levels, and then exposed them to a stressor task. We predicted that attention training would reduce vulnerability to anxiety during the stressor task, particularly for those with a poor self-image or negative self-beliefs. It was expected that this effect would be mediated by changes in self-focus.

In addition to examining the workings of attention training, we sought to examine and build on the theoretical models which suggest that self-focus is a particular problem for those with poor self-beliefs. Research has been accumulating which suggests that security of self-esteem has important implications for vulnerability to stress, perhaps more so than average self-esteem level (e.g., Kernis et al., 1998). Kernis has postulated that this vulnerability might reflect heightened concern about maintaining self-esteem, an increased tendency to be self-evaluative, and possibly tendencies to over-generalise from failure and attribute negative events to the self (Kernis et al., 1993; Kernis et al., 1998).

From this research, it was thought that a measure of self-esteem security might also interact with self-focus to predict stress and anxiety in response to a stressor. We thought that factors contributing to insecure self-esteem, such as heightened concern with being evaluated, when made particularly salient by self-focus, might exacerbate vulnerability to the stressor.

To determine this, we developed an easily administered measure of self-esteem security in the form of self-esteem range—we simply asked participants to retrospectively rate what

their self-esteem was like on their best and worst days. The difference was used as an indicator of the degree to which their self-esteem fluctuated.

In the following sections we will discuss what the study's findings tell us about the effects of attention training, and the relationship between self-focus, self-esteem, and stress-vulnerability. We will then review the implications and applications of these findings and how they fit into the existing empirical and theoretical literature.

Does attention training reduce vulnerability to stress and anxiety by reducing self-focus?

The hypothesis that participants with low self-esteem, a large self-esteem range, or high social anxiety, who received attention training, would experience less anxiety during the stressor task than those who received the control treatment was not supported by the results. Attention training did not appear to buffer these participants from stress and anxiety.

Three interpretations of this unexpected finding are possible: (1) Wells's attention training technique does not reduce self-focus; (2) the particular attention training used in this study did not decrease self-focus and was not an adequate analogue of Wells's attention training; and (3) experimental design and measurement limitations prevented a true effect of the experiment's attention training on self-focus from being detected.

The first of these interpretations would challenge Wells's claim that attention training's therapeutic effect is a result of a reduction in self-focus. One would then be left to conclude that attention training's therapeutic effectiveness results either from specific changes in other processes, or from common treatment factors such as the therapist-client alliance and therapist allegiance to a theoretical model. These and other common treatment factors contribute a great deal to the outcome of all forms of psychological treatment (Wampold, 2001). The assessment of changes in self-focus in Wells and colleagues' effectiveness studies was not routinely conducted, and when it was measured, was done in a way that precluded mediation analysis. The conclusion that improvement was mediated by changes in self-focus could only be inferred indirectly.

There are a number of reasons, however, why the lack of an effect on self-focus in this study should not be generalised to attention training as a therapeutic procedure. The experimental attention training developed for this study may not have been a good analogue of Wells's therapeutic attention training. Such a discrepancy could have resulted from the exercise itself, or from differences in the participants involved and the context of the attention training. The first possibility is that the attention training exercise developed for this study

was not a close enough match to Wells's attention training exercise. A number of differences between the two may have led to divergent effects. In the present study, attention training instructions were pre-recorded and presented via headphones, rather than live in person. It is possible that recorded instructions are less powerful than oral instructions from a therapist. Also, in this study, the sound effects that served as auditory stimuli during the attention training were introduced via headphones rather than being located in the near and far external environment. Consequently, the demands on participants' attention, and possibly the need for external-focus, may not have been as great.

Future studies therefore, should make changes to the attention training and control exercises that could lead to a more pronounced attentional effect. One modification would be to switch from a headphone-based presentation to an external presentation. A study by Cavanagh (2004) used an attention training setup with a recording presented through four speakers placed around the participant. This approach would allow for an external presentation of the attention training without affecting standardisation. This would require the participant to be in a soundproof room, however, to ensure that the experimenter remains blind—or deaf in this case—to participants' group assignment. Changes to the recordings could also be made to enhance the attentional effect and increase the difference between the two conditions. One option would be to reduce the loudness of the sound effects. Quieter sounds would be more demanding on concentration in the attention training group, perhaps further enhancing external-focus. Participants in the control group might be less inclined to deliberately focus on the sounds if they were quieter, allowing them to focus more on their own thoughts or other internal processes, which would maintain a state of self-focus.

In addition to the differences between the exercise used in the present study and that used by Wells and colleagues, differences in the participants and the context of the attention training were present. These differences may have also contributed to divergent effects on self-focus. In the present study, university students, not selected for having psychological disorders or problematic self-focus levels, volunteered to undergo the procedure in a laboratory setting; they were also given a deceptive rationale for the exercise. In Wells and colleagues' research, attention training was administered to individuals who had psychological disorders with associated cognitive biases, in a treatment setting; these individuals were also aware that the procedure was intended to reduce self-focus. It is likely that the clients treated with the therapeutic technique were more motivated to comply with the instructions and fully engage with the task; the present study's volunteers may have been less compliant. An improvement would be to inform participants that their effort and

engagement is very important, and perhaps, that concentration and effort can be monitored via the physiological recordings. Also, in attention-training based therapy, clients engage in repeated practice of the technique under the therapist's direction within sessions and by themselves between sessions. It may be that individuals need to develop a degree of proficiency with the technique before it becomes effective at reducing self-focus. Future studies could require participants to attend a number of sessions in which attention training is practiced, before its effects are measured and tested.

It is also possible that attention training has little or no effect on the self-focus levels of individuals who do not have excessively high self-focus to begin with. Attention training may act to reduce high self-focus to a more normal level, but have no effect on self-focus levels that are already in the normal range. This could be due to a floor effect of the attention training, whereby it will reduce self-focus to a certain level but have little effect beyond this. A more powerful analogue, however, may be able to decrease self-focus to a lower level before its effects are constrained by such a limitation.

The third interpretation of the apparent lack of an attention training effect in this study is that methodological problems prevented an actual effect of attention training on self-focus from being detected. Problems relating to the experimental design or to the measures used may have contributed to missing a real effect. One possibility is that both the attention training and the control treatment reduced self-focus. This would have masked a true self-focus reducing effect of the attention training exercise. As there were no measures of self-focus before the manipulation, only the relative effects of the two conditions could be examined. Measuring self-focus before, as well as after, the attention training or control exercise would also be beneficial. This would allow us to assess the effects of two treatments separately, which would show not only whether attention training is effective at reducing self-focus, but also what effect the control treatment is having.

Another improvement would be to eliminate or substantially reduce the delay between the attention training and the self-focus measure. This break was originally included to obtain a second baseline EDA measure, but was found to be of insufficient length to obtain a stable reading, and was consequently not utilised in the data analysis. The removal or shortening of this phase would maximise the likelihood of detecting an effect, as well as maximising its influence on participants during the following stressor task.

It is possible that the Linguistic Implication Form, used to measure self-focus, did not provide a valid measure of self-focused attention. The LIF has demonstrated adequate

reliability and validity in previous studies, however (see Silvia & Abele, 2002), and did relate to other variables in this study in a theoretically meaningful way.

Given these limitations, it cannot be confidently asserted that the absence of a measured effect of the attention training exercise on self-focus in this study challenges the claim that attention training as a therapeutic procedure work by reducing self-focus. Differences in the attention training exercise used, the participants involved, and the circumstances of the intervention, may all have contributed to divergent outcomes. In addition, a number of methodological limitations could have prevented a true effect from being detected.

Self-Focus, Self-Esteem, and Vulnerability to Anxiety

The second major aim of the study was to examine self-focus in interaction not just with level of self-esteem and social anxiety, but with the new measure of self-esteem range. Based on self-focus and self-esteem theories (e.g., Ingram, 1990; Kernis et al., 1993; Wells & Matthews, 1994), we expected that participants with self-esteem and social anxiety scores indicative of negative self-beliefs would be negatively affected by higher self-focus. In contrast, it was thought that participants with scores consistent with positive self-beliefs would either be unaffected by self-focus, or would actually be positively affected. These predictions stem from the proposition that self-focus activates self-beliefs, which in turn influence cognition, emotion, and behaviour. Negative self-beliefs should lead people to be more vulnerable to a stressor, whereas positive beliefs should have some protective effect.

Whilst the effects of self-esteem level on the relationship between self-focus and negative affect are relatively straight-forward and have been previously demonstrated (e.g., Brockner, 1979; Sedikides, 1992), the effects of self-esteem security variables had not been explored, to our knowledge, prior to this study.

If self-esteem reflects the general positivity or negativity of one's perceived self-worth, what internal state or process does self-esteem range reflect? Kernis and colleagues have argued that a high degree of variability in self-esteem reflects an overall fragility in one's sense of self-worth. This fragility may result from a number of factors, such as a heightened perception of events as being relevant to self-worth, greater reactivity to positive or negative events, an over-importance placed on one's self-view, and a tendency to over-generalise from failure and attribute negative events to oneself (Kernis et al., 1993; Kernis et al., 1998). These underlying factors may explain why self-esteem range moderated the relationship between self-focus and anxiety in the present study. During self-focus, high self-esteem range

participants were more likely to be focusing on their self-worth, more likely to perceive the negative task feedback as reflecting on their self-worth, and were likely to be more affected by the negative feedback than low self-esteem range individuals. It is possible that the self-focused low self-esteem range individuals were not engaging in self-evaluation at all, and might have been focusing on other self-related material, such as positive attributes, that bolstered their response to the threat.

Given that self-evaluation necessarily involves awareness of self-referent material, the process cannot occur in states of heightened external-focus. As self-esteem is essentially a product of self-evaluation, it is likely that self-esteem's role in influencing behaviour is contingent on a degree of self-focus. Consequently, in low self-focus participants, self-esteem measures did not predict response to the stressor in a meaningful way.

These hypotheses received a good deal of support in this study. A number of statistically significant and near-significant moderating relationships consistent with these predictions were found. Moderation analyses indicated that self-focus predicted heightened anxiety during the stressor for those with a low self-esteem level or a high self-esteem range. Self-focus predicted lower anxiety, however, in those with a high self-esteem level or low self-esteem range. No moderating effects were found for the social anxiety or state self-esteem variables. Thus, in sum, we found that both level and stability of self-esteem interacted with self-focus to predict anxiety. Whilst not all the predictions were supported, no statistically significant or near-significant moderating relationships were found to be in the direction opposite to that expected.

Implications and Applications

Whilst the findings relating to the mechanisms of attention training's action were not conclusive, results pertinent to this study's secondary hypotheses do contribute to the self-focus and self-esteem literatures, and have a number of implications and practical applications.

This study found the self-esteem range measure to be as predictive of participants' anxious responding as the self-esteem level measure. This finding supports the recommendation of Kernis and other researchers that measures of self-esteem security should be included in research relating to self-esteem. This experiment's self-esteem range measure is worth further study as it is considerably easier to administer than Kernis's self-esteem

stability measure. If further studies support its reliability and validity, it would provide a useful measure for future research.

This study also highlights the relationship between self-focus and self-esteem. Self-esteem researchers do not often considered self-focus, though it has been shown here and elsewhere to be an influential variable. It is likely that focus of attention also has an influence in other experiments investigating self-esteem and other variables. To enhance predictive power, researchers should consider the role of self-focus, and when feasible, measure this variable in order to control for its effects.

Another contribution of this study was the use of a psychophysiological outcome measure. Few studies assessing the relationship between self-focus and negative affect have utilised such measures (see Mor & Winquist, 2002). Though psychophysiological measures have limitations, they do provide objective information that is unaffected by self-report biases. This study found changes in electrodermal activity to be as good an outcome measure as self reported stress and anxiety. Sympathetic nervous system arousal is an important component of stress and anxiety which could be more commonly accessed in social psychology research.

One practical application of the finding of self-esteem range importance, is in the psychological assessment and treatment of people in clinical settings. Whilst it is common in clinical interviews to assess people's self-esteem and beliefs about themselves, it is less common to enquire as to what degree self-esteem fluctuates over time. The finding that the self-esteem range variable can be predictive, informs us that simply asking people about their self esteem on their best days versus their worst days can provide useful information. It is clear from the present study's findings and from those of Kernis and others (e.g., Kernis et al., 1998), that insecure self-esteem leaves an individual more vulnerable to stressors in life. In a diathesis-stress model of psychopathology, insecure self-esteem likely acts as a general diathesis.

The observed relationship between self-esteem and self-focus informs us that even when problematic self-esteem is resistant to modification, reducing self-focus will diminish its influence on vulnerability to stress. Self-focus reducing interventions such as Wells's attention training, cognitive therapy for social phobia (e.g., Clark & Wells, 1995), and some forms of mindfulness meditation, should have such an effect.

Comparison with Previous Studies

The findings relating self-focus to self-esteem in the present study are largely consistent with previous empirical studies. Brockner's (1979) study most closely matches this experiment in the variables assessed and outcome. Brockner found that dispositional self-esteem moderated the effects of self-focus on self-reported anxiety and task performance. Whilst this study replicates Brockner's findings, it extended the measure of self-esteem to include self-esteem range. The findings of this study are also consistent with those of other studies assessing the influence of moderating variables closely related to negative self-beliefs (Gibbons et al., 1985; Mor & Winquist, 2002; Nix et al., 1995; Phillips & Silvia, 2005; Sakamoto, 1998; Sedikides, 1992).

Unlike Woody (1996), however, no moderating effect was found for dispositional social anxiety in the present study. It is possible, however, that the participants in this study, who responded to advertisements describing what would be a fairly novel experience, were lower in social anxiety than the general population. The advertised reimbursement of a café voucher, also may not have appealed to many people with social fears. These factors may have created a self-selection bias on the social anxiety variable. Whilst this is a speculative hypothesis, it is a plausible explanation for why social anxiety did not have a moderating effect in this study.

In contrast with the majority of previous studies, the present study found that self-focus actually predicted a lower level of anxiety during the stressor in those with high self-esteem or a small self-esteem range. This effect is consistent with Terror Management Theory which postulates that self-esteem buffers individuals from the experience of anxiety (Martens, Greenberg, & Allen, 2008; Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004). This is based on the assertion that self-esteem is an indicator that one is living up to cultural expectations, providing a sense of security and symbolic immortality, shielding one from deep fears, such as that of death.

Consistency with Self-focus Theories

Modern self-focus theories have much in common with regard to predictions for the present study. Though the competing theories postulate different internal mechanisms, all the models assert that expectations and beliefs are important determinants of how individuals are influenced by self-focus.

The updated OSA theory (Silvia & Duval, 2001) and the self-regulation theory of and Carver and Scheier (1998) would predict that self-focus would lead to a self-evaluative process in which participants would compare themselves on a particular dimension with their ideal or standard on that dimension. The design of the present experiment was such that for many of the participants, the salient dimension would have been test performance, and the negative feedback from the experimenter would likely have created a current–ideal discrepancy. The participant would then appraise their progress on the task. If the progress is insufficient, withdrawal or negative affect would result; if the progress is sufficient then task engagement will result and affect should not be negatively influenced. The nature of the task in the present study prevented participants from receiving any experimenter-feedback indicating that they were improving. Therefore, participants' sense that they could reduce the discrepancy was likely determined by their own confidence in their abilities. Consequently, it is not surprising that those with low or insecure self-esteem were negatively affected by self-focus whilst those with high or secure self-esteem were positively affected. It is possible that high or secure self-esteem participants were over-confident and believed themselves to be improving in spite of a lack of positive feedback. In such individuals, self-focus and self-evaluation might actually have had a positive effect on their response to the task.

The present study's findings are partially consistent with Buss's self-consciousness theory (Buss, 1980). Self-consciousness theory would certainly predict that dispositionally socially anxious participants would feel more conspicuous and uncomfortable during self-focus than non-socially anxious participants, but this was not the case. Buss would likely also have predicted that low self-esteem and large self-esteem range individuals would be more negatively affected by self-focus, and this did eventuate. Regarding the reverse effect found in high self-esteem and low self-esteem range participants, Buss did postulate that particularly extraverted individuals or "exhibitionists" might experience positive affect when in public self-focus (Buss, 1980). This is a possible explanation for the reverse effect, though Buss asserted that such individuals were likely quite rare.

Ingram's (1990) theory of self-focus and pathological self-absorption is not as specific in its prediction for self-focus in relatively healthy individuals. Ingram asserted that self-evaluation is only one possible response to self-focus and that any aspect of personal experience may be the centre of attention during self-focus. It is likely that participants with particularly negative beliefs about themselves would respond negatively in the situation in which failing at a task is salient, however. As with the other theories, Ingram's model would

predict that the activated positive or negative self-beliefs would influence emotion and behaviour as has occurred in the experiment.

Wells and Matthew's (1994, 1996) self-regulatory executive function model postulates that self-focus activates self-beliefs, including meta-cognitive beliefs, that guide cognition, leading to dysfunctional and biased information processing. In individuals with maladaptive self-beliefs and cognitive strategies, self-focus leads to negative affect and behaviours that perpetuate emotional disorder. Whilst this full-blown "cognitive-attentional syndrome" is unlikely to dominate cognition in a many of the present study's participants, a relationship between self-focus and belief activation is still asserted by Wells. Thus, self-focus should negatively affect emotional state in participants with negative self-beliefs and perhaps positively affect those with positive self-beliefs.

Conclusion

In sum, though we didn't find any evidence for an effect of our attention training analogue on self-focus or vulnerability to anxiety, we did observe theoretically consistent interactions between self-focus and self-esteem variables on vulnerability to anxiety. Specifically, we found that self-focus predicted greater anxiety during the stressor task in individuals with low self-esteem or a large self-esteem range. In contrast, self-focus predicted lower anxiety in those with high self-esteem or a small self-esteem range. These findings support the conception that self-focus influences emotions indirectly, through the activation of self-beliefs. This study's findings are also supportive of the use of a self-esteem range, a new variable that indexes the range within which people's self-esteem fluctuates over time.

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BELIEFS AND ATTITUDES QUESTIONNAIRE

For each statement, please circle a number to indicate the degree to which you feel the statement is characteristic or true of you. The rating scale is as follows:

0   Not at all characteristic or true of me
1   Slightly characteristic or true of me
2   Moderately true or characteristic of me
3   Very characteristic or true of me
4   Extremely characteristic or true of me

1   I become anxious if I have to write in front of other people.   **0 1 2 3 4**

2   I become self-conscious when using public toilets.   **0 1 2 3 4**

3   I can suddenly become aware of my own voice and of others listening to me.   **0 1 2 3 4**

4   I get nervous that people are staring at me as I walk down the street.   **0 1 2 3 4**

5   I fear I may blush when I am with others.   **0 1 2 3 4**

6   I feel self-conscious if I have to enter a room where others are already seated.   **0 1 2 3 4**

7   I worry about shaking or trembling when I'm watched by other people.   **0 1 2 3 4**

8   I would get tense if I had to sit facing other people on a bus or train.   **0 1 2 3 4**

9   I get panicky that others might see me faint or be sick or ill.   **0 1 2 3 4**

10   I would find it difficult to drink something if in a group of other people.   **0 1 2 3 4**

11   It would make me feel self-conscious to eat in front of a stranger in a restaurant.   **0 1 2 3 4**

12   I am worried people will think my behaviour is odd.   **0 1 2 3 4**

13   I would get tense if I had to carry a tray across a crowded cafeteria.   **0 1 2 3 4**

14   I worry I'll lose control of myself in front of other people.   **0 1 2 3 4**

15   I worry I might do something to attract the attention of other people.   **0 1 2 3 4**

16   When in an elevator I am tense if people look at me.   **0 1 2 3 4**

17   I can feel conspicuous standing in a line.   **0 1 2 3 4**

18   I can get tense when I speak in front of other people.   **0 1 2 3 4**

19   I worry my head will shake or nod in front of others.   **0 1 2 3 4**

20   I feel awkward and tense If I know people are watching me.   **0 1 2 3 4**

Sentence Completion Task

<u>Instructions</u>

This task requires you to complete a series of sentences. Each sentence contains a blank where you are to select one of 3 options by circling the word with the pen provided.

Select the word that you think best fits the sentence. All are correct but choose what you think is the most natural word. Do not spend too long on any one sentence.

Now turn over the page and begin...

1. All of (our, my, his) answers matched the ones in the back of the book.

2. At first it didn't seem to make any difference, but by later that night the noise from the party was entirely too loud to allow (her, me, us) to sleep.

3. The salesman tried to persuade (me, her, us) to buy a set of encyclopedias.

4. The noise got to (us, them, me) before long.

5. (Our, His, My) idea of fun is sitting at home and listening to music.

6. The sun went in just when (we, she, I) decided to go outside.

7. Please don't do this to (her, us, me); it is just not fair.

8. It was (her, our, my) understanding that the deadline for the paper had been delayed one week.

9. Except for (me, us, her), everyone failed the test.

10. As a result of (our, my, his) suggestions, a minor revision in the policy has occurred.

11. (He, We, I) spent so much time on the initial planning that it seemed impossible to finish before the deadline.

12. It rained so hard that all of (our, my, her) clothes got soaked.

13. For the past few months, (I, we, they) have had reports of squabbling and dissatisfaction among the office workers.

14. According to (our, my, her) notes, only five of the original seven laws are still in existence.

15. Someone stopped (them, me, us) to get directions to the stadium.

16. (We, He, I) waited by the phone for the doctor to return the call.

17. The cashier charged (her, us, me) too little for the groceries.

18. The mosquitoes didn't even bother (him, us, me).

19. Dinner was waiting on the table when (he, I, we) came back from the store.

20. It isn't easy to get lost in this town, but somehow (I, we, they) managed it.

Remote Association Task

<u>Instructions</u>

This task requires you to find words which relate to other words.

For example, for the following three words:

1. **Stalk**   **Trainer**   **King**

The fourth word would be: **Lion**

15 sets of 3 words are printed on the next page. You must think of a fourth word that relates to the other three in each set.

You must also say your answers out loud to the experimenter as you solve them in the following format:

For the above example, you would say: **"Number one… Lion"**

The experimenter will let you know if the answer is correct. If it is correct move to the next one. If it is not correct you can choose to try again or move to the next set of words. If you are unable to think of an answer, move on to the next set.

For each of the following problems, find a fourth word that somehow relates to the previous three.

1.	tree	grass	stomach
2.	blood	goal	cheese
3.	athlete's	web	rabbit
4.	head	found	bulb
5.	board	magic	read
6.	walker	main	sweeper
7.	bass	model	sleep
8.	inch	deal	client
9.	chamber	staff	box
10.	shelf	read	end
11.	jump	kill	useful
12.	bald	rain	emblem
13.	surprise	line	birthday
14.	skunk	kings	boiled
15.	mouse	sharp	staple

Demographics Questionnaire

This questionnaire serves to provide us with some information important to the experiment. If you complete this questionnaire, please be assured that all information obtained will be handled STRICTLY confidential and will not shared with individuals not directly involved with this study.

1.   Age: _____   Gender: M / F

2.   Vision: Normal   / Corrected to normal   Else: _____

3.   Hearing: Normal   / Corrected to normal   Else: _____

4.   First language learned: _____   4b. Spoken how long? _____

5.   Second language learned: _____   5b. Spoken how long? _____

6.   How long ago did you eat your last meal (approx)? _____ hours and _____ minutes ago.

7.   Some medications and drugs affect the physiological measures we wish to take. These medications may be prescribed or taken for range of reasons. Your information is completely confidential. Please complete the chart below.

> **Note**: Antidepressants do not affect the results and do not need to be reported. (e.g. fluoxetine (Prozac), citalopram, paroxetine, venlafaxine (Efexor), moclobamide)

Drug Type	Taken in last 24 hrs	Number of hours since last dose
Stimulants (e.g. dexamphetamine, methamphetamine, methylphenidate (Ritalin), 'P')	Y / N	
Minor Tranquilizers (e.g. diazepam (Valium), clonazepam, lorazepam, temazepam, zopiclone (Imovane).)	Y / N	
Major Tranquilizers (e.g. clozapine, risperidone, olanzapine, quetiapine, chlorpromazine, haloperidol)	Y / N	

Please read the following questions carefully and answer by circling the most appropriate number below each question.

1.) *Right now* I have high self-esteem.
     1   *2*   *3*   *4*   *5*
  not very true   *very true*

2.) On my *best* days my self-esteem is:

	1	2	3	4	5
very low					very high

3.) On my *worst* days my self-esteem is:

	1	2	3	4	5
very low					very high

4.) Please estimate the average level of your self-esteem over the *past month*.

	1	2	3	4	5
very low					very high

5). Please estimate the average level of your self-esteem over the *past year*.

	1	2	3	4	5
very low					very high

6.) I feel that I am living up to my standards.

0%   20%   40%   60%   80%   100%

7.) I feel that people generally value and respect me as a person.

0%   20%   40%   60%   80%   100%

8.) I feel that people generally support me.

0%   20%   40%   60%   80%   100%

9.) I feel that my peers/classmates value and respect me.

0%   20%   40%   60%   80%   100%

10.) I feel that my parents value and respect me.

0%   20%   40%   60%   80%   100%

11.) *Right now* I feel anxious

	1	2	3	4	5
not very true					very true

12.) Please estimate your *potential* to feel anxiety in general (in other words, do not rate how anxious you are, but how great you feel your potential to become anxious is).

	1	2	3	4	5
low potential to become anxious					high potential to become anxious

13.) Please rate how much potential you feel you have to become anxious in the next hour.

	1	2	3	4	5
Low potential to become anxious					high potential to become anxious

14.) People often challenge me.

	1	*2*	*3*	*4*	*5*
not very true of me					*very true of me*

15.) People often try to undermine my sense of self-worth.

	1	*2*	*3*	*4*	*5*
not very true of me					*very true of me*

16.) People often are out to put me down.

	1	*2*	*3*	*4*	*5*
not very true of me					*very true of me*

17.) How meaningful is your life to you?

	1	*2*	*3*	*4*	*5*
not at all meaningful					*extremely meaningful*

18.) How strong are your beliefs about what is meaningful in this world?

	1	*2*	*3*	*4*	*5*
not at all strong					*extremely strong*

19.) To what extent do you feel your childhood was psychologically painful compared to the average person's?

	1	*2*	*3*	*4*	*5*
much less painful					*much more painful*

Please read the following questions carefully and answer by circling the most appropriate number below each question.

1.) *During the previous task,* I had high self-esteem.

      1   *2*   *3*   *4*   *5*

 not very true   *very true*

2.) *During the previous task,* I felt stressed or anxious

      1   *2*   *3*   *4*   *5*

 not very true   *very true*

Information Sheet

Physiological Responses to Auditory Stimuli and Mental Exercises
University of Canterbury, Department of Psychology

You are invited to participate as a subject in the research project *Physiological Responses to Auditory Stimuli and Mental Exercises.*

The aim of this project is to investigate how the body responds to brain activity created by hearing auditory stimuli and doing mental exercises.

Your involvement in this project will involve (1) completing self-report forms about your thoughts, feelings, attitudes, and beliefs, (2) having sensors attached to your arms and hands, (3) participating in a procedure involving exposure to various sounds, and (4) doing some mental exercises. The study will take approximately 45 minutes and you have the right to withdraw from the project at any time, including withdrawal of any information provided and still receive reimbursement. For your participation you will receive a 7 dollar voucher.

The risk of suffering physical or psychological harm is minimal. The mental exercises will require some effort and performance will vary between participants.

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: the identity of participants will not be made public without their consent. To ensure anonymity and confidentiality, your name will be separated from your responses in the study. Further, the data will be accessed and viewed only by the experimenter Alex Mortlock and immediate supervisors.

The project is being carried out as part of a MA degree in psychology by Alex Mortlock (awm31@student.canterbury.ac.nz) under the supervision of Andy Martens, who can be contacted at 364 2987. They will be pleased to discuss any concerns you may have about participation in the project.

The project has been reviewed and approved by the University of Canterbury Human Ethics Committee.

Consent Form

Physiological Responses to Auditory Stimuli and Mental Exercises
University of Canterbury, Department of Psychology

I have read and understood the description of the above-titled project. I agree to participate as a subject in the project and I consent to publication of the results of the project with the understanding that confidentiality will be preserved.

I understand that I may at any time withdraw from the project, including withdrawal of any information I have provided.

Name (please print):

Signature:

Date: