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Selective Attention to Illness-Related Stimuli in Health Anxiety

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Abstract

The literature review explores the nature of health anxiety or hypochondriasis, and discusses theoretical models of the disorder. The focus is upon cognitive-behavioural formulations of health anxiety, including attentional processes and the role of linguistic and pictorial information. Attentional bias toward threatening stimuli in other anxiety disorders is discussed. This includes consideration of the non-unitary nature of attentional bias where processes of vigilance towards, and maintenance of attention upon, threat stimuli are differentiated. Given that cognitive-behavioural models of hypochondriasis conceptualise the disorder as an anxiety about health, it is argued that exploration of attentional bias in health anxiety is also useful.

The empirical study examines the occurrence of attentional bias toward health-threat stimuli in non-clinical student participants, who are anxious or non-anxious about health-related matters. The study also investigates whether format of the health-threat stimuli (word or pictorial) and duration of stimulus presentation has an effect, in terms of attentional bias. Results indicate the occurrence of attentional bias toward briefly presented health-threat pictures, but only when groups were separated according to a measure of fear of autonomic arousal-related symptoms (the Anxiety Sensitivity Index; Peterson & Reiss, 1992). No evidence of attentional bias toward health-threat stimuli was found when groups were separated according to a conventional measure of hypochondriasis (Illness Attitudes Scale; Kellner, 1986, 1987). The results are discussed in relation to literature on health-related fears. Clinical implications and suggestions for future research are also highlighted.

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The role of cognitive factors and processes in health anxiety

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The role of cognitive factors and processes in health anxiety

Abstract

This review discusses the nature of hypochondriasis, or health anxiety, and explores various models of the disorder. In particular, it focuses upon a cognitive-behavioural model of health anxiety (Warwick and Salkovskis, 1989,1990), and discusses empirical studies that have aimed to test some of the model's predictions. A key prediction of this model is that health-related material is perceived as threatening, and readily attended to, on the part of health-anxious individuals. However, one question that arises from this prediction, concerns the role of linguistic and pictorial health-related information. Although Warwick and Salkovskis (1989, 1990) argue that both linguistic and pictorial information play a part in hypochondriasis, they do not specify to what extent each type of information may trigger health anxiety, or may capture attention. Another question that arises, is to what extent selective attention occurs for *internal*, physiological information, and to what extent it occurs for *external*, health-related information. Both of these issues are addressed in this review. Finally, future research directions arising from this review are suggested, along with the clinical implications of exploring such areas.

Health anxiety

Definitions of health anxiety and hypochondriasis

Health anxiety, or hypochondriasis, is the belief and/or fear of developing a serious illness. Within the literature, the two terms are often used interchangeably, however they originate from different schools of thought and will be defined independently. 'Hypochondriasis' is defined as a "preoccupation with fears of having, or the idea that one has, a serious disease based on a misinterpretation of one or more bodily signs or symptoms" (DSM-IV; American Psychiatric Association; APA, 1994). It is classified within DSM-IV as a somatoform disorder, grouped with somatisation and conversion disorder, and is not considered to be a form of anxiety disorder.

'Health anxiety' consists of the same features of hypochondriasis (fear and/or belief in serious illness), but has been proposed as a continuum, with 'hypochondriasis' representing the extreme end (Kenyon, 1976; Salkovskis, 1989). There is some evidence (e.g., Costa & McCrae, 1985) that hypochondriacal concerns occur along a continuum in the general population, and that these are stable over the age span. The term 'health anxiety' therefore has advantages in its emphasis upon a continuum of severity of symptomatology (Salkovskis, 1989), and inclusion of the concerns of both psychiatric and non-psychiatric patients. It also places a greater emphasis upon the anxiety component of the disorder, which is emphasised by the cognitive-behavioural conceptualisations (Warwick & Salkovskis, 1989, 1990), but not by the psychiatric viewpoint (APA, 1994). However, due to the overall similarity of the content of these terms, they will be considered to be interchangeable throughout this review.

General overview of hypochondriasis

Hypochondriasis has been referred to, under varied terminology, for several hundred years. Although there has been substantial debate regarding the concept of hypochondriasis, there is some general agreement as to the key features of the condition. McKinley and Hathaway (1940) have described hypochondriasis as 'an abnormal neurotic concern over bodily health'. They used this description as the basis for the construction of nine scales aimed at assessing hypochondriasis within the Minnesota Multiphasic Personality Inventory (MMPI; Kleinmuntz, 1967).

The condition has been further described in terms of four main characteristics which have been widely accepted within the psychiatric literature (Stoeckle, 1966). These are: firstly, the occurrence of physical symptoms that cannot be accounted for by demonstrable underlying disease; secondly, a fear of disease and the belief that one is ill; thirdly, a preoccupation with bodily functioning and illness; and fourthly, the persistent pursuit of medical care. In line with this, Pilowsky (1967) identified three main dimensions of hypochondriasis from analysis of questionnaires administered to 100 cases of hypochondriasis and 100 controls. These were bodily preoccupation, disease phobia and a conviction of presence of disease with no effect of reassurance. However, Kellner (1985) argued that hypochondriasis consists predominantly of just two factors, which were those of disease phobia and disease conviction. There has been therefore, some overlap in the content of the main dimensions of hypochondriasis, even though there are varied views as to the number.

Physical symptomatology, and the associated anxiety, may differ widely between patients. However, studies have found some patterns, in terms of the areas

and systems of the body that appear to cause most concern. For example, Kenyon (1964) studied 512 hypochondriacal patients over a ten-year period and found that the head/neck, abdomen and chest were the commonest regions for concern. The bodily systems that were most frequently implicated were those of the musculo-skeletal, gastro-intestinal and central nervous system (Kenyon, 1964).

Prevalence

The prevalence of hypochondriasis is largely unknown. However, Barsky, Wyshak, Klerman & Latham (1990) reported an incidence of hypochondriasis [lasting for at least six months, according to DSM-III-R (APA, 1987) criteria] in between 4.2% and 6.3% of general medical outpatients. However, Kellner (1985) estimated that illness worries of a broader nature may occur in between 10% and 20% of the population. Kellner (1985) also reported that the prevalence of anxiety about health is likely to vary across different cultures and communities. For example, it is possible that western societies' emphasis upon the self-application of 'health treatments' such as vitamin pills, has contributed to anxiety about health in these regions (Brown, 1963).

The burden that hypochondriasis places upon general medical health care has further emphasised the need for research. For example, it has been estimated that 30-80% of patients visiting a general practitioner suffer from functional complaints, rather than clear somatic illnesses (Lowy, 1975). Other authors (e.g., Lamberts, 1979; Brown, Robertson & Kosa, 1971) have suggested that the majority of primary care medical visits are made by patients who are overly anxious about their health in the absence of observable physical illness.

Hypochondriasis has only become better understood more recently, and one reason for the delay in understanding this condition, may be due to the infrequent opportunities that there are to study it in practice. Barsky and Klerman, (1983) highlight the fact that significant numbers of patients experiencing hypochondriasis are seen in general medical care by professionals focusing primarily upon somatic illness investigation. One of the dimensions of hypochondriasis is thought to be 'disease conviction' (Kellner, 1985), making it more likely that patients will seek medical rather than psychological intervention. The infrequent incidence of hypochondriasis in psychiatric services is likely to have delayed psychological understanding of the condition. There has also been some debate about the status of hypochondriasis as a psychiatric entity, which will be discussed next.

The primary versus secondary debate

The status of hypochondriasis as a psychiatric entity has been questioned in terms of whether the condition is 'primary' or 'secondary' in nature. Primary hypochondriasis refers to the existence of hypochondriasis as a psychiatric condition in its own right, which is not better accounted for by another diagnosis, a view endorsed by DSM-IV (APA, 1994). Secondary hypochondriasis refers to the existence of the disorder as a product of another more fundamental condition, often depression.

Suggestion that hypochondriasis may be 'secondary' to another illness could be seen in the early literature where the label 'melancholia' was used, implicating low mood as a key component. Other authors have noted that depressive symptomatology frequently co-exists with hypochondriasis (e.g., Kenyon, 1965; Ibor, 1972). However,

a number of other affective states often co-exist with hypochondriasis, apart from that of depression. Ladee (1966) and Kenyon (1964) reviewed large groups of patients with hypochondriacal symptoms, and found that these could be accounted for by other diagnoses. In fact, it is possible that hypochondriasis merely describes clusters of illness attitudes. For example, various individuals including those undergoing life stress, those having previously suffered from serious illness, or those in the early stages of studying medicine often develop transient hypochondriasis (Barsky & Klerman, 1983). Barsky and Klerman (1983) argue that this transient state occurs due to the development of new illness attitudes, rather than to psychopathology. Kenyon (1976) also draws up a list of numerous 'hypochondriacal states' in which various aspects of hypochondriasis co-exist with other psychiatric diagnoses.

However, other researchers have found evidence to suggest that hypochondriasis can exist in primary form. For example, Pilowsky (1970) examined 147 cases of hypochondriasis and concluded that 66 of these were primary in nature (i.e., did not meet criteria for other psychiatric diagnoses). It would therefore appear likely that hypochondriasis can exist as a primary condition. As Warwick and Salkovskis (1990) point out, studies demonstrating the co-existence of other affective states offer relatively meaningless information in terms of the status of hypochondriasis as a psychiatric condition. They state the need for research into the sequence of development of conditions, as has been undertaken in obsessive-compulsive disorder (OCD). Warwick and Salkovskis (1990) point out that there is much evidence for the primary status of OCD, despite the frequent presence of depression.

Summary

It would appear that hypochondriasis or health anxiety, occurs relatively frequently within the population. Health anxiety has been conceptualised as a continuum of differing degrees of health concern (Salkovskis, 1989). This review will now consider time factors in health anxiety, and the extent to which the feared outcome is imminent or delayed.

Autonomic arousal and health anxiety

Time factors, in terms of how soon bodily dysfunction is to be expected, are thought to be one element that differentiates hypochondriasis from panic disorder (Warwick & Salkovskis, 1990). Whereas people experiencing panic often fear an immediate catastrophe, those experiencing health anxiety are more likely to believe that the catastrophe will occur in the more distant future. The reason behind this may be the varying involvement of the autonomic nervous system in each anxiety type. For example, whereas panic may involve the misinterpretation of autonomic symptoms (e.g., a racing heart), hypochondriasis is more likely to involve the misinterpretation of non-autonomic symptoms (e.g., lumps). So, whereas the symptoms involved in panic are more likely to involve the autonomic nervous system (and are thus susceptible to direct amplification), this is less likely in hypochondriasis (Warwick & Salkovskis, 1990). These two types of symptom have also been labelled 'arousal-reactive' and 'arousal-nonreactive' respectively (e.g., Stewart & Watt, 2000).

There has been some recent debate, however, as to the specificity of 'arousal-reactive' symptoms and 'arousal-nonreactive' symptoms in terms of their direct

involvement in panic and hypochondriasis. For example, Otto, Pollack, Sachs and Rosenbaum (1992) asked panic patients to complete both the Illness Attitudes Scale (IAS; Kellner, 1987) and the Anxiety Sensitivity Index (ASI; Peterson & Reiss, 1992). The IAS focuses mainly upon arousal-nonreactive symptoms, and is thought to be a measure of health anxiety (Kellner, 1987). The ASI, on the other hand, is a tool that is designed to measure fear of arousal-reactive symptoms, and is thought to tap into the concerns underlying panic. Such concerns have also been labelled 'anxiety sensitivity' (Reiss, 1991). Otto et al. (1992) found a significant positive correlation between scores on both measures, with ASI scores being the best predictor of IAS scores, out of a list of other measures of panic. Otto et al. (1992) therefore suggested that ASI and IAS measure different aspects of a tendency to fear somatic symptoms, and that arousal-reactive and arousal-nonreactive symptoms may form part of a common dimension.

Watt and Stewart (2000) further explored the relationship between arousal-reactive and arousal-nonreactive involvement in hypochondriasis, in terms of their relative contribution to its development. They used a retrospective study in which to explore learning experiences during childhood, the extent to which these had involved reactive and non-reactive somatic symptoms, and later hypochondriasis. Watt and Stewart (2000) collected information about early learning experiences involving each of these sub-types, and measured current levels of anxiety sensitivity and hypochondriasis, using the ASI and IAS respectively. They found that hypochondriacal beliefs were associated with both arousal-reactive and arousal-nonreactive early learning experiences, and were mediated by anxiety sensitivity. In

comparison, Ehlers (1993) found that arousal-reactive learning experiences alone contribute to the development of panic in adulthood. Watt and Stewart (2000) therefore suggest that panic disorder originates from specific arousal-reactive fears and health anxiety originates from a fear of bodily symptoms in general. Panic disorder and hypochondriasis can therefore be differentiated in the sense that panic disorder consists of arousal-reactive fears alone, whereas hypochondriasis consists of both arousal-reactive and arousal-nonreactive fears. In this sense, hypochondriasis may incorporate those autonomic nervous system fears associated with panic disorder, in addition to more general health-related fears.

Summary

Hypochondriasis may consist of a general anxiety about health, including both immediate and delayed feared catastrophe. This review will now discuss theoretical models of hypochondriasis, including psychodynamic, social-learning, cognitive and cognitive-behavioural viewpoints. There will be a main emphasis upon the contribution of the cognitive-behavioural model.

Theoretical models of hypochondriasis

Psychodynamic theory

In terms of psychodynamic theory, Freud (1911) initially viewed hypochondriasis as a form of paranoia. He drew a parallel between the sense of mistrust towards others, seen in paranoia, and the mistrust of the body experienced in hypochondriasis. Other writers have conceptualised hypochondriasis in terms of the "conversion" of

unacceptable drives and wishes into somatic complaints (Brown & Vaillant, 1981), or as a defense against a low self-esteem (Sullivan, 1953). These alternatives have both been considered to result in primary and secondary gain. Primary gain consists of the direct reduction of intrapsychic conflict, whereas secondary gain consists of the interpersonal benefits which arise from the resulting physical symptoms (Wahl, 1963).

Social-learning theory

Other theories incorporate the view that hypochondriasis is a learned social behaviour. For example, Wooley, Blackwell and Winget (1978) argued that hypochondriacal patients, and somatisers in general, initially acquire the sick role either through actual illness or by modelling the behaviour of others. Once this role has been acquired, it is positively reinforced by others' nurturing and supportive behaviour. This may lead to the motivation to pursue a "diagnostic label" from doctors, rather than symptom relief, and to the involvement in numerous medical investigations.

Cognitive approaches

Various cognitive explanations for health anxiety have been proposed, which tend to fall into two main categories (Barsky & Klerman, 1983). The first consisted of the idea that health-anxious patients tend to "amplify and augment" normal bodily sensations, or in other words, are more physiologically sensitive to sensations. The second consists of the idea that health-anxious patients misinterpret normal bodily sensations, i.e., demonstrate cognitive bias. The first type of explanation states that people with hypochondriasis have a lower threshold for physical discomfort. For

example, Bianchi (1971) found that participants with "disease phobias" had lower thresholds for detecting electrical shocks than did controls. The second explanation states that people with hypochondriasis tend to misattribute normal physical sensations as being directly caused by serious disease or illness. For example, Rodin (1978) reported that the health worries of non-clinical participants, who scored highly on a hypochondriasis scale, were directly related to the misattribution of such concerns. From these separate ideas, a cognitive-behavioural model of health anxiety (Warwick & Salkovskis, 1989, 1990) was developed.

Warwick and Salkovskis' (1989, 1990) cognitive-behavioural model

A cognitive-behavioural model of hypochondriasis was developed to account for some of the previous research findings, and describes both the development and maintenance of the condition. Warwick and Salkovskis (1989, 1990) propose that dysfunctional attitudes towards health/illness are formed from early experience, and act as a filter for later relevant information. They argue that when critical incidents occur (which often include illness themes), these underlying assumptions become activated which then results in negative cognitions around health/illness. Warwick and Salkovskis (1989, 1990) acknowledge that the negative cognitions involved may be either verbal or pictorial. This cognitive component of the model is similar to Beck, Rush, Shaw and Emery's (1979) conceptualisation of cognition in emotional disorders. Its similarity lies in the assumption that dysfunctional assumptions about health lead to negative automatic thoughts. However, the model does not include the

presence of schemas which are described as screens or filters that process stimuli which give rise to the assumptions (Beck et al., 1979).

According to Warwick and Salkovskis (1989, 1990), negative automatic thoughts result in various physiological, cognitive, behavioural and emotional effects. For example, in terms of physiological effects, it is likely that there are changes in the functioning of the nervous system, heightened autonomic arousal and enhanced physical sensations. The cognitive effects consist of biases in processing, including a focus of attention toward the body, the monitoring of bodily changes and attention to negative illness information in the environment (whilst discounting positive information). Behavioural effects include self-inspection of the body, reassurance-seeking, scanning for illness information and various forms of avoidance. Finally, the changes in affect may include increases in anxiety, depression and anger.

There are some central assumptions arising from this model. One assumption is that illness-related information is perceived as threatening by people with health anxiety. Another assumption is that such perception of threat leads to anxiety. Anxiety is assumed to result in an increased bodily focus, physiological arousal and checking behaviour/reassurance-seeking. A further assumption is that these resulting processes lead to a preoccupation with bodily sensations. For example, checking behaviour is thought to keep attention focused towards the body, and prevent the habituation of anxiety. Such preoccupation is thought to lead to the misinterpretation of bodily sensations as signs of severe illness. Finally, it is thought that the misinterpretation of sensations leads to a tendency to perceive threat in relevant illness-related information.

Summary

The theoretical explanations for hypochondriasis are therefore quite different. Warwick and Salkovskis' (1989, 1990) model provides greatest detail in terms of the separate processes involved in the disorder. Several studies have explored these processes, with some providing support for the model. These will now be discussed.

Evidence for Warwick and Salkovskis' (1989, 1990) model

Warwick & Salkovskis' (1989, 1990) cognitive-behavioural model of health anxiety has led to a substantial body of research that aimed to test some of its predictions. The majority of research studies fall into two categories; firstly, those that have explored the existence of "perceptual and attentional bias" and secondly, those that have explored the existence of "reasoning bias". The first area of research investigates the prediction made by the model that health-related stimuli are perceived and attended to more readily in health-anxious individuals than in non health-anxious individuals. The second area of research explores the prediction made by the model that various health-related dysfunctional assumptions, acquired early in life, lead to the misinterpretation of health-related information. In addition to these main areas, however, some research has been carried out which explores the ability of stimuli to trigger health anxiety.

Perceptual and attentional biases

Perceptual biases consist of a tendency for health-related cues to be readily perceived, whereas attentional biases concern the allocation of attention toward or away from bodily cues. Although perception and attention are viewed as discrete cognitive

processes within an information-processing approach (Sanders, 1990), the research into health anxiety often considers both simultaneously. Perception and attention have mainly been explored in terms of the processing of internal physiological sensation (e.g., Barsky, Brener, Coeytaux & Cleary, 1995). However, some research (Brown, Kosslyn, Delamater, Fama & Barsky, 1999) has explored the perception of external health-related stimuli, which will be discussed later.

Internal cues

In terms of internal bodily sensations, the model predicts that these will be more readily perceived by health-anxious individuals, both as a result of bodily scanning and heightened bodily attention (Warwick & Salkovkis, 1989, 1990). There is some evidence to suggest that internal sensations are readily perceived in this group, a phenomenon which has been labelled "somatosensory amplification" (Barsky & Wyshak, 1990). This amplification of bodily sensation is thought to result in an enhanced perception of sensation, rather than a process of "simply imagining aches and pains" (Hanback & Revelle, 1978). Some studies have found that patients who are high in levels of hypochondriasis, tend to report a more intense pain experience in both naturally-occurring (Ziesat, 1978) and experimentally-induced (Merskey & Evans, 1975) pain.

Gramling, Clawson and McDonald (1996) investigated the perception of physiological sensations in hypochondriasis by administering a "cold pressor task", in which participants immersed their feet in cold water for varying lengths of time. They found that the hypochondriacal group reported higher levels of pain and removed their

feet from the water after shorter periods of time. However, this study also found that the heart rate of the hypochondriacal group was significantly higher than that of the control group throughout. These results are therefore difficult to interpret in terms of heightened perception of sensations per se, as actual physiological changes were observed.

In an analogue study investigating possible mechanisms behind somatic amplification, Schmidt, Wolfs-Takens, Oosterlan and Van den Hout (1994) explored the effects of attention and expectation of naturally-occurring internal sensations. Instructions were given via audiotape to healthy students wherein they either attended to, or expected various internal sensations (or they were allocated to a control condition). Symptom-reporting was found to be higher in both the attention and expectation condition than it was in the control condition. Schmidt et al. (1994) concluded that expectation of bodily sensations may increase their perception via attention. Attention may therefore be the central mediating factor, as proposed by the Warwick and Salkovskis (1989, 1990) model. However, it is uncertain whether the participants did in fact 'expect' a naturally occurring sensation, based upon instructions given by the experimenters. Also, the study utilised healthy participants only, and it is unclear to what extent these findings may generalise to those who are anxious about their health. Finally, Schmidt et al. (1994) highlight the difficulties of using a symptom-report measure to tap into symptom perception.

Some work has explored the role of attention and its effect upon perceived internal sensations in hypochondriasis. Papergeorgiou and Wells (1998) utilised an A-B-A design in the intervention program of three patients with hypochondriasis. The

treatment phase consisted of the application of "Attention Training" (ATT; Wells, 1990), in which patients were instructed to participate in "regular practice of external auditory attention", including selective attention, attention switching and divided attention exercises. The authors reported clinically significant improvements in affective, cognitive and behavioural measures of hypochondriasis following treatment. Papergeorgiou and Wells (1998) argued that ATT acted as a means of interrupting perseverative cognitive processing, for example by directing attention away from, rather than toward internal bodily sensations. They also argued that processing strategies involving the allocation of attention are a key part in the maintenance of hypochondriasis, in line with the Warwick and Salkovskis (1989, 1990) model. However, like the previous study, it is unclear to what extent participants were actually engaging in these different attentional tasks.

Barsky, Bailey, Fama and Ahern (2000) explored perceptual/attentional and misinterpretation aspects of the cognitive-behavioural model of hypochondriasis in terms of endurance of the condition. They were interested in whether these components of the model had greater predictive value, together or alone, in the long-term outcome of patients with hypochondriasis. Measures were taken of the tendency to perceive internal bodily sensation and the tendency to misinterpret normal symptoms as being indicative of disease. These measures were administered initially to patients attending a primary care clinic who met criteria for hypochondriasis. Four years later, the patients were re-contacted and asked to repeat the questionnaire measures. Barsky et al. (2000) found that both perceptual/attentional factors and misattributional tendencies together predicted the chronicity of hypochondriasis better

than did misattributional factors alone, predicting 22 out of 25 patients who remained hypochondriacal. They conclude that both aspects of the model are of equal importance in the maintenance of health anxiety. However, they do not appear to comment upon the predictive value of perceptual/attentional factors alone. More importantly, the study failed to control for, or collect information upon, treatment received between the two time intervals.

Although studies have reported an enhanced perceptual awareness of health-related information in hypochondriacs, several studies report no such finding. For example, Barsky et al. (1995) asked hypochondriacal and non-hypochondriacal participants to estimate the frequency of their heart rate in order to explore bodily perceptual awareness. They presented participants with a series of auditory tones that varied in terms of the time duration between each tone. Participants were required to select the tone series that was thought to match their own heart rate. Barsky et al. (1995) found that, although hypochondriacal participants considered themselves to be sensitive to bodily sensations, there was no actual difference between the accuracy of perception in the two groups. However, participants in this study were required to make judgements both upon the time intervals of external stimuli (tones) and internal cues (heart rate). In requiring participants to *match* the timings of two separate cues, it clearly involved abilities over and above simple perception of heart rate.

Similarly, Haenen, Schmidt, Schoenmakers and van den Hout (1997) explored the ability of hypochondriacal and control participants to make tactile discrimination judgements. Participants were asked to say whether they had felt one or two points of stimulation, when two compass points were applied to their forearm at varying

proximities. Like the findings of Barsky et al. (1995), these researchers found that although hypochondriacal participants believed themselves to be more sensitive to sensations, they did not perceive sensations more accurately than non-hypochondriacal controls. In fact, Steptoe and Noll (1997) reported that participants with hypochondriacal concerns were less accurate in their perception of somatic sensation (sweat gland activity), than were controls. These authors did not attempt to explain their finding, other than expressing a limitation of the measures employed in their study.

Other authors also report no differences in the perceptual awareness of bodily sensations in hypochondriacal individuals. For example, Lautenbacher, Pauli, Zaudig and Birbaumer (1998) investigated the ability of non-clinical participants, high or low in health anxiety, to monitor their pain intensity levels during relaxation periods and a "heat pain task". The heat task involved their dominant hand being placed upon a temperature-controlled plate whilst engaging in a "no distraction" condition or a "distraction" condition, in which participants carried out a simple arithmetic task. The results demonstrated an overall reduction in pain intensity when attention was shifted away from the "heat pain task", however there were no differences in pain perception or abilities to reduce pain by switching attention between the two groups.

Some studies have explored the *nature* of attention toward internal bodily sensations in hypochondriasis. For example, Hadjistavropoulos, Craig and Hadjistavropoulos (1998) explored the type of the attentional focus on the body, the time course of the focus, and its effects on health anxiety. Participants who scored high or low in health anxiety, were asked to take part in a task where a cold pressor

was applied in order to elicit pain. Information was gathered about the type of strategies individuals used to cope with their pain. This appeared to consist of an avoidant style, a style of positive, objective monitoring ('positive concrete monitoring') or a style of negative attention ('negative somatic monitoring'). It was found that health-anxious individuals tended to report a higher frequency of 'negative somatic monitoring' than did non health-anxious individuals. The health-anxious group did not appear to use higher levels of cognitive avoidance than the non health-anxious group, but they did use 'positive concrete monitoring' to a lesser degree. The authors argued that this finding was not inconsistent with the Warwick and Salkovskis (1989, 1990) model, but suggested an extension of the model by detailing possible functions of bodily monitoring, and differentiating between positive and negative monitoring styles. Hadjistavropoulos et al. (1998) argued that a negative monitoring style may have functioned to reduce anxiety in the short-term in health anxiety. However, they stated that such a style may have resulted in an immediate, but temporary, decrease in anxiety, similar to that achieved by reassurance-seeking (Salkovskis & Warwick, 1986).

Hadjistavropoulos, Hadjistavropoulos and Quine (2000) found a similar effect in an investigation of the cognitive strategies utilised by a group of chronic pain patients. These patients were interviewed after a physiotherapy session in which they attended to physical sensations, distracted from sensations or did the session as usual. Hadjistavropoulos et al. (2000) found that among the health-anxious patients, attention to sensations resulted in lower pain and anxiety than did distraction. Therefore, internally-focused attention in the health-anxious group was functional in the sense

that it reduced sensation (and anxiety), at least in the short-term. It is unclear however, as to what effects such attentional strategies may have had in the long term. In fact, information about the potential function and time-course of attentional focus is not detailed fully in the Warwick and Salkovskis (1989, 1990) model. However, the nature of attentional factors in anxiety and how these may operate in health anxiety will be considered more fully later on.

External cues

The Warwick and Salkovskis (1989, 1990) model also predicts heightened perception of, and attention towards, external health-related information and asserts that such awareness serves to trigger and maintain health concerns. Brown et al. (1999) carried out an experiment that has focused more upon the visual perception (and memory) of external health-related information, rather than internal bodily sensation. They argued that although previous studies (e.g., Barsky, Wyshak & Klerman, 1990) have found evidence for selective attention and amplification of physical sensations, there has been a lack of exploration as to whether hypochondriacal individuals generally "see the world through a health-related lens". Brown et al. (1999) presented both health-related and neutral words to hypochondriacal and control participants. The stimuli were either intact or perceptually degraded, with the participants' task being to read the words aloud. Results showed that the hypochondriacal group perceived more degraded non-health words than health words, whereas the control group showed the opposite pattern. The authors refer to the idea of "perceptual defense" whereby an "unconscious shielding mechanism" defends against material which is seen to be

threatening (McGinnies, 1949). However, Brown et al. (1999) also reported that the bias against reporting the health-related words was related to social class, and groups were unevenly matched on this variable. This finding is therefore unclear in terms of the mechanisms that may be involved in hypochondriasis.

Summary

Support for the "hypervigilance" component of the Warwick and Salkovskis (1989, 1990) model is therefore mixed, with some studies reporting a perceptual hypersensitivity toward internal bodily sensation (e.g., Merskey & Evans, 1975), and many others reporting no such finding. Research exploring the perception of external health-related stimuli (Brown et al., 1999) has found no evidence of perceptual bias toward health-threat stimuli. There would, however, appear to be some evidence of a particular pattern of attentional focus to internal bodily sensation in health anxiety (Hadjistavropoulos et al., 1998), with no studies exploring attention toward external health-related stimuli. Evidence for the existence of reasoning biases in health anxiety will now be explored.

Reasoning biases

Research into reasoning biases in hypochondriasis aims at testing the dysfunctional assumption level of cognition proposed by the cognitive-behavioural model (Warwick & Salkovskis, 1989, 1990). For example, de Jong, Haenen, Schmidt and Mayer (1998), investigated whether hypochondriacal patients were likely to selectively seek out danger-confirming information when they were asked to judge the accuracy of

conditional rules. These rules consisted of both health and general "danger rules" as well as health and general "safety rules". An example of a health danger rule was: "If I feel a lump, then I will have cancer". Participants were required to ask the experimenter questions in order to either confirm or disconfirm the rule. When participants sought evidence aimed at proving the rule e.g., "If I feel a lump, does this *always* mean cancer", this was viewed as a confirmation strategy. However, when participants sought evidence aimed at disproving the rule e.g., "Can I feel a lump, without having cancer?", this was viewed as a disconfirmation strategy. There were no differences found in the strategy adopted by the hypochondriacal group and that adopted by the controls. All participants selected disconfirmatory evidence in the context of a "safety rule" and confirmatory evidence in the context of a "danger rule". There were also no differences found between the strategies adopted between either of the groups and the content of the rule, whether health or general. The authors conclude that this study found no evidence for the existence of a danger-confirming reasoning strategy in hypochondriasis.

Smeets, de Jong and Mayer (2000) replicated the above study, using similar materials and procedure. However, Smeets et al. (2000) omitted a statement in their study, that they believed may have heightened the worry element of all participants. Again, there was a greater overall use of confirmation strategies with danger rules and disconfirmation strategies with safety rules. More importantly, it was found that whereas control participants used the confirmation strategy only in the case of general threats, hypochondriacal patients used the confirmation strategy in the case of both general and health-related threats. The authors therefore concluded that a threat-

confirming reasoning bias operates for health information in hypochondriacal participants, which is domain-specific and not apparent in controls. However, these authors did not appear to address the fact that this bias also occurs for general threat in the hypochondriacal group, nor did they report measures of general anxiety between the experimental groups.

It is important to assess whether reasoning biases in hypochondriacal individuals are general in nature or restricted to the area of health threat, and this has been addressed by Haenen, de Jong, Schmidt, Stevens and Visser (2000). These authors explored the relative frequency with which hypochondriacal patients report estimates of negative outcomes when judging threatening situations in health-related and general domains. As well as presenting such threat material, alarming and reassuring statements were provided. Haenen et al. (2000) found that hypochondriacal patients produced higher estimates of negative outcomes than controls, only for health-related threats. There were no differences between the groups in terms of their responses to alarming and reassuring information, with estimations of likelihood increasing in the case of alarming information and decreasing in the case of reassuring information. The results of this study therefore support the predictions of Warwick and Salkovskis' (1989, 1990) model of health anxiety that bodily sensations and symptoms are *misinterpreted* as being signs of serious disease. However, interestingly, the study found evidence of hypochondriacal individuals reducing their estimation of likelihood of serious illness after reading reassuring information, in line with that of controls. Warwick and Salkovskis (1989, 1990) argue that medical reassurance-seeking tends to maintain health anxiety. However, this may still be the case, as

Haenen et al. (2000) state that the effects of such reassuring information may be short-lived and time-delay was not explored in their study.

Finally, other authors have explored general concepts of "good health" which, in terms of the cognitive-behavioural model of health anxiety (Warwick & Salkovskis, 1989, 1990), are also likely to exist at the dysfunctional assumption/schema level. Barsky, Coeytaux, Sarnie and Cleary (1993) asked both hypochondriacal and non-hypochondriacal patients to make judgements about whether they would consider another person to be "healthy" or "not healthy" on the basis of them experiencing a progressively greater number of physical symptoms. Barsky et al. (1993) found that the hypochondriacal group rated others as "no longer healthy" on the basis of fewer symptoms than did the non-hypochondriacal group. They suggest that hypochondriacal individuals may possess a rather idealistic view of good health as a "symptom-free state".

Summary

In summary, there is mixed evidence of reasoning biases in hypochondriasis, however cross-sectional studies cannot, of course, make clear the causal direction. It is these early-developed health-related beliefs and assumptions that Warwick and Salkovskis (1989, 1990) argue may predispose an individual to hypochondriasis. Another aspect of the model that has been explored concerns the type of information thought to trigger health anxiety, which will be discussed next.

Triggers

Marcus (1999) explored the ability of verbal (written) material to trigger anxiety, by presenting sentences to individuals who scored high or low in health anxiety. These sentences were scrambled and contained ambiguous information representing both illness and neutral topics (e.g., "Cancer was Pisces he a"), or unambiguous, neutral information (e.g., "Capricorn was Pisces he a"). Participants were required to select four words to sort the sentences so that they made sense, and then completed anxiety questionnaires immediately afterwards. Marcus (1999) found that whereas the low health-anxious group had higher levels of general anxiety in the illness condition than the neutral condition, the high health-anxious group's anxiety did not differ between the tasks. Marcus (1999) suggested that health-anxious individuals' illness concerns may be chronically activated, unlike non health-anxious individuals, who under these conditions showed an "experimentally induced hypochondriasis" (Pauli, Schwenzer, Brody, Rau & Birbaumer, 1993). This study raises questions with regard to the potential triggers thought to precipitate health anxiety, as suggested by Warwick and Salkovskis (1989, 1990). In particular, it is unclear to what extent written material (as opposed to pictorial) may act as a cue for health anxiety.

Summary

Some studies described provide evidence for the perceptual/attentional biases and reasoning biases described by the Warwick and Salkovskis (1989, 1990) model. However, many studies do not find clear evidence in support of this model. The

studies also highlight some elements of the model which are less clear, and it is these unresolved issues that will be focused upon next.

Unresolved Issues

Firstly, there are questions about the nature of the cognitions and threat material involved in health anxiety, and to what extent these are verbal or imagery-based. Although internally-represented imagery is thought to be a key part of anxiety disorders (Beck, Emery & Greenberg, 1985), little is known about its role in health anxiety. Warwick and Salkovskis (1989, 1990) acknowledge that the extent to which health anxiety is developed, maintained and triggered by verbal or pictorial information is unclear. One suggestion is that internally-generated images may increase the accessibility of cognitions involved in hypochondriasis. Alternatively, externally-presented health-threat imagery may play a more direct role as a trigger in the onset of health anxiety, and it is unclear whether such a trigger is more or less potent than verbal material in the onset of health anxiety.

Secondly, there are unresolved issues about the presence of attentional bias in health anxiety. Attentional bias in anxiety disorders describes a process of selective attention toward stimuli that have been negatively evaluated (Pratto & John, 1991). Threatening stimuli have been found to capture attention in a range of anxiety disorders. This has been demonstrated in general anxiety (e.g., Mathews & MacLeod, 1985), panic disorder (e.g., Ehlers, Margraf, Davies & Roth, 1988), post-traumatic stress disorder (e.g., McNally, Kaspi, Riemann & Zietlin, 1990), social phobia (e.g., Hope, Rapee, Heimberg & Dombeck, 1990) and obsessive-compulsive disorder (e.g.,

Foa, Ilai, McCarthy, Shoyer & Murdock, 1993). Warwick and Salkovskis' (1989, 1990) model of health anxiety predicts that health-threatening stimuli (both internal and external) are selectively attended to, however most studies exploring this aspect have examined attention toward internal, physiological rather than external cues.

These two issues will now be addressed separately by focusing firstly, on the possible existence, and role, of images in health anxiety and secondly, on attentional biases in anxiety disorders in general.

Themes and Images in Health Anxiety

There has been some initial exploration of the occurrence and potential role of images in health anxiety. Wells and Hackmann (1993) recorded instances of images being reported in their routine clinical work with health-anxious patients. These patient reports were spontaneous and the authors used them to attempt to elicit underlying themes or beliefs thought to predispose toward health anxiety. Wells and Hackmann (1993) used semi-structured interviewing, once an image had been alluded to, and found that the images described by patients did appear to contain "additional layers of meaning" compared to the automatic thoughts. There were two types of belief that arose from the images, one regarding the self, and the other regarding the nature of illness and death. General themes arose across the images that were metaphysical in content and often involved punishment and abandonment by a higher power that went beyond death. The themes also appeared to be associated with earlier childhood experience, which may suggest a role in the development of health anxiety, as Warwick and Salkovskis (1989, 1990) argued. In encapsulating both the meaning of

the fear, and where it may have come from, Wells and Hackmann (1993) argued that images are a valuable source of information in clinical work. It would appear, therefore, that images are involved in health anxiety, and possibly play a role in its development, with their close links to core beliefs and the meaning of the health-related fear (Wells & Hackmann, 1993).

However, images may also play a role in triggering health anxiety. Craske and Herrmann (1993) explored the extent to which written, spoken and pictorial health-related cues triggered internal imagery and anxiety in hypochondriasis. Information about a skin disease and a rare disease was presented in one of these three modalities to health-anxious and non health-anxious participants. The overall vividness of imagery did not differ between the two groups of participants, but the audiotaped cue led to more vivid imagery than the other cues. In terms of anxiety provoked, Craske and Hermann (1993) found that the health-anxious group had higher levels of anxiety triggered by the cues than the non health-anxious group. More interestingly, whereas the non health-anxious group were equally anxious following the presentation of all three cue types, anxiety in the health-anxious group was significantly higher following the picture than it was following the script. So, although the health-anxious individuals were not reporting internal imagery that was more vivid than controls, externally presented images did elicit higher levels of anxiety in this group. Although heart rate was measured, no differences were found. However, one shortcoming of this study concerns the content of the disease-information presented which was somewhat limited in terms of being either a skin disease or a rare disease. Various authors (e.g., Kenyon, 1964; Wells & Hackmann, 1993) have emphasised the idiosyncratic element

of hypochondriasis. For example, individuals may only tend to fear certain diseases and not others.

It is unclear as to why images of health-related threats may elicit higher levels of anxiety in health-anxious people than verbally-presented information. However, one possibility concerns the psychophysiological arousal that takes place whilst forming images. Brownlee, Leventhal and Balaban (1992) explored psychophysiological factors in hypochondriacal and control participants who were presented auditory and visual scenes. The participants were asked to form internal images of the scene or just be exposed to them. The scenes were presented either via video or via a tape recorder and were either neutral (pleasant, relaxing), illness-related (intubation, incision) or exercise-related (bike). Whereas there were no between-group differences in the visually-presented scenes, there were differences in the auditory-presented scenes. For the auditory scenes, generating an internal image of a scene reduced heart rate (compared to just listening to it), for the control participants for all scenes, and the hypochondriacal for the neutral scene. However, hypochondriacal participants' heart rates were elevated higher when they generated an internal image of an illness scene, (as opposed to just listening to it). Brownlee et al. (1992) argue that the internal imagery component of health anxiety is reflected cardiovascularly and that this enhanced physiological arousal helps to maintain anxiety about health.

These studies therefore found evidence for the involvement of both externally-presented images and internally-generated images in health anxiety. Brownlee et al. (1992) found an elevated physiological response to internally-generated illness images in hypochondriacal patients. In contrast, Craske and Herrmann (1993) did not report

an elevated physiological response to externally-presented health threat images in health-anxious participants. However, Craske and Hermann (1993) did find that health-anxious participants rated their anxiety as higher than did controls following the presentation of externally-generated illness images. Therefore, imagery may play a role in health anxiety, although the nature of its involvement is at present unclear.

Summary

Apart from the nature of threat material in health anxiety, the other unresolved issue from Warwick and Salkovskis' (1989, 1990) model concerned attentional bias towards external health-related information. Although there has been much documented evidence of biases occurring across a range of anxiety disorders, to the author's knowledge, there are no published studies reporting this type of attentional bias in health anxiety. Attentional bias in anxiety disorders will be discussed next.

Attentional Bias

Evidence of attentional bias for threat in anxiety

Attentional bias describes the tendency to direct attentive processing toward emotional stimuli (Kitayama & Howard, 1994). This process may occur towards either positively, or negatively evaluated stimuli, although it is unclear to what extent each of these stimulus-types may capture attention (e.g., Fazio, Roskos-Ewoldsen & Powell, 1994). These attentional shifts may occur at pre-conscious levels of awareness, and there are likely to be evolutionary reasons for their occurrence (Mogg & Bradley, 1998). For example, the early processing of environmental threat may be necessary for

the survival of the organism when faced with real danger. In anxiety disorders, however, the anxiety level of the individual may cause mildly unpleasant stimuli to be evaluated as threatening, and oriented towards. Such stimuli may be specific to the disorder in question. For example, Foa et al. (1993) found an attentional bias toward contamination words by a sub-group of obsessional-compulsive disordered patients whose compulsion was that of washing. Also, Hope et al. (1990) reported an attentional bias toward social threat words by social phobics. It has been proposed (e.g., Mathews, 1990) that, not only do generally anxious individuals tend to shift their attention towards threatening information, but this attentional focus also functions to maintain general anxiety. This happens as a result of the heightened awareness of potentially dangerous stimuli in the environment.

Attentional bias towards pictorial and linguistic stimuli

It is likely that the initial orientation response that occurs toward threatening word stimuli, also occurs when threatening picture stimuli are presented. In fact, picture stimuli may in some cases be more capable of eliciting this response. For example, Ohman (1993) argued that systems designed to orient towards threat are especially sensitive to some stimuli e.g., angry faces, as these would have survival implications from early in life. Studies that have investigated attentional bias for pictorial stimuli, have largely utilised emotional faces or threat scenes. For example, Bradley, Mogg, White, Groom and de Bono (1999) presented threatening, happy and neutral faces to patients with general anxiety disorder, and controls. They found greater vigilance toward threatening faces than neutral faces in anxious patients relative to control

participants. Similar findings have been reported in the case of pictures of scenes (e.g., Mogg, McNamara, Powys, Rawlinson, Seiffer & Bradley, 2000). Here, participants have been found to show greater vigilance for high-threat than mild-threat scenes, with this being true both for participants (non-clinical) who scored high in trait anxiety, and for those who scored low in trait anxiety.

Therefore, it would appear that orientation towards threatening picture does occur in anxious individuals (e.g., Bradley et al., 1999). Some studies have utilised both picture and word stimuli in order to compare the relative effects of each upon attentional bias. Lavy and van den Hout (1993) used both word and picture stimuli in a combined pictorial/linguistic Stroop task (Stroop, 1935) with spider-phobic participants, who were in treatment. This task consisted of words presented in various colours, and pictures surrounded by coloured circles. Participants were required to name the colour associated with the stimulus, when each stimulus was presented. Slow colour-naming was thought to indicate semantic intereference from the stimulus, and therefore suggested that attentional bias was occurring toward the stimulus. Lavy and van den Hout (1993) measured attentional bias toward stimuli before and after treatment. Although the spider-phobic participants showed an attentional bias toward spider-related stimuli which reduced following treatment, this bias was greater for linguistic as opposed to pictorial stimuli. These authors argued that threatening pictures have more 'reality constraints' than threatening words. So whereas, the picture of a spider is limited in the number of feared associations it can elicit, the word 'spider' may elicit widespread associations, regarding for example its size, colour, dangerousness, speed etc. However, this study utilised pictures that were *surrounded*

by colour circles, and words that were *comprised* of coloured letters. The stimulus conditions were therefore not well matched in this study.

Kindt and Brosschot (1997) also explored attentional bias toward words and pictures in spider phobia. They attempted to overcome the difficulty of poorly matched stimuli in the study of Lavy and van den Hout (1993), by using both integrated and non-integrated versions of pictures and words. Integration involved stimuli *being* coloured and non-integration involved stimuli being *surrounded* by colour. Although spider phobics showed a greater bias toward spider-related stimuli than controls, there was no difference in the extent of bias toward picture and word stimuli. The integrated stimuli produced greater bias than the non-integrated stimuli, but this was true for both participant groups. It would appear, therefore, that attentional bias in anxiety disorders, can occur in the context of both verbal and pictorial stimuli. The extent to which verbal and pictorial stimuli are perceived as threatening, or evoke a vigilant style of responding in anxious individuals is unclear.

Summary

Attentional biases have been found in a range of anxiety disorders for both word and pictorial stimuli. Several cognitive theories of anxiety have been proposed which explain the occurrence of attentional bias. These theories will now be reviewed, as they provide a general framework, which alongside Warwick and Salkovskis' (1989, 1990) model, would also predict the occurrence of attentional bias in health anxiety.

Cognitive Models of Anxiety

Beck's (Beck et al., 1979, 1985) Theory

Beck's cognitive theory of emotional disorders began predominantly with work on cognition in depression (Beck et al., 1979) and anxiety (Beck et al., 1985). Beck (Beck et al., 1979, 1985) suggested that people's experiences help to shape the cognitive structures they possess, and that these cognitive structures then influence the way they perceive and interpret events. As these structures are related to personal experiences, they are often distorted due to the limited viewpoint that each individual has. Beck (Beck et al., 1979, 1985) termed these structures 'schemata', and suggested that specific schemata are responsible for the development of anxiety and depression separately. These schemata consist of global cognitions about the self, world or future. The theory explains the tendency for anxious individuals to attend to threatening information in the environment, in terms of the schema acting as a filter on information processing. In this sense, an anxious person will selectively perceive, attend to and remember danger-relevant information. However, Beck (Beck et al., 1979, 1985) did not distinguish between different aspects of cognition, suggesting instead that biases operate throughout cognitive processes, including attention and memory. Although there has been much documented evidence of attentional biases in anxiety disorders (e.g., Mathews & MacLeod, 1985), several studies have failed to find evidence of attentional biases in depression (e.g., MacLeod, Mathews & Tata, 1986).

Bower's (1981, 1987) Theory

Bower's (1981, 1987) theory proposes that there are associative networks utilised in memory, in which events are represented as configurations. These configurations consist of novel pathways between various individual concepts or nodes, which describe events. In order for retrieval to occur, cues are needed to probe various parts of this pathway, until access at one point occurs, which can trigger the identification of the entire pathway through spreading activation. The central part of this theory is that emotions are represented as specific nodes within these associative networks in memory. When an emotion node is activated, the accessibility of associated nodes is increased. As a result, a processing bias occurs, in which information that is congruent with emotional state is favoured. Bower's (1981, 1987) theory is therefore able to account for attentional biases. For example, if anxiety levels are high in an individual, then threat information stored in memory is more likely to be activated.

Williams et al.'s (1988, 1997) Model

In contrast to the theories described above, Williams, Watts, MacLeod and Mathews (1988, 1997) propose a model of processing biases in anxiety and depression that differentiates between different aspects of cognition. They argue that a number of processes occur before information reaches the conscious level. One of these stages comprises the activation of all the meanings of a stimulus and the context in which it occurs, so that the emotional significance of the stimulus can be decided. The emotional meaning of the stimulus can therefore be decided at the pre-conscious stage, which results in either an orientation towards or away from the stimulus. In people

with high trait anxiety, there will be an orientation towards those stimuli that are perceived to be threatening at the preconscious level. However, Williams et al. (1988, 1997) also proposed that people with low trait anxiety, show the opposite pattern, with a tendency to orient attention away from threat, or in other words to be avoidant of threat. Although this theory differentiates between different levels of cognitive processing in terms of preconscious and conscious processes, there are some problems here too. The theory suggests that attentional bias to threat results from a direct interaction between trait anxiety and threat input. However, this interaction fails to make sense when the threat of the incoming stimulus is increased to become severe. Whereas Williams et al.'s (1988, 97) theory would predict increased avoidance by individuals who have low trait anxiety, when the threat becomes more severe, there is some evidence to suggest that increased vigilance occurs in these cases (Mogg et al., 2000).

Mogg and Bradley's (1998) Model

Mogg and Bradley (1998) argue that the above theory fails to make intuitive sense from an evolutionary perspective. They state the importance of a threat detection system, which identifies severe threats for all individuals, whether low or high in trait anxiety. Mogg and Bradley (1998) thus argue that the attentional biases toward threat-related information are not unitary in nature, but take place in the context of a two-dimensional framework. The two systems that are involved in the allocation of attention toward a stimulus are those of 'valence evaluation' and 'goal engagement'. The valence evaluation system is responsible for the fast and automatic appraisal of a

stimulus in terms of its emotional threat value. This system utilises information about the stimulus, the context in which it occurs, current levels of arousal and past learning experiences. The system is therefore influenced by both trait and state variables, including the severity of stimulus threat. The goal engagement system, on the other hand, is responsible for allocating processing resources to tasks. This system ensures that, if a stimulus is perceived to be high in threat value, any current tasks are interrupted and attentional resources are directed toward the threat. However, if a stimulus is perceived to be low in threat value, then resources can be maintained upon ongoing tasks, and the stimulus ignored.

Mogg and Bradley's (1998) model is thought to underly both pre-attentional and attentional biases, involving multiple levels of processing. The model has several advantages. Firstly, it emphasises the distinction between processes that appraise threat value of a stimulus and those that control goal-oriented processes. Secondly, unlike previous models, it can account for the absence of pre-attentional biases in individuals who have high levels of anxiety and depression (e.g., MacLeod et al., 1986), as depression may result in an impoverished ability to engage processing resources with external goals. Thirdly, it can account for differences in resource allocation for stimuli occurring at different durations. Mogg and Bradley (1998) argue that a 'vigilance-avoidance' pattern occurs, whereby automatic processes allocate attention towards threatening stimuli at short exposure durations. This can then lead to subsequent avoidant goal-oriented action, whereby attentional resources may then be directed away from threat at longer stimulus exposure durations. This latter effect

may occur as a result of a strategy to reduce the anxiety-provoking effects of the threat stimulus.

Some studies, however, have failed to find the existence of a 'vigilance-avoidance' pattern of attentional bias in high trait anxious individuals. For example, Mogg, Bradley, de Bono and Painter (1997) carried out a study that explored the time course of attentional bias to threat-related words in non-clinical participants at three varying exposure times. They found that although higher levels of state anxiety (but not trait anxiety) were associated with a greater attentional bias for threat stimuli, there was no evidence of avoidance at the longer stimulus durations in this study. Likewise, Bradley, Mogg, Falla and Hamilton (1998) presented threatening facial stimuli to high and low trait anxious individuals at two different exposure durations. Although attentional bias toward threatening faces was found in the high trait anxious group, again there was no evidence for avoidance following initial orientation to the stimulus.

Summary

The models of cognition described above have been proposed in order to account for cognitive processing across emotional disorders in general. In conceptualising hypochondriasis as a type of anxiety (Salkovskis, 1989), it would be anticipated that attentional bias toward threat-related environmental material would also occur in this disorder. The direction that future research might take will be discussed next.

Future Research Direction

There are several questions that arise from this review in terms of current understanding of health anxiety. Firstly, although studies have explored whether there is a heightened perception of (and attention to) internal physiological sensations in health anxiety, few have explored responding toward externally presented health-related information. Studies that have explored the perception of externally-presented health-related information (e.g., Brown et al., 1999) and the ability of such information to trigger health anxiety (Marcus, 1999) have reported unexpected findings. These studies reported a perceptual *insensitivity* toward such information in health anxiety (Brown et al., 1999), and an inability of such information to *trigger* anxiety (Marcus, 1999). It is unclear as to whether there is an attentional bias toward externally-presented threatening information, as has been reported in other anxiety disorders (e.g., Mathews & MacLeod, 1985).

The results of Brown et al. (1999) and Marcus (1999) are somewhat surprising in light of Warwick and Salkovkis' (1989, 1990) predictions that external health-threat cues trigger anxiety and are oriented toward. However, there is a key consideration to take into account, entailing the importance of time factors in health anxiety. Although hypochondriasis has been more recently conceptualised as an *anxiety* about health by the cognitive-behavioural viewpoint, it may consist broadly of two dimensions. These include a short-term anxiety about immediate or arousal-reactive symptoms, as well as long-term anxiety about the potential of future illness based upon arousal-nonreactive symptoms (Stewart & Watt, 2000). The relative immediacy of the threat may well have an effect upon responding towards such threat, especially in the light of recent

cognitive models of anxiety, such as that of Mogg and Bradley (1998). This model argues that time factors are paramount in cognitive responding towards threatening information. Whereas people may have their attention initially captured by threat (vigilance), they may then attempt to prevent maintaining attention upon the threat (avoidance). So, apart from it being unclear as to whether attentional bias exists in health anxiety, it is also unclear as to how this may operate over time. Future research might therefore investigate whether health-threats are initially orientated toward, and if so, whether attention is then maintained upon them or whether avoidance occurs. Also, it may be beneficial to explore whether arousal-reactive concerns (e.g., of fear of fainting) result in more or less vigilance than arousal-nonreactive concerns (e.g., fear of developing cancer).

Secondly, questions arise concerning whether there are differences between linguistic and pictorial health-threats, in terms of the anxiety they provoke. There is some evidence to suggest that images play a role in health anxiety, and may encapsulate information based at the core-belief level (e.g., Wells & Hackmann, 1993), and may trigger more anxiety than written information (Craske & Hermann, 1993). Also, imagery, specifically when internally-generated, has been found to result in increased physiological arousal (Brownlee et al., 1992), which may be particularly threatening to those anxious about their health. Such evidence suggests that health-related pictures may be especially anxiety-provoking to health-anxious individuals. However, one study of attentional bias in phobic disorders has reported greater levels of bias toward words as opposed to pictures (e.g., Lavy & van den Hout, 1993). Therefore, the final question concerns the nature of threat stimuli in health anxiety. In

other words, future research could explore whether pictures of health-threats produce increased or decreased attentional bias in health-anxious people, in comparison with health-threat words.

Clinical Implications

There are a number of clinical implications arising from the questions raised above. Evidence of attentional bias in health anxiety for externally-presented health-threatening information could guide treatment in terms of exposure to such information. In terms of any initial *vigilance*, Warwick and Salkovskis (1989, 1990) argued that selective attention toward health-related information helps to maintain the disorder. Therefore, treatment might aim to reduce short-term focus upon external, as well as internal, health stimuli. In terms of any subsequent *avoidance* of health-related information, there may be some benefit in the use of exposure-based programs, similar to those used in phobic treatment. Any differences found between attentional bias in individuals who are more anxious about arousal-reactive symptoms as opposed to those who are more anxious about arousal-nonreactive symptoms would be of value too. Arousal-reactive symptoms sensations would involve the autonomic nervous system and be associated with immediate danger. Arousal-nonreactive symptoms do not involve the nervous system and are associated with future danger. If, for example, attentional bias occurs in the case of one of these types of worry, in the absence of the other, then treatment may be more effective if immediate and future health-threats in health anxiety are differentiated between.

Finally, standard cognitive-behavioural treatment programs for hypochondriasis tend to be largely verbally rather than imagery-based. However, images may also play a role in triggering health anxiety, and information about this would be of clinical value. This may be especially true in the case of vigilance toward threatening information, which may occur at early stages of processing, prior to the information entering awareness (Mogg & Bradley, 1998). Imagery representations are thought to be more closely linked with pre-conscious sensory information than are verbal representations (Borkovec & Inz, 1990). So, it is possible, that work with images may alter information represented at pre-conscious levels more directly than verbal work. Therefore, there may be value in imagery-based treatments in health anxiety, should evidence of lower level processing biases be found.

Conclusions

This review explored the literature on health anxiety and the possibility that the disorder comprises fears of a long- and short-term nature, in contrast to the short-term fears of panic disorder. The review discussed some models of health anxiety, focusing primarily upon Warwick and Salkovskis' (1989, 1990) model. In particular, the predictions that this made in terms of the selective processing of health-related information were discussed. It was highlighted that, although there is some evidence to support this model, there are some unresolved issues. One of these concerned the nature of the material selectively attended to, and whether this was predominantly internal (physiological) or external. Another issue was whether words or pictures related to health were likely to trigger anxiety, in equal or varying degrees. In fact, the

likely role of images in health anxiety may suggest a particular propensity of pictures to trigger anxiety. It was highlighted that although attentional bias has been found in a number of anxiety disorders, to the author's knowledge, attentional bias for external-threat stimuli has not been reported in health anxiety. Finally, potential clinical implications of this area were discussed in terms of the specific information that might be gained from research.

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Attentional bias for health-threatening stimuli in health anxiety: The role of linguistic and pictorial information

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Attentional bias for health-threatening stimuli in health anxiety: The role of linguistic and pictorial information

Abstract

This study investigated attentional biases for pictorial and linguistic stimuli in high health-anxious and low health-anxious individuals. A forced-choice reaction time version of the visual probe task was used to present both health-threat and neutral stimuli to participants at two exposure durations, 500msec and 1250 msec. Results showed that there was attentional bias toward pictorial health-threat stimuli at the shorter duration when the Anxiety Sensitivity Index (ASI) was used to separate participant groups. No evidence of attentional bias was found when participant groups were separated according to a conventional measure of health anxiety, the Illness Attitudes Scale (IAS). The discussion includes exploration of underlying components accessed by these two measures. General theoretical and clinical implications are also discussed.

Keywords: Attentional bias; hypochondriasis; health-threat; pictorial/linguistic information; physiological arousal

1. Introduction

There has been considerable interest in attentional bias in anxiety, with studies reporting evidence of vigilance for threat across a range of anxiety disorders (e.g., MacLeod, Mathews & Tata, 1986; Lavy, van Oppen & van den Hout, 1994; Mattia, Heimberg & Hope, 1993). One reason for this interest is the proposal that attentional bias towards environmental threat produces overestimates of danger, and therefore functions to maintain anxiety (e.g., Mathews, 1990). Therefore, as a maintenance factor, such a cognitive style would have clear clinical implications.

A cognitive-behavioural conceptualisation of health anxiety (Warwick & Salkovskis, 1989, 1990) proposes a similar maladaptive cognitive pattern of attentional vigilance toward somatic information. Within this model, these attentional processes are also thought to function as a maintenance factor in health anxiety. Some studies have explored factors of attention toward internal physiological sensations (e.g., Hadjistavropoulos, Craig & Hadjistavropoulos, 1998; Hadjistavropoulos, Hadjistavropoulos & Quine, 2000). Amongst these, there is some evidence to suggest that selective attention toward internal physiological sensation does occur in health anxiety, and that this acts to reduce pain/symptom intensity (and anxiety) in the short term (Hadjistavropoulos et al., 2000). However, it is important to consider the type of attentional bias, as this may not be unitary. For example, it has been found that health anxiety is associated with both a heightened tendency to negatively monitor internal sensations, as well as a failure to engage in positive, objective monitoring of sensations, as carried out by the non health-anxious (Hadjistavropoulos et al., 1998).

There have been no published studies reporting selective attention toward external health-threatening material in health anxiety.

The fact that attentional bias is unlikely to be a straightforward, unitary process emerges from research into selective attention. For example, Allport (1989) described a process of attentional shifting, and distinguished between the initial orientation of attention towards stimuli and the maintenance of attention upon stimuli. More recently, a 'cognitive-motivational' analysis of anxiety has been proposed which suggests that there are two distinct subsystems underlying attentional processing (Mogg & Bradley, 1998). The 'emotional valence system' acts to assess the threat value of stimuli, and includes both pre-conscious and conscious processes. The 'goal engagement system', on the other hand, determines how resources are allocated for processing and subsequent action. Through inclusion of a motivational component (goal engagement system), the model proposes that an organism utilises somewhat conflicting strategies, when confronted with threat. These opposing strategies comprise systems that capitalise upon the need to turn towards environmental threat, and to engage in avoidant behaviour to defend oneself (e.g., Gray, 1990). Therefore, this can result in an initial orientation towards threat followed by avoidance of threat, a pattern known as 'vigilance-avoidance' (e.g., Mogg, Mathews & Weinman, 1987). When exposure to environmental threat is prolonged, this may result in an unstable pattern of responding with repeated cycles of orientation towards and away from the threat (Mogg & Bradley, 1998). It is therefore important to take into account factors of time course with respect to attentional bias, and to be aware that different durations of stimulus presentation may result in quite different patterns of orientation.

In addition to the complexity of the response involved in attentional bias, there are also issues regarding the nature of threat stimuli involved. Much of the previous work exploring attentional bias in other anxiety disorders has utilised word stimuli, however it is unclear as to how much ecological validity such stimuli may possess. Whereas word stimuli are symbolic in nature and contain only semantically-relevant information, pictorial stimuli contain both perceptually- and semantically-relevant information. Some have suggested (e.g., Foa & Kozak, 1986; Lang, 1979) that stimuli which convey both perceptual and semantic threat (such as pictures) are more likely to activate the fear network than are stimuli conveying semantic threat alone (such as words). Moreover, Kindt and Brosschot (1997) argue that the more easily the fear network is activated by threat-related information, the greater the degree of processing resources that will be allocated (and the greater the attentional bias).

Pictorial and imagery-based information is likely to play a role in health anxiety. For example, Wells and Hackmann (1993) produced documentation of imagery that appeared in their routine clinical work with health-anxious patients. These internally-derived images appeared to encapsulate meaning related to the patient's particular core beliefs i.e., global beliefs about the self, others and the world (Beck, Rush, Shaw & Emery, 1979). Wells and Hackmann (1993) also noted themes that emerged across different health-anxious patients' imagery, which incorporated metaphysical issues and death (e.g., being buried alive, or surviving in a useless body beyond death). They argue that images in health anxiety are likely to contain relevant information derived from a variety of sensory modalities, including elements of both meaning and affect.

Images may therefore encapsulate a broad range of information that is perceived as threatening in health anxiety. Brownlee, Leventhal and Balaban (1992) explored the ability of internally-generated images to produce anxiety, by presenting illness-related and neutral scenes to hypochondriacal and control participants. When scenes were described to participants, generating an image of the scene reduced heart rate (as opposed to just listening), for control participants on all scenes and hypochondriacal on the neutral scenes. However, the heart rate of the hypochondriacal participants increased when they generated an image of an illness-related scene, as opposed to just listening to it. It has been found, more generally, that imagining pictures of fearful scenes tends to increase physiological arousal (Lang, 1979). It is possible that such heightened arousal is perceived as particularly threatening in health anxiety (particularly when health fears are based upon such arousal), and has been proposed as one of the maintenance factors (Warwick & Salkovskis, 1989, 1990). Other authors (Craske & Hermmann, 1993) have reported greater anxiety in health-anxious individuals, following the presentation of health-threat pictures compared to health-threat words.

Attentional bias toward pictorial stimuli has been explored in other anxiety disorders. For example, some studies (Lavy & van den Hout, 1993; Kindt & Brosschot, 1997) have reported evidence of attentional bias in spider phobics, however this was found to be smaller for threat-related pictures than for words. These studies both utilised a version of the Stroop task which may give rise to a number of explanations for colour-naming interference, apart from that of attentional bias (Mogg & Bradley, 1998). An alternative means of measuring the allocation of attention is the

probe detection task, where a probe follows the presentation of stimuli in different spatial locations. This task has the advantage of not relying upon interference effects in order to measure attentional bias, and thus being a more direct means of measurement.

Before stating the aims of the current study, it is useful to consider the nature of health anxiety. Hypochondriasis is thought to consist of both a fear of symptoms that are quickly heightened by increases in arousal of the autonomic nervous system (e.g., dizziness), and a fear of symptoms that are not quickly heightened by increases in arousal (e.g., lumps). These two symptom-types have been termed 'arousal-reactive' and 'arousal-nonreactive' respectively (Stewart & Watt, 2000). The Illness Attitudes Scale (IAS; Kellner, 1986, 1987) has been widely used as a measure of health anxiety. However, it is unclear to what extent the IAS is a measure of arousal-reactive and arousal-nonreactive symptoms (Taylor, 1994). More recently the ASI (Peterson & Reiss, 1992) was designed as a specific measure of 'anxiety sensitivity', which is the fear of arousal-reactive bodily sensations. Although, anxiety sensitivity is thought to be a key component of panic, it has been acknowledged to be of use in tapping into general arousal-reactive health concerns (Stewart & Watt, 2000). Also, several studies have found that the ASI is predictive of hypochondriacal concerns (e.g., Otto, Pollack, Sachs & Rosenbaum, 1992; Otto, Demopulos, McLean, Pollack and Fava, 1998; Asmundson & Norton, 1995). In fact, Otto et al. (1992) (page 230) conclude that it is most likely that the IAS and ASI "assess *different aspects* of a tendency to become fearful and aroused in response to somatic sensations", and that this tendency is associated to both hypochondriasis and panic disorder.

The present study utilised a probe detection task in order to explore attentional bias toward word and pictorial stimuli in health anxiety. Both the IAS and the ASI were used in order to access health-related concerns. The ASI was included in order to access health fears of an immediate nature, involving autonomic nervous system arousal, in contrast to the more distant-future fears assessed by the IAS. The reason for this was that both types of fear are thought to be involved in health anxiety (Stewart & Watt, 2000), and time factors have been found to affect the nature of attentional bias (Mogg & Bradley, 1998). Probe detection involves the simultaneous presentation of pairs of stimuli, one above the other. Following the disappearance of the stimuli, a probe appears in the position of one of them. In this case, the probe consisted of either a left (←) or right pointing (→) arrow. This forced choice version of the probe detection task is thought to reduce the likelihood that attention is allocated to one side of the screen only (e.g., MacLeod & Chong, 1998; Bradley, Mogg, Falla & Hamilton, 1998). Participants then press the key corresponding to arrow direction, and the resulting reaction times provide an index of attentional bias. Word and pictorial stimuli were presented at exposure durations of 500 and 1250 msec in order to explore attentional shift, as attentional bias may consist of initial orientation towards, followed by avoidance of, threat material (Mogg & Bradley, 1998). The duration of 500 msec has been found to result in anxiety-related vigilance for threat in a number of studies (e.g., MacLeod et al., 1986; Mogg, Bradley, de Bono & Painter, 1997). The duration of 1250 msec has previously been utilised by Bradley et al. (1998), and is likely to be more sensitive to processes involved in maintained attention, as it allows for multiple shifts of attention between items of the stimulus pair. Participants were also asked to

rate stimuli in terms of perceived threat, in order to see whether any differences in attentional bias between words and pictures might be explained by corresponding differences in threat value.

In summary, the main aims of the study were to examine: (1) whether high health-anxious individuals show an initial attentional bias toward (externally-presented) health-threatening stimuli (500 msec condition); (2) whether attentional bias will occur at the duration of 1250 msec, or whether avoidant strategies will be seen; (3) whether attentional bias (vigilance at shorter duration or avoidance at longer duration) will be greater for picture than for word threat material.

2. Method

2.1. Participants

After gaining ethical approval for the study (Appendix 3), a total of 220 undergraduate student volunteers were recruited by disseminating information following social science lectures. They completed a shortened version of the Illness Attitudes Scale (Kellner, 1986, 1987) as a screening measure for health anxiety. This consisted of a total of 13 items chosen from four lower-order levels (fears, behaviour, beliefs and effects of health anxiety), found to be a valid conceptualisation of the IAS (Stewart & Watt, 2000). The items that were selected have all been found to have salient loadings with the respective groupings, by these authors. The students who scored in the upper and lower quartile ranges of this measure were invited to take part, corresponding to scores of $\geq$ 17 and $\leq$7 respectively. The shortened IAS score range was 0-41, and a total of 48 participants (24 High Health Anxiety, 24 Low Health

Anxiety) were tested. The mean age of this group was 20.25 (sd = 3.27), range 18-37 years. The group consisted of 7 (15 %) males and 41 (85 %) females. Students who were suffering from serious illness (currently receiving treatment *and* believing their doctor to consider them ill) were excluded from the study.[1]

2.2. Measures

2.2.1. Questionnaires

Participants completed the full version of the Illness Attitudes Scale (IAS; Kellner, 1987), the Anxiety Sensitivity Index (ASI; Peterson and Reiss, 1992), the state and trait versions of the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg and Jacobs, 1983) and a 10-item version of the Marlowe-Crowne Social Desirability Scale (MCS; Strahan and Gerbasi, 1972) (see Appendices 8-11 for questionnaires). The IAS is a standard measure of health anxiety and has been reported to demonstrate good validity and reliability (Watt & Stewart, 2000). The ASI measured specifically those aspects of health anxiety which were arousal-reactive and thus of immediate concern to the individual, unlike the IAS which mostly, although not predominantly, taps into arousal-nonreactive, future physical threat. The ASI was included because time factors have been found to be important in attentional shifting (Mogg & Bradley, 1998), and vigilance may only occur for immediate, short-lived danger. The STAI was included as it is a general measure of anxiety, which has also been found to be associated with attentional bias toward threat (e.g., MacLeod,

[1] Two students were excluded from the study because they were both currently receiving treatment for serious illness *and* believed their doctor considered them to be seriously ill.

Mathews & Tata, 1986). The MCS measures tendency towards defensiveness, and was used as high levels of this measure may have a confounding effect upon level of self-reported anxiety (e.g., Weinberger, Schwartz and Davidson, 1979).

2.2.2. Word stimuli

There were 32 words in total, half of these were health threats (e.g., cancer, coffin, paralysed), and half were neutral (e.g., steamboat, manor, farmyard) (see Appendix 4). The health threat words consisted partly of words drawn from previous research into attentional bias towards physical threat (e.g., MacLeod et al., 1986). However, the study carried out by Wells and Hackmann (1993), into imagery in hypochondriasis highlighted potential underlying themes involved. These consisted of death, survival in a useless body and hospitalisation. These themes were also used in order to select potentially threatening stimuli. Each health threat word was paired with a length and word-frequency matched neutral word, using Carroll, Davies and Richman's (1971) norms (e.g., infectious-coniferous). The mean frequency of the health threat words was 5.33 (sd = 8.17), range 0.07 – 32.20. The mean frequency of the neutral words was 5.20 (sd = 6.05), range 0.00 – 23.40. (See Appendix 5 for frequencies). Four independent judges rated the words, which were presented in randomised order on a 7-point scale, for how related each word was to health/illness (0 = not at all, 6 = extremely). The mean rating for the health threat words was 5.03 (sd = 1.18) and the mean rating for the neutral words was 0.13 (sd = 0.42). A paired samples t-test showed that there was a significant difference between the ratings given for the health-threat and neutral words [$t(63) = 32.23$, $p<0.001$]. The words were

presented in white uppercase letters, so that all measured 19mm in height. The members of the word pairs were presented above and below the central fixation position, such that the distances between their inner edges was 98mm. The shortest word (3 letter) was 38 mm wide and the longest word (12 letter) was 165mm wide. An additional 8 word pairs were drawn up to act as fillers, creating a total of 24 word pairs (i.e., 16 threat-neutral and 8 neutral-neutral fillers).

2.2.3. Picture stimuli

There were 32 picture stimuli created from a variety of sources e.g., digital camera, computer image software (Appendix 6). Half of the pictures depicted health threatening scenes and the other half depicted neutral scenes. Each picture was selected in order to match each of the word stimuli in terms of its semantic meaning (i.e. a picture of a person in a wheelchair was taken to represent the word 'paralysed'), and this was true for both health-threat and neutral stimuli. The health threat pictures were each paired with a neutral picture so that the complexity of the scene was matched as far as possible (e.g., picture of doctor taking someone's pulse was matched with a picture of a music teacher showing someone how to play a violin). Four independent judges rated each picture which were presented in randomised order, on a 7-point scale for how related each picture was to health/illness (0 = not at all, 6 = extremely). The mean rating for the health threat pictures was 4.78 (sd = 1.11) and the mean rating for the neutral pictures was 0.05 (sd = 0.39). A paired samples t-test showed that there was a significant difference between the ratings given for the health-threat and neutral pictures [$t(63) = 31.42$, $p<0.001$]. Each picture was displayed in

monochrome (8 grey scale bitmap), measured 70 x 96 mm and the distance between their inner edges, when displayed on the screen, was 44 mm. There were an additional 8 image pairs which acted as fillers, creating a total of 24 image pairs (i.e., 16 threat-neutral and 8 neutral-neutral fillers). This therefore meant that there were a total of 48 word and picture pairs altogether.

2.3. Procedure

After receiving information and providing consent for the study (Appendix 7), participants were seated 100 cm away from the computer screen in order to carry out the attentional task. This consisted of 16 practice trials (8 filler word and 8 filler picture pairs) and 192 experimental trials, as each stimulus pair was presented four times. The trials were presented in a new random order to each participant, and the word and picture stimuli both appeared in mixed order in one main block. Each trial commenced with a fixation cross which appeared for 500 msec. This was followed by either a word or picture pair which were presented so that one was above and one below the earlier fixation cross. The centres of the words and pictures were in the same position. The stimulus pairs appeared for either a shorter (500msec) or a longer (1250ms) duration and, following their disappearance, were immediately followed by a small arrow that acted as the probe. This was 13 mm in length and the distance between each probe and the central fixation cross was 57 mm. The probe appeared in the central position of either the top or bottom stimulus, with the arrow pointing in either the right or left direction.

Participants were instructed to press the button on a response box that corresponded with the direction which the arrow probe was pointing (either left or right), as quickly as possible. They were also instructed to try to avoid making mistakes and were informed that a feedback beep would sound, should they do so. The inter-trial interval following their button press was 500 msec. Trials were counterbalanced so that there were even numbers of left/right arrows, upper/lower probes, short/long stimulus exposure and upper/lower position of threat stimuli. As the total number of combinations existed across 16 trials (4 stimulus pairs only), the stimulus set appeared in one of four possible combinations. Therefore, there were four different trial presentations, and these were balanced across participant groups.

Following the attentional task, participants were asked to rate each of the stimuli in terms of how threatening they perceived them to be. Threat was defined as "the degree of uneasiness or fear which the word or picture makes you feel" and the scale provided was 0-6 where 0 = 'not at all' and 6 = 'extremely'. Pictures and words were displayed one at a time on the screen in random order. Participants responded by pressing the key corresponding to the chosen number, which prompted presentation of the next stimulus.

Finally, participants completed the IAS, the ASI, the STAI (both state and trait subscales) and the MCS.

3. Results

3.1. Attentional Task

3.1.1. Characteristics of screening version IAS groups

Details of the IAS screening group characteristics are given in Table 1. The groups did not differ significantly in terms of MCS scores. However, the high IAS screening group had significantly higher scores on screening (brief version of IAS), STAI state anxiety and STAI trait anxiety.

Insert table 1 about here

Firstly, data from trials with errors were discarded. The reaction time data were explored using box and whiskers plots, which showed that the reaction times (RTs) ranged from 336 msec to 6591 msec. RTs which were greater than 2 standard deviations above each participant's mean were excluded as outliers, with no exclusion of data at the lower extreme. The mean percentage of data lost in the final sample (n = 48) due to errors and outliers was 5 % in both the high IAS and low IAS groups, and the overall mean RT was 680 msec.

Attentional bias scores were calculated from the RT data for each type of health threat stimulus and exposure duration, in order to simplify the analyses. Bias scores were obtained by subtracting the mean RT when the threat and probe were in the same position, from the mean RT when the threat and probe were in different positions. Therefore, on those trials that contained threat-neutral stimulus pairs, bias

scores were calculated for each participant. Positive values of the bias score suggest that RTs are faster when the threat stimulus appears in the same position as the probe (showing vigilance for threat). Negative values of bias, however, suggest that RTs are slower when the threat stimulus appears in the same position as the probe (showing avoidance of threat).

A 2 x 2 x 2 mixed design ANOVA was carried out, where the between-subjects variable was health anxiety (high vs. low) and within-subjects variables were exposure duration (500msec vs. 1250 msec) and stimulus type (word vs. picture). The between-subjects variable was based upon the separation of groups according to their preliminary screening score on the brief version of the IAS (≤ 7 and ≥ 17). There were no significant effects found, and $F<1$ for all groups.[2] See Table 2 below for attentional bias means when the screening IAS was used to divide groups.

Insert table 2 about here

3.1.2. Characteristics of ASI groups

The groups were then separated according to the ASI, which is thought to measure the 'arousal-reactive' component of health anxiety (Stewart & Watt, 2000) in order to see whether 'arousal-reactivity' had an effect upon attentional bias for health-threat stimuli. It should be noted here participants selected for the study as a whole

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[2] Groups were also analysed following a median split method for the full version of the IAS and a combination of the IAS and initial screening score. Mixed three-way ANOVAs revealed that there were no significant effects involving group, with $F<1$ in all these instances.

had already been divided on the basis of them being extreme scorers on another measure (the brief-version IAS). This secondary analysis, in which groups were split according to the ASI, should therefore be viewed with some degree of caution.

Insert table 3 about here

A median split method was then used to form two groups based upon scores on the ASI. Scores of ≤16 on the ASI formed the low health-anxious group and scores >16 formed the high health-anxious group. Details of the group characteristics are given in Table 3 (groups separated according to ASI scores). The groups did not differ significantly in terms of MCS scores. However, the high ASI group had significantly higher scores on screening (brief version of IAS), the IAS, STAI state anxiety and STAI trait anxiety.

A 2 x 2 x 2 mixed ANOVA was carried out where the between-subjects variable was ASI group (high ASI vs. low ASI), and within-subjects variables were exposure duration (500msec vs. 1250 msec) and stimulus type (word vs. picture). This revealed a main effect of group [$F(1,46) = 4.17$, $p<0.05$] and a significant interaction between group and stimulus type [$F(1,46) = 6.28$, $p<0.05$]. There was a trend towards significance in the three way interaction between group, stimulus type and exposure duration [$F(1,46) = 3.02$, $p = 0.09$]. See Table 4 for means.

Insert table 4 about here

In order to clarify these results, 2 x 2 mixed design ANOVAs were carried out for each stimulus type (word and picture) separately. Each ANOVA included exposure duration (500 msec vs. 1250 msec) as the within-subjects variable and group (high ASI vs. low ASI) as the between-subjects variable. There were no significant interactions in the case of word stimuli. However, for pictures, there was a significant main effect of group [$F(1,46) = 5.19$, $p<0.05$], with the high ASI group (mean = 22.49; sd = 30.44) demonstrating higher bias scores than the low ASI group (mean = 2.64; sd = 29.95). Picture stimuli also resulted in a significant group x exposure duration interaction [$F(1,46) = 4.76$, $p<0.05$] (see Figure 1).

Insert figure 1 about here

Post hoc t-tests were then carried out in order to see whether the differences between the groups' bias scores for health threat pictures at the shorter and longer duration were significant. For the shorter exposure duration, the bias scores of the high ASI group toward health threat pictures were significantly greater than those of the low ASI group [$t(46) = 2.82$, $p<0.01$]. However, for the longer exposure duration, there were no differences in bias scores between the two groups [$t(46) = 0.33$, $p = 0.75$]. In order to see whether the two groups' response times to the pictures at the shorter duration indicated vigilance toward or avoidance of threat stimuli, one-sample t-tests were carried out. Here, each mean bias score was compared with a value of zero, where scores significantly lower than zero indicated avoidance and scores

significantly higher then zero indicated vigilance. The low ASI group's responses to pictures at the shorter duration did not differ significantly from a value of zero [$t(23) = 0.81$, $p = 0.43$]. In contrast, the high ASI group's responses to pictures at the shorter duration did differ (positively) significantly from zero, indicating vigilance for these stimuli [$t(23) = 3.02$, $p<0.05$].

3.2. Rating Task

3.2.1 Screening version IAS groups

In order to explore the rating data, a 2 x 2 x 2 mixed ANOVA was carried out where screening IAS group (high vs. low) was the between-subjects factor, with valence (threat vs. neutral) and stimulus type (picture vs. word) as the within-subjects factors.

Results showed that there was a significant main effect of group [$F(1,46) = 7.91$, $p<0.05$], with the high screening group giving more threatening ratings overall (mean = 1.93; sd = 0.67) than the low screening group (mean = 1.40; sd = 0.63). There was also a main effect of valence [$F(1,46) = 337.39$, $p<0.001$], which showed that the health-threat stimuli (mean = 3.13; sd = 1.26) were rated as more threatening than the neutral stimuli (mean = 0.21; sd = 0.29). There was found to be no main effect of stimulus type [$F(1,46) = 0.00$, $p = 0.99$], and no interaction between group and stimulus type [$F(1, 46) = 0.55$, $p = 0.46$]. There was also no interaction between valence, group and stimulus type [$F(1,46) = 0.11$, $p = 0.75$]. However, there was a significant interaction between group and valence [$F(1,46) = 8.23$, $p<0.05$]. Post hoc t-tests demonstrated that whereas the neutral stimuli were rated similarly in terms of

threat by both the high screening and low screening groups [$t(46) = 0.88$, $p = 0.38$], the health-threat stimuli were rated as more threatening by the high screening than the low screening group [$t(46) = 2.9$, $p<0.01$]. See Table 5 below for means.

Insert table 5 about here

3.2.2. ASI groups

A 2 x 2 x 2 mixed ANOVA was also carried out where ASI group (high vs. low) was the between-subjects factor, with valence (threat vs. neutral) and stimulus type (picture vs. word) as the within-subjects factors. See Table 6 for means.

Insert table 6 about here

Results here showed that there was a significant main effect of group [$F(1,46) = 12.11$, $p<0.05$], with the high ASI group giving more threatening ratings (mean = 1.98; sd = 0.66) than the low ASI group (mean = 1.35; sd = 0.59). There was also a main effect of valence, but no main effect of stimulus type and no interaction between valence and stimulus type, as reported in section 3.2.1. There was also no interaction between group and stimulus type [$F(1,46) = 0.35$, $p = 0.56$], and no significant interaction between valence, group and stimulus type [$F(1, 46) = 0.73$, $p = 0.40$]. However, there was a significant interaction between group and valence [$F(1,46) = 10.28$, $p<0.05$]. Post hoc t-tests demonstrated that whereas the neutral stimuli were

rated similarly in terms of threat by both the high ASI and low ASI groups [$t(46) = 1.60$, $p = 0.12$], the health-threat stimuli were rated as more threatening by the high ASI than the low ASI group [$t(46) = 3.45$, $p<0.01$]. See Figure 2.

Insert figure 2 about here

3.3. Correlations

Pearson correlations were used to examine relationships between the measures. These showed that there was a significant correlation between the full version of the IAS and the screening version and a significant correlation between the ASI scores and the full version IAS scores. The ASI scores were also significantly correlated with the screening version of the IAS. The MCS showed a significant negative correlation with the full version of the IAS, but there was no correlation between the MCS and any of the other questionnaire measures, either positive or negative. Finally, the STAI was positively correlated with the ASI, IAS and screening IAS measure and this was true for both the state and trait subscales. See Table 7 below for the table of correlations.

Insert table 7 about here

In terms of attentional bias, it was found that ASI scores were significantly correlated with bias scores for health-threat pictures at the shorter duration. There was

also a negative correlation found between the state anxiety scores of the STAI and the measure indicating bias toward health-threat words at the longer duration. None of the other questionnaire measures correlated with bias scores.

Finally, in terms of the rating data, there was a significant correlation between the degree of threat perceived in the threat stimuli and both the ASI, the two versions of the IAS and both state and trait subscales of the STAI. There were no correlations found between any of the questionnaire measures and the degree of threat perceived in the neutral words. The degree of threat perceived in both the neutral and the health threat words was however, positively correlated.

4. Discussion

The initial aim of the study was to see whether high health-anxious individuals demonstrated attentional bias toward health-threatening stimuli. When groups were defined according to their scores on a conventional measure of health anxiety, the Illness Attitudes Scale (IAS), no evidence of vigilance toward health-threatening stimuli was found. However, the study found evidence of attentional bias when the groups were divided on the basis of their anxiety sensitivity scores. The results showed vigilance for picture threat stimuli at the shorter exposure duration in the high anxious group (as measured by the Anxiety Sensitivity Index; ASI), with no bias seen in the low anxious group.

In order to interpret this result, consideration will be given to the ASI and IAS, and the extent to which they tap into health-related fears. As mentioned in the introduction, the ASI was devised initially to measure fears related to autonomic

nervous system arousal, thought to be a component of panic (Peterson & Reiss, 1992). The IAS, on the other hand, was devised to be a specific measure of health anxiety (Kellner, 1986, 1987). However, it is unclear to what extent the ASI and IAS are specific measures of panic and hypochondriasis respectively, or indeed the independence of these diagnoses. One reason for this uncertainty concerns the fact that panic disorder and hypochondriasis have been frequently found to be comorbid (e.g., Barsky, Barnett & Cleary, 1994). In addition, the ASI has been found to be predictive of hypochondriacal concerns (e.g., Otto et al., 1992). There is also evidence to suggest that anxiety sensitivity, as measured by the ASI, acts as a mediator between early childhood experiences of illness and later development of hypochondriasis (Watt & Stewart, 2000). In fact, Stewart and Watt (2000) argue that health anxiety may consist of both 'arousal-reactive' and 'arousal-nonreactive' health fears, and that these two fear types form a common dimension. Therefore, it is possible that the IAS and the ASI were measuring slightly different aspects of health concerns in this study. As the ASI has been specifically designed for the measurement of arousal-reactive symptoms, it is likely to have accessed this component of health anxiety more readily than the IAS. The IAS, in comparison, does not make clear to what extent scores are a measure of arousal-reactive and arousal-nonreactive fears (Taylor, 1994). Whereas arousal-reactive fears consist of fears that are immediately relevant, arousal-nonreactive fears involve distant future threat.

Following this differentiation, the present results suggest that the attentional bias for threat pictures may be primarily shown by individuals with high levels of fear related to physiological reactivity (measured specifically by the ASI, but not by the

IAS). There is an area of literature concerning threat immediacy, which may help to explain the presence/absence of attentional bias under the two circumstances. The cognitive motivational view of attentional bias (Mogg & Bradley, 1998) describes the initial orientation towards environmental threat as being of evolutionary importance in terms of motivating the organism to escape. Such orientation is therefore more likely to occur with immediate future danger, as in the case of most anxiety disorders. (This can be contrasted to depression, where biases are thought to occur at an elaborate processing level, for example that involved in memory for *past* events e.g., Williams, Watts, MacLeod & Mathews, 1988, 1997). However, in the case of non-arousal-reactive fears, these could be considered to be concerning distant future threat, rather than immediate. In cognitive motivational terms, therefore, rapid orientation to immediate threat stimuli would be less relevant. In accessing a greater number of distant future (arousal-nonreactive) concerns, the high health-anxious group (as measured by the IAS) may have been less likely to demonstrate attentional bias than the high anxious group (as measured by the ASI).

Another aim of the study was to see whether attentional bias would occur at the longer (1250msec) duration, or whether avoidant strategies would be seen. Neither attentional bias nor avoidance of health-threat stimuli were seen at the longer duration. Other studies that have explored time course of attentional bias (e.g., Bradley et al., 1998; Mogg et al., 1997) have also not reported evidence of avoidance at exposure durations of 1250msec and 1500msec respectively. One possible reason for this could be that there are several shifts of attention toward and away from threat stimuli during that time. Another potential reason is that the stimuli utilised in this study were not

threatening enough to have evoked strategic avoidance. It has been hypothesised that a possible role of strategic avoidance is to prevent anxiety from becoming too high (Bradley et al., 1998), however in relatively low threat situations, it may be redundant. More specific to health anxiety, Hadjistavropoulos et al. (1998) also found no evidence of cognitive avoidance as a strategy for the monitoring of internal bodily sensation.

A further aim was to explore differences in attentional bias occurring towards linguistic and pictorial stimuli. Results demonstrated vigilance toward picture stimuli, in the absence of vigilance toward word stimuli (when participant groups were separated according to scoring on the ASI). Although it is unclear to what extent the presentation of external pictures may involve arousal, the internal generation of images has been found to increase physiological arousal (e.g., Lang, 1979; Brownlee et al., 1992). It may also be the case that (externally-presented) picture-threats are more likely to increase physiological arousal than are word-threats. For example, some authors have found that externally-presented threatening pictures are more anxiety-provoking than are externally-presented words (e.g., Craske & Hermann, 1993). Therefore, stimuli that increase arousal are likely to be particularly threatening (and be more readily attended to), to individuals scoring high on an arousal-reactive fear measure (the ASI). In being a less direct measure of arousal-reactive fears in hypochondriasis, it is possible that the IAS failed to produce such an effect. Future studies, may however, aim to measure physiological arousal during responding in order to ascertain whether pictures do indeed increase arousal during this task.

Although the present study did not assess physiological arousal, it did include a measure of how threatening the stimuli were judged to be by participants. Whereas there were no differences in threat ratings of high and neutral stimuli by the low ASI group, the high ASI group rated health threat stimuli as being significantly more threatening than neutral stimuli. This was true of both the health-threat pictures and words alike, as there were no interactions involving the type of stimulus. It is interesting to note that pictures and words were rated as similarly threatening and that the attentional bias was only found for pictures. This suggests that explicitly rated threat value is not a useful predictor of attentional vigilance and that other factors may be important in detecting attentional bias, such as that of physiological arousal, as mentioned previously. Both the IAS and ASI scores were correlated with health-threat stimulus ratings, suggesting that both measures reflected a tendency to perceive these stimuli as being of potential threat.

A significant correlation was also found between the ASI and the degree of bias toward pictures presented at the shorter duration. This result reflects the main finding concerning vigilance toward briefly-presented pictures, seen by the high ASI group. The negative correlation between the state measure of the STAI and attentional bias for words at the longer duration is interesting. It suggests that general anxiety-state was associated with avoidance of threatening word stimuli at longer exposure durations. This result was not explored further as it was considered beyond the scope and aims of the current study.

Finally, some shortcomings of the present study should be considered alongside various suggestions for improvement in future research. The first criticism

concerns the stimuli that were utilised in this study. In making a direct comparison between responding to words and pictures, attempts were made to perceptually match these stimulus-types. The words were presented in large font in order to more closely match pictures in terms of size. However, unlike pictures, words varied substantially in terms of their length (width). However, in presenting target and distractor stimuli one above the other, it was anticipated that the width difference would have less effect upon attentional shifts than any height difference due to the effect the latter would have upon visual angle. Secondly, the threat stimuli that were used were, of course, related to general health-related threats, rather than targeting participants' individual concerns. Wells and Hackmann's (1993) argued that (internal) images in health anxiety contain specific meaning related to individuals' core beliefs. It would, however, be difficult to capture idiosyncratic threat in the stimuli that were used. Instead, this study drew upon broad themes in order to construct the stimuli, such as damage to self, hospitalisation and death identified as prominent fears in health anxiety (Wells & Hackmann, 1993).

Thirdly, results suggested that the degree to which health anxiety was based upon arousal-reactive fear played a part in terms of whether attentional bias toward threat stimuli occurred. However, the stimuli used did not separate out arousal- and arousal-nonreactive threat but were based upon health-threats in general. It may be useful to utilise stimuli that are specifically aimed to encapsulate arousal-reactive threat (e.g., picture of a collapsed person), and others specifically aimed to encapsulate arousal-nonreactive fear (e.g., picture of a facial tumour).

Fourthly, there is the question of whether the ASI was measuring an index of panic, due to its arousal-reactive content, or more general anxiety. In terms of panic, it should be noted that the ASI and IAS (both versions) were correlated in this study. Such correlations have been reported elsewhere and are thought to be independent of panic disorder (e.g., Otto et al., 1998). However, future studies could aim to use other measures of health anxiety and panic disorder in order to try to separate out any effects. In terms of general anxiety, it should be noted that attentional bias (towards briefly-presented pictures) and the STAI were not correlated. Instead, attentional bias toward pictures presented at the shorter duration was associated with the ASI alone. With respect to this finding, it is likely that the ASI was not merely tapping into general anxiety, but an alternative underlying dimension. In line with this, McNally (1990) asserts that anxiety sensitivity (AS) is a distinct component from that of general trait anxiety. There may be some effect of gender though, as Stewart, Conrod, Gignac and Pihl (1998) found that males high in AS showed attentional bias toward social/psychological threat as well as health threat, whereas females high in AS showed attentional bias toward health threat only. The participants were predominantly females in this study. Therefore, future studies could use general threat stimuli in addition to health threat, and explore the effects of gender, in order to check the specificity of this finding.

Finally, as mentioned in the results section, the secondary analysis undertaken when groups were divided according to the ASI should be interpreted with a degree of caution. The participant group had already been selected according to another independent variable, the brief IAS, and was therefore a biased sample of the

population in terms of further analysis. Perhaps an alternative means of selection would have been to utilise both a brief version IAS in addition to a brief version ASI at screening. Participants may have been selected based upon either high or low scoring on the combination of these measures in order to justify further analysis based upon median splits of each. Alternatively, a correlational design may have been adopted. Subsequently, all the participants could be used in order to carry out two median splits; one based upon the IAS and one based upon the ASI.

To summarise, the main prediction of a relationship between attentional bias and a conventional health anxiety measure (IAS) was not supported in this study. Results were only found when a secondary analysis was undertaken, using the ASI. It may therefore be advisable to be cautious with respect to using these results as evidence of attentional bias in health anxiety. Further studies, utilizing clinical samples of health-anxious participants may be useful. It would be more likely, perhaps, that a patient sample would score more highly on measures of health anxiety and may therefore perceive a greater degree of threat in the health stimuli used.

5. Conclusion

Although Warwick and Salkovskis' (1989, 1990) model of health anxiety predicts selective attention toward external health threat, there has been no published evidence in support of this. This study did not provide support for the above prediction, when analyses were based on a standardized measure of health anxiety (IAS). There was evidence of an anxiety-related bias for health-threat pictures, presented at the shorter exposure duration when the ASI measure was used. Results

thus suggest that pictorial stimuli may act as greater sources of threat than verbal stimuli in arousal-reactive anxiety, given the occurrence of attentional bias toward pictures but not words. This finding may have implications for the cognitive-behavioural treatment of health fears that are arousal-reactive, and suggest that the use of pictorial/imagery work may be beneficial. It is less clear to what extent this may apply to specifically to health anxiety. However, the study has highlighted the value of differentiating between arousal-reactive and arousal-nonreactive fears in health anxiety. If attentional bias occurs for the former but not the latter, then clinical differentiation would guide the use of attentional strategies in intervention.

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Figure 1 – Attentional Bias Toward Pictures when Groups were divided by ASI

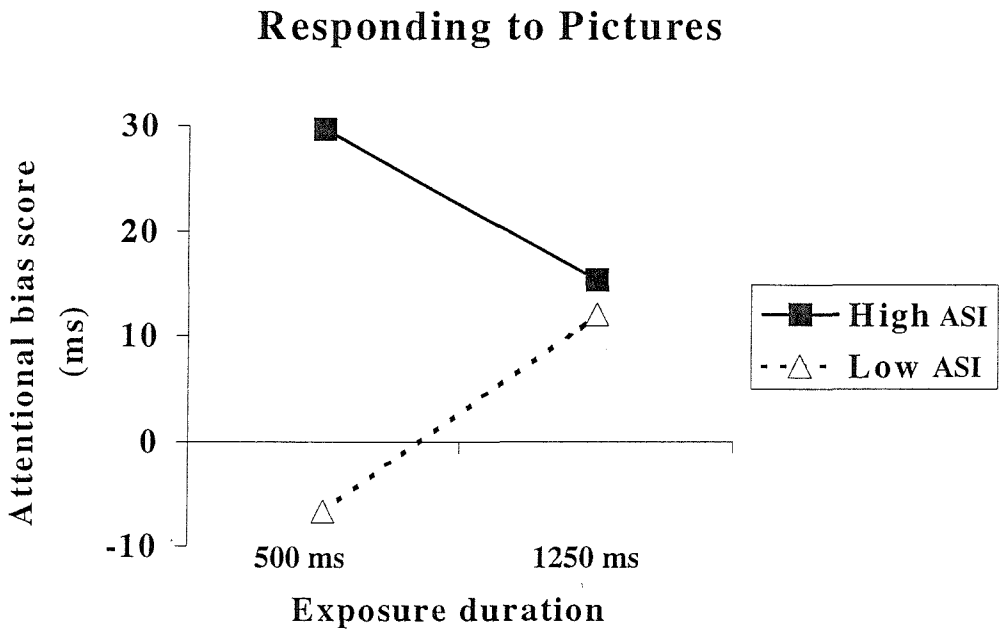

Figure 2 – Ratings of Degree of Stimulus Threat when Groups were divided by ASI (words and pictures combined)

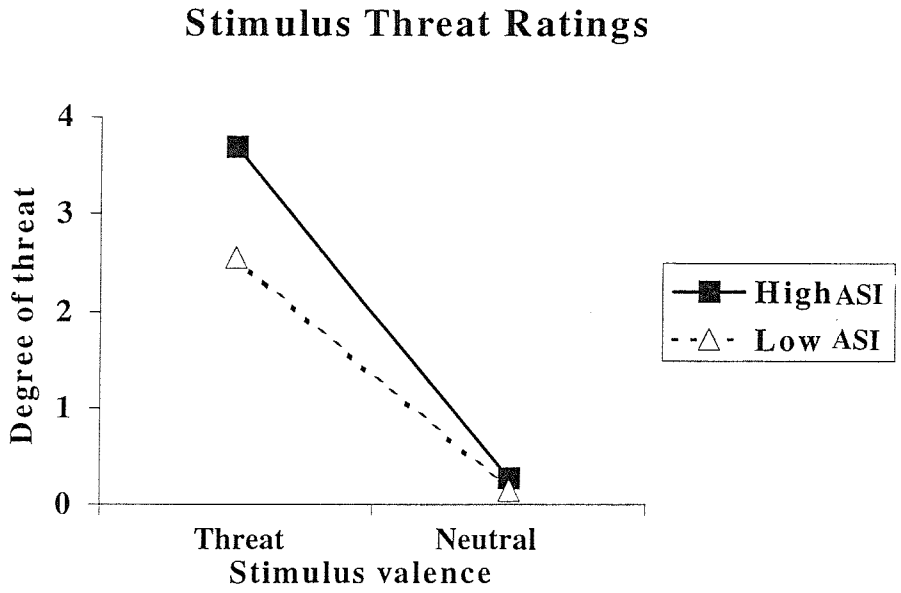

Table 1 – Characteristics of High and Low Brief Version Illness Attitudes Scale Groups (Screening)

	Low Brief IAS *n = 24*	*High Brief IAS* *n = 24*	*t (46)*	*p*
	Mean (SD)	Mean (SD)		
Gender (females)	20 (83 %)	21 (88 %)		
Age	20.63 (4.36)	19.88 (1.60)	0.79	0.43
Screening (Brief IAS)	4.83 (1.90)	25.38 (5.54)	17.18	<0.001
IAS	27.63 (8.33)	50.33 (12.62)	7.36	<0.001
ASI	13.79 (5.58)	24.04 (11.92)	3.82	<0.001
STAI state	31.42 (6.47)	42.96 (11.41)	4.31	<0.001
STAI trait	37.04 (9.02)	51.42 (11.98)	4.70	<0.001
Marlowe-Crowne Scale	3.96 (2.05)	3.00 (2.09)	1.60	0.12

Table 2 – Mean Attentional Bias Scores to Stimuli at Different Exposure Durations (Screening Version IAS Groups)

Stimulus Type	*Exposure Duration*	*Low Brief IAS* Mean (SD)	*High Brief IAS* Mean (SD)
Picture	500 msec	6.90 (40.57)	16.02 (54.74)
	1250 msec	10.29 (37.88)	17.03 (31.05)
Word	500 msec	5.54 (49.93)	3.06 (29.43)
	1250 msec	1.63 (40.54)	0.46 (40.27)

Table 3 – Characteristics of High and Low Anxiety Sensitivity Groups

	Low ASI	*High ASI*	*t (46)*	*p*
	Mean (SD)	Mean (SD)		
Age	20.71 (4.41)	19.79 (1.41)	0.97	0.34
Screening (Brief IAS)	10.50 (9.61)	19.71 (10.86)	3.11	<0.05
IAS	31.42 (11.71)	46.54 (15.53)	3.81	<0.001
ASI	11.04 (3.47)	26.79 (9.30)	7.77	<0.01
STAI state	32.33 (7.79)	42.04 (11.47)	3.43	<0.05
STAI trait	37.92 (9.96)	50.54 (12.26)	3.92	<0.001
Marlowe-Crowne Scale	4.04 (2.10)	2.92 (2.00)	1.90	0.06

Table 4 – Mean Attentional Bias Scores to Stimuli at Different Exposure Durations (ASI Groups)

Stimulus Type	*Exposure Duration*	*Low ASI*	*High ASI*
		Mean (SD)	Mean (SD)
Picture	500 msec	-6.75 (41.0)	29.67 (48.12)
	1250 msec	12.02 (37.41)	15.30 (31.90)
Word	500 msec	9.98 (46.82)	-1.38 (33.20)
	1250 msec	-0.23 (35.67)	2.32 (44.62)

Table 5 – Mean Threat Ratings for Health and Neutral Stimuli based upon Screening Version IAS Groups

Stimulus Type	*Valence*	*Low Brief IAS* Mean (SD)	*High Brief IAS* Mean (SD)
Picture	Threat	2.63 (1.27)	3.55 (1.13)
	Neutral	0.22 (0.36)	0.26 (0.25)
Word	Threat	2.64 (1.24)	3.69 (1.31)
	Neutral	0.12 (0.22)	0.22 (0.47)

Table 6 – Mean Threat Ratings for Health and Neutral Stimuli based upon ASI groups

Stimulus Type	*Valence*	*Low ASI* Mean (SD)	*High ASI* Mean (SD)
Picture	Threat	2.48 (1.06)	3.70 (1.20)
	Neutral	0.18 (0.29)	0.30 (0.32)
Word	Threat	2.64 (1.24)	3.68 (1.31)
	Neutral	0.10 (0.17)	0.25 (0.48)

Table 7 – Bivariate Correlations on Questionnaire Measures, Attentional Bias Measures and Stimulus Threat Ratings (Pearson r values)

	IAS	BRIEF IAS	ASI	MCS	PSBIAS	PLBIAS	WSBIAS	WLBIAS	STAI (STATE)	STAI (TRAIT)	HRATE	NRATE
IAS	-	0.85**	0.70**	-0.30*	0.14	0.11	0.04	-0.05	0.65**	0.68**	0.57**	0.24
BRIEF IAS		-	0.59**	-0.27	0.11	0.16	-0.23	-0.03	0.64**	0.66**	0.42**	0.19
ASI			-	-0.27	0.35*	0.01	-0.04	0.00	0.65**	0.66**	0.55**	0.11
MCS				-	-0.04	-0.74	-0.07	0.16	-0.28	-0.28	-0.17	0.01
PSBIAS					-	0.15	-0.05	0.42**	0.02	0.01	0.13	0.03
PLBIAS						-	0.14	-0.06	0.03	-0.01	-0.07	-0.04
WSBIAS							-	-0.18	-0.03	-0.04	0.19	-0.01
WLBIAS								-	-0.30*	-0.28	0.16	0.11
STAI (STATE)									-	0.81**	0.29*	0.04
STAI (TRAIT)										-	0.40**	0.05
HRATE											-	0.38**

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Note: IAS = Illness Attitudes Scale (full version), BRIEF IAS = Illness Attitudes Scale (screening version), ASI = Anxiety Sensitivity Index, MCS = Marlowe-Crowne Scale, PSBIAS = attentional bias to pictures (500 msec), PLBIAS = attentional bias to pictures (1250 msec), WSBIAS = attentional bias to words (500 msec), WLBIAS = attentional bias to words (1250 msec), STAI (STATE) = State Trait Anxiety Inventory (State subscale), STAI (TRAIT) = State Trait Anxiety Inventory (Trait subscale), HRATE = ratings of health-threat stimuli (words and pictures), NRATE = ratings of neutral stimuli (words and pictures)

APPENDICES

Appendix 1: Cognition and Emotion: Notes to contributors

COGNITION AND EMOTION

Aims and Scope *of Cognition and Emotion*

Cognition and Emotion is devoted to the study of emotion, especially to those aspects of emotion related to mental processes. The Journal aims to bring together work on emotion undertaken by researchers in cognitive, social, clinical, and developmental psychology, neuropsychology, and cognitive science; it also welcomes psychologically orientated submissions from those in philosophy, the humanities, anthropology, sociology, and other social sciences. Examples of topics appropriate for the Journal include emotional appraisals; effects of emotion or mood on cognition and motivation; the nature of emotional experience; self-regulation of emotion or mood; social, historical, or cultural aspects of emotion; and the nature of particular emotions or emotionality in general. *Cognition and Emotion* publishes theoretical papers, original research reports, literature reviews, and extended reviews of selected books. Submissions can be considered for expedited publication as brief reports. The Journal also publishes critical abstracts of recent books.

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Appendix 2: Behaviour Research and Therapy: Notes to contributors

BEHAVIOUR RESEARCH AND THERAPY
incorporating BEHAVIORAL ASSESSMENT

Information for Contributors

Submission of Papers

Authors are requested to submit their original manuscript and figures with two copies. Manuscripts for the regular section should be sent to Dr S. Rachman, Department of Psychology, University of British Columbia, Vancouver, British Columbia, Canada, V6T 1Z4. Manuscripts for the *Behavioral Assessment* Section should be sent to Dr S. Taylor, Department of Psychiatry, 2255 Wesbrook mall, Vancouver, British Columbia, Canada, V6T 2A1.

Submission of a paper implies that it has not been published previously, that it is not under consideration for publication elsewhere, and that if accepted it will not be published elsewhere in the same form, in English or in any other language, without the written consent of the publisher.

Manuscript Preparation

General: Manuscripts must be typewritten, double-spaced with wide margins on one side of white paper. Good quality printouts with a font size of 12 or 10 pt are required. The corresponding author should be identified (include a Fax number and E-mail address). Full postal addresses must be given for all co-authors. Authors should consult a recent issue of the journal for style if possible. An electronic copy of the paper should accompany the final version. The Editors reserve the right to adjust style to certain standards of uniformity. Authors should retain a copy of their manuscript since we cannot accept responsibility for damage or loss of papers. Original manuscripts are discarded one month after publication unless the Publisher is asked to return original material after use.

Abstracts: A summary, not exceeding 200 words, should be submitted on a separate sheet in duplicate. The summary will appear at the beginning of the article.

Keywords: Authors should include up to six keywords with their article. Keywords should be selected from the APA list of index descriptors, unless otherwise agreed with the Editor.

Text: Follow this order when typing manuscripts: Title, Authors, Affiliations, Abstract, Keywords, Main text, Acknowledgements, Appendix, References, Vitae, Figure Captions and then Tables. Do not import the Figures or Tables into your text. The corresponding author should be identified with an asterisk and footnote. All other footnotes (except for table footnotes) should be identified with superscript Arabic numbers.

References: All publications cited in the text should be present in a list of references following the text of the manuscript. In the text refer to the author's name (without initials) and year of publication, e.g. "Since Peterson (1993) has shown that . . ." or "This is in agreement with results obtained later (Kramer, 1994)". For 2–6 authors, all authors are to be listed at first citation, with "&" separating the last two authors. For more than six authors, use the first six authors followed by et al. In subsequent citations for three or more authors use author et al. in the text. The list of references should be arranged alphabetically by authors' names. The manuscript should be carefully checked to ensure that the spelling of authors names and dates are exactly the same in the text as in the reference list.

References should be prepared carefully using the *Publication Manual of the American Psychological Association* for style as follows:

Birbaumer, N., Gerber, D., Miltner, W., Lutzenberger, W., & Kluck, M. (1984). Start with biofeedback and continue with behavior therapy in migraine. *Proceedings of the 15th Annual Meeting of Biofeedback Society of America* (pp. 33–36) Albuquerque.

Gray, J.A. (1976). The behavioral inhibition system: a possible substratum for anxiety. In M. P. Feldman & A. Broadhurst. *Theoretical and experimental bases of the behaviour therapies* (pp. 3–41). London: Wiley.

Taber, I.I., McCormick, R.A., Russo, A.M., Adkins, B.J., & Ramirez, L.F. (1987). Follow-up of pathological gamblers after treatment. *American Journal of Psychiatry, 144*, 757–761.

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Contact details for questions arising after acceptance of an article, especially those relating to proofs, are provided when an article is accepted for publication.

Appendix 3: University of Southampton Ethics Committee approval for research

University of Southampton

Department of Psychology

University of Southampton
Highfield
Southampton
SO17 1BJ
United Kingdom

Telephone +44 (0)23 8059 5000
Fax +44 (0)23 8059 4597
Email

28th July 2000

FAO Andie Lees
Clinical Psychology Department
University of Southampton
Highfield, Southampton
SO17 1BJ

Dear Andie,

Re: Application for Ethical Approval

I am writing to confirm that your ethical application titled "Selective attention to health-related stimuli in health anxiety" has been given approval by the department.

Should you require any further information, please do not hesitate in contacting me on (023) 80 593995.

Yours sincerely,

KMSmith

Kathryn Smith
Ethical Secretary

DEPARTMENT OF PSYCHOLOGY

OUTLINE OF PROPOSED RESEARCH TO BE
SUBMITTED FOR ETHICAL APPROVAL

PLEASE NOTE: *You will need to discuss this form with your Supervisor. In particular, you should ask him/her for any departmental guidelines relating to this area of research which you must read and understand. You should also read and understand the Ethical Principles for Conducting Research with Human Participants published by the British Psychological Society.* ***You must not begin your study until ethical approval has been obtained. Failure to comply with this policy will affect the viability of your research***

To obtain ethical approval it may take up to one week for undergraduates and up to two weeks for staff and postgraduates.

1. **Name(s):** Andie Lees

   Supervisor: Dr Karin Mogg

2. **How may you be contacted?**

   Clinical Psychology Office (25321)
   Home: 80238140
   e-mail: aml@psy.soton.ac.uk

3. **Into which category does your research fall?**

Year 1 Practical	
Year 2 Practical	
Year 3 Project	
Intercalated Medical	
MSc Ed Psy	
MSc/Diploma Health	
DClin Psy	X
PhD Research	
Intercalated Medical Student	
Staff Research	

4. **Provisional Title of Project:** Selective attention to health-related stimuli in health anxiety

5. **ANSWER THE FOLLOWING QUESTIONS.**
Give full details where necessary.

a) **What are the aims, hypothesis or research questions of this project?**

Research Question
Do health anxious individuals demonstrate attentional biases for health-threat stimuli?

Aim
The aim of the study is to explore attentional biases for health-related words and images presented at two stimulus durations in health anxious and non-health anxious participants.

Hypotheses
1) There will be a greater degree of avoidance of health-threat images than health-threat words at the longer stimulus duration in the health anxious group.

2) There will be a greater degree of avoidance of health-threat images at the longer stimulus duration than the shorter stimulus duration in the health anxious group.

3) There will be a greater degree of vigilance towards health-threat stimuli than neutral stimuli at the shorter stimulus duration in the health anxious group.

4) The health anxious group will show a greater degree of vigilance towards health-threat stimuli, presented at the shorter duration, than the non-health anxious group.

b) **What measurement procedures will be employed?**
(If a questionnaire/test protocol/structured interview is to be used, a copy should be attached).

Stimuli
A dot-probe task will be used to present the stimuli used in this experiment. There will be 16 health-threat images, 16 health-threat words, 16 neutral images, 16 neutral words and 32 'filler' stimuli (16 neutral images, 16 neutral words).

The health-threat and neutral stimuli will be presented twice each at two stimulus durations (500 ms and 1500ms). There will be a total of 192 trials (including 'filler' stimuli) and it is estimated that the experiment will last about 12 minutes. There will be a rest period in the middle of the task.

Following the task, participants will be asked to rate each of the stimuli (64 in total) in terms of their degree of threat.

Examples of Health-Threat Pictures and Words (all pictures black and white)

Word	Picture
CASUALTY	**picture of an ambulance**
COFFIN	**picture of a coffin**
COLLAPSE	**picture of person in recovery position on floor**
CORONARY	**picture of person attached to ECG machine**
FUNERAL	**picture of a gravestone**
PARALYSED	**picture of person sitting in wheelchair**

The neutral images will be matched for degree of complexity and pre-rated as low in emotional valence (will be selected from the International Affective Picture System). The neutral words will be matched for length and frequency of usage, using Carroll, Davies and Richman's (1971) norms.

Filler stimuli will be selected from a graphics computer software package and Carroll et al's (1971) norms.

Questionnaires
In order to designate participants into the Health Anxious and Non-Health Anxious groups, the Illness Attitudes Scale (Kellner, 1986) will be used.

The State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg and Jacobs, 1983) will be used to monitor general anxiety levels, which may also affect patterns of responding in the experiment.

The Marlowe-Crowne Social Desirability Scale (SDS; Strahan and Gerbasi, 1972) will be used to look at need for social approval as this may affect completion of above questionnaires.

If a standard questionnaire is to be used, have you obtained permission to duplicate this questionnaire or purchased sufficient copies? YES/NO
Permission to use/or sufficient copies of all these questionnaires will be obtained prior to data collection.

c) **Who are the participants?**
The participants will be psychology undergraduates in the first instance. Estimated numbers needed for screening are based upon previous research on health anxiety using participants from non-clinical university samples. For example, Hadjistavropoulos, Craig and Hadjistavropoulos (1998) screened 782 undergraduate psychology students, using the IAS, to achieve a sample of 96 High Health Anxious and 96 Low Health Anxious (using cut-off points).

For this study, it is planned that 20 participants will form the High Health Anxious Group, and 20 the Low Health Anxious Group. Based upon the ratio above, it is anticipated that around 200 students would need to be screened. If there are not enough numbers within psychology undergraduates, it is hoped that undergraduates from another department (e.g., geography/physics) could be recruited.

d) **How will they be recruited?**
The experimenter aims to approach participants following departmental lectures to invite them to take part in the screening. Permission would be sought from lecturers to ask students to complete a screening questionnaire after teaching. Screening questionnaires include a short version of the IAS, contact details to invite participants to take part in the main experiment following screening and questions designed to exclude students currently experiencing serious illness (see copy included).

e) **If participants are under the responsibility of others (such as teachers, nurses or medical staff) have you obtained permission for the participants to take part in the study? YES/NO**
N/A

f) **Is there reason to believe participants will experience discomfort during your study?**
There is no reason to believe participants will experience physical discomfort during the study. Participants may experience a temporary increase in anxiety as a result of viewing the health-threat images. Care will be taken to provide information about the nature of the stimuli at the outset in the consent form.

g) **How will you obtain the consent of participants?**
A consent form will be provided for participants to read and sign before starting the experiment (see copy included).

h) **How will it be made clear to participants that they may withdraw consent to participate at any time?**
This will be made clear in the consent form provided.

Will the procedure involve deception of any sort? YES/NO
NO

If YES, what is your justification?
-

j) **Do you propose to debrief participants and/or provide them with information about the findings of your study?**
YES

If YES, how will this be done?
Participants will be given the opportunity to provide contact details, should they wish to receive information about the findings of the study.

If NO, why is there no debriefing?
-

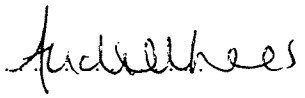
k) **How will information obtained from or about participants be protected?**
Participants' will be allocated codes once they take part in the main experiment, and these codes will be linked to the data collected, both from the dot probe task and the questionnaires.

l) **Experimental apparatus employed must be approved for safety by Martin Hall or Bryan Newman. Has this approval been given?**
The experimenter has approached Martin Hall about the setting up of the dot probe task.

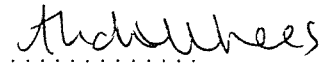
m) **Do you intend to make a submission to the medical ethical committee?**
(Certain projects may need medical ethical approval, please check with your supervisor) YES/NO
NO

6. **Outline any other information you feel relevant to this submission.**
-

I endorse the following statement: "I confirm that I have a copy of, have read and understand the Ethical Principles for Conducting Research with Human Participants published by the British Psychological Society".

Signature(s) 

If you have received additional written guidelines from your supervisor please endorse the statement; "I have received, read and understood departmental ethical guidelines issued to me by my Supervisor relating to this work"

Signature(s)  Date 17.7.00

Appendix 4: Word stimuli

CANCER

FELINE

CASUALTY

TRACTORS

COFFIN

ROWING

COLLAPSE

FARMYARD

CORONARY

DWELLING

CORPSE

CITRUS

DISEASED

BATHROOM

DYING

CANAL

FATAL

MANOR

FUNERAL

COTTAGE

HOSPITALISED

PERFORMANCES

ILLNESS

FLOWERY

INFECTIOUS

CONIFEROUS

OPERATION

STEAMBOAT

PARALYSED

LEISURELY

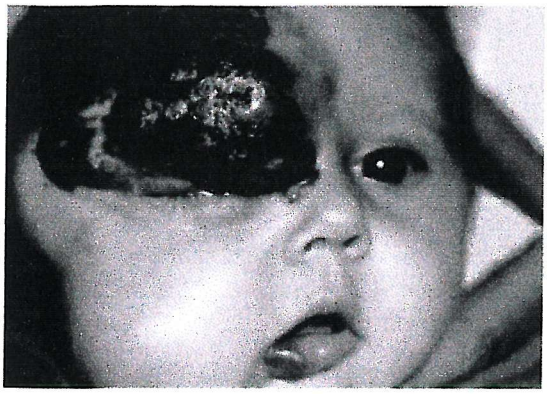
SPASM

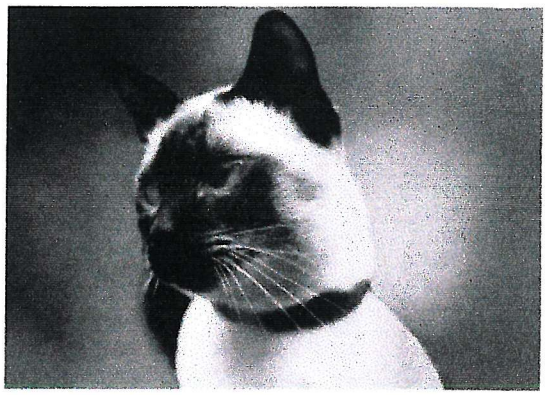
WOVEN

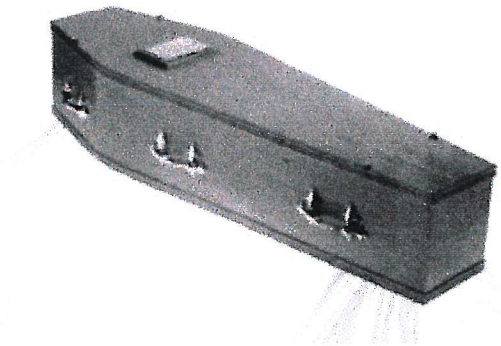
Appendix 5: Word frequencies based upon Carroll et al's (1971) norms

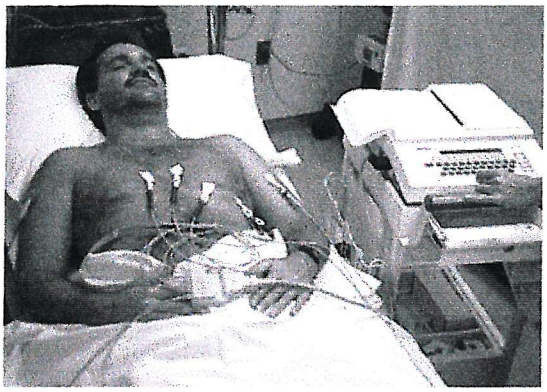
Health-threat word	Frequency	Neutral word	Frequency
CANCER	4.30	FELINE	0.00
CASUALTY	0.07	TRACTORS	3.75
COFFIN	3.16	ROWING	5.29
COLLAPSE	2.44	FARMYARD	1.85
CORONARY	0.23	DWELLING	2.73
CORPSE	1.82	CITRUS	3.20
DISEASED	1.39	BATHROOM	6.22
DYING	14.23	CANAL	23.40
FATAL	5.68	MANOR	1.58
FUNERAL	4.58	COTTAGE	12.74
HOSPITALISED	0.17	PERFORMANCES	3.31
ILLNESS	10.70	FLOWERY	0.25
INFECTIOUS	1.17	CONIFEROUS	0.54
OPERATION	32.20	STEAMBOAT	5.09
PARALYSED	2.76	LEISURELY	1.95
SPASM	0.32	WOVEN	11.25

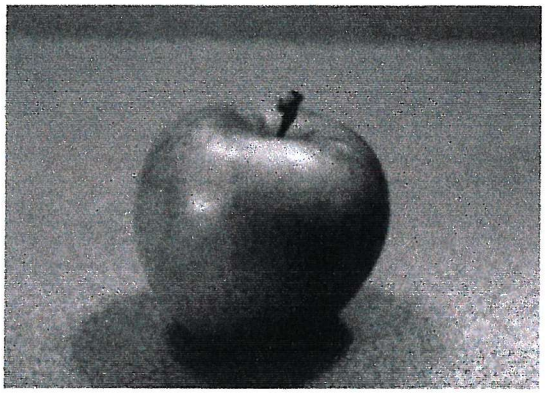
Appendix 6: Picture stimuli

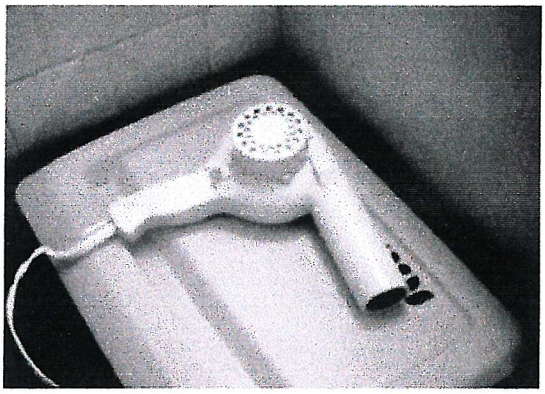


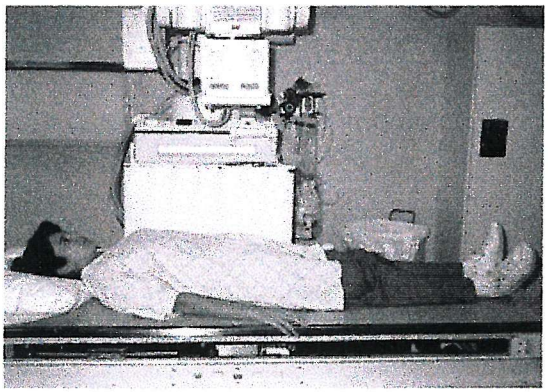


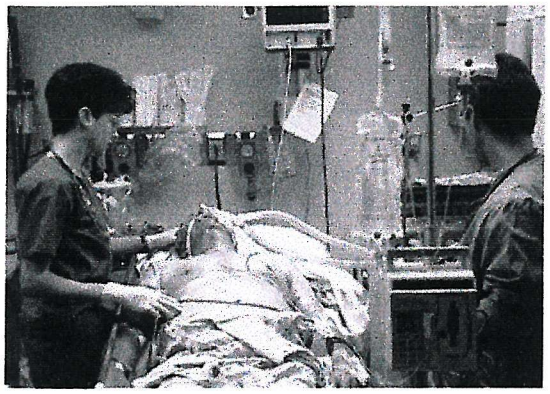


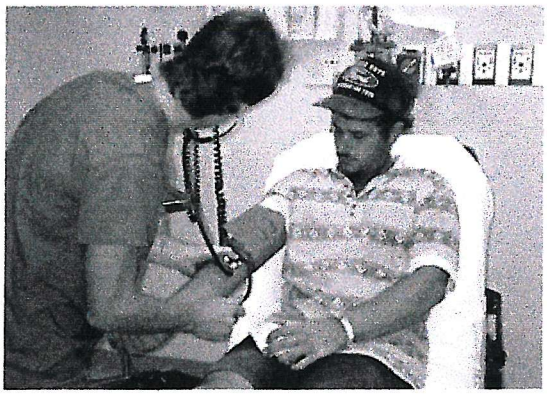


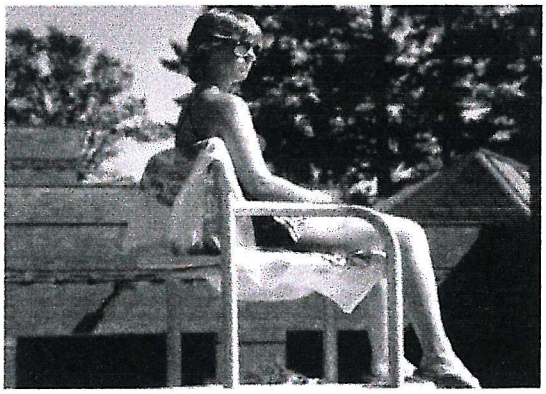


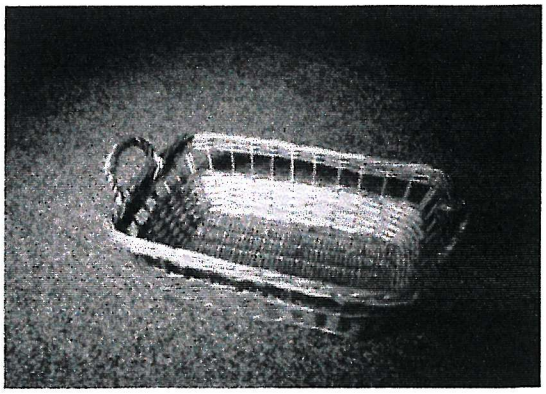












Appendix 7: Consent form

CONSENT FORM

You are being invited to take part in a research experiment about health anxiety. You have been selected for this study following the screening questionnaire you completed. Before you decide, this sheet provides information about the experiment and what it will involve. Please ask if there is anything that is not clear.

The experiment involves completing three questionnaires and also taking part in a computer task. The total time of data collection will be around 30 minutes. In the task, you will see a series of pictures and words presented briefly. There will be a wide range of pictures including animals, country scenes, hospital scenes, household items and sporting scenes. You will see these at brief intervals in the task itself and at longer intervals following the computer task, when you will be asked to rate them. You may find some of the words or pictures unpleasant, and it is important to remember that you are free to withdraw from the experiment at any time. If you wish to withdraw for this, or any other reason during the experiment, let the experimenter know and you will not be asked to say why.

Participants will be assigned codes in order to maintain confidentiality with regard to the data collected. The results of this study will be written up by the researcher as part of a training course in clinical psychology. If you would like a summary of the results, then please indicate this on the final sheet you are given with the address/e-mail to which they are to be sent.

Please read the following, and sign below if you still wish to take part

1. I confirm that I have read and understood the information above for this study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.

3. I agree to take part in the above study.

Name of Participant	Date	Signature

Appendix 8: Illness Attitudes Scale (IAS)

**(items marked with an asterisk denote those included in the brief version of IAS, used for screening)*

NAME: _____

Illness Attitudes Scale (Kellner, 1986)

0 = not at all/none 1 = rarely 2 = sometimes 3 = often 4 = most of the time

1. Do you worry about your health?	0	1	2	3	4
2. Are you worried that you may get a serious illness in the future?	0	1	2	3	4
3. *Does the thought of a serious illness scare you?	0	1	2	3	4
4. If you have pain, do you worry that it may be caused by a serious illness?	0	1	2	3	4
5. If pain lasts for a week or more, do you see a physician?	0	1	2	3	4
6. If a pain lasts a week or more, do you believe that you have a serious illness?	0	1	2	3	4
7. Do you avoid habits which may be harmful to you, such as smoking?	0	1	2	3	4
8. *Do you avoid food which may not be healthy?	0	1	2	3	4
9. Do you examine your body to find out whether there is something wrong?	0	1	2	3	4
10. *Do you believe that you have a physical disease, but the doctors have not diagnosed it correctly?	0	1	2	3	4
11. *When your doctor tells you that you have no physical disease, do you refuse to believe him/her?	0	1	2	3	4
12. *When you have been told by a doctor what he/she found, do you soon begin to believe that you may have developed a new illness?	0	1	2	3	4
13. *Are you afraid of news which reminds you of death?	0	1	2	3	4
14. *Does the thought of death scare you?	0	1	2	3	4
15. Are you afraid that you may die soon?	0	1	2	3	4
16. *Are you afraid that you may have cancer?	0	1	2	3	4

0 = not at all/none 1 = rarely 2 = sometimes 3 = often 4 = most of the time

17. Are you afraid that you may have heart disease?	0	1	2	3	4
18. Are you afraid that you may have another serious illness?	0	1	2	3	4
19. When you read or hear about an illness, do you get symptoms similar to those of the illness?	0	1	2	3	4
20. When you notice a sensation in your body, do you find it difficult to think of something else?	0	1	2	3	4
21. When you feel a sensation in your body, do you worry about it?	0	1	2	3	4
22. *How often do you see a doctor?	0	1	2	3	4
23. *How many different doctors/chiropractors, or other healers have you seen in the past year?	0	1	2	3	4
24. How often have you been treated during the past year? (for example drugs, change of drugs, surgery etc.)	0	1	2	3	4
25. *Do your bodily symptoms stop you from working?	0	1	2	3	4
26. *Do your bodily symptoms stop you from concentrating on what you are doing?	0	1	2	3	4
27. *Do your bodily symptoms stop you from enjoying yourself?	0	1	2	3	4

Please circle YES or NO for these questions:

A) Are you currently receiving treatment for a serious illness? YES/NO

B) Does your GP think that you are suffering from a serious illness? YES/NO

Optional Question: If YES to either of the above, please describe below.

Appendix 9: Anxiety Sensitivity Index (ASI)

Reiss-Epstein-Gursky A.S.I.

Name _____ **Today's Date** _____

Circle the *one* phrase that best represents the extent to which you agree with the item. If any of the items concern something that is not part of your experience (e.g., "It scares me when I feel shaky" for someone who has never trembled or had the "shakes"), answer on the basis of how you think you might feel *if you had* such an experience. Otherwise, answer all items on the basis of your own experience.

1. It is important to me not to appear nervous.

   Very Little A Little Some Much Very Much

2. When I cannot keep my mind on a task, I worry that I might be going crazy.

   Very Little A Little Some Much Very Much

3. It scares me when I feel "shaky" (trembling).

   Very Little A Little Some Much Very Much

4. It scares me when I feel faint.

   Very Little A Little Some Much Very Much

5. It is important to me to stay in control of my emotions.

   Very Little A Little Some Much Very Much

6. It scares me when my heart beats rapidly.

   Very Little A Little Some Much Very Much

7. It embarrasses me when my stomach growls.

   Very Little A Little Some Much Very Much

(Over)

8. It scares me when I am nauseous.

Very Little A Little Some Much Very Much

9. When I notice that my heart is beating rapidly, I worry that I might have a heart attack.

Very Little A Little Some Much Very Much

10. It scares me when I become short of breath.

Very Little A Little Some Much Very Much

11. When my stomach is upset, I worry that I might be seriously ill.

Very Little A Little Some Much Very Much

12. It scares me when I am unable to keep my mind on a task.

Very Little A Little Some Much Very Much

13. Other people notice when I feel shaky.

Very Little A Little Some Much Very Much

14. Unusual body sensations scare me.

Very Little A Little Some Much Very Much

15. When I am nervous, I worry that I might be mentally ill.

Very Little A Little Some Much Very Much

16. It scares me when I am nervous.

Very Little A Little Some Much Very Much

Appendix 10: State-Trait Anxiety Inventory (STAI)

MIND GARDEN
Palo Alto, California

SELF-EVALUATION QUESTIONNAIRE

STAI Form Y-1

Please provide the following information:

Name_____ Date_____ S_____

Age_____ Gender (*Circle*) **M** **F** T_____

DIRECTIONS:

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate value to the right of the statement to indicate how you feel *right* now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4
4. I feel strained	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel satisfied	1	2	3	4
9. I feel frightened	1	2	3	4
10 I feel comfortable	1	2	3	4
11. I feel self-confident	1	2	3	4
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4
14. I feel indecisive	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel confused	1	2	3	4
19. I feel steady	1	2	3	4
20. I feel pleasant	1	2	3	4

SELF-EVALUATION QUESTIONNAIRE

STAI Form Y-2

Name_____ Date_____

Please read these too:

DIRECTIONS

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate value to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
21. I feel pleasant	1	2	3	4
22. I feel nervous and restless	1	2	3	4
23. I feel satisfied with myself	1	2	3	4
24. I wish I could be as happy as others seem to be	1	2	3	4
25. I feel like a failure	1	2	3	4
26. I feel rested	1	2	3	4
27. I am "calm, cool, and collected"	1	2	3	4
28. I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4
29. I worry too much over something that really doesn't matter	1	2	3	4
30. I am happy	1	2	3	4
31. I have disturbing thoughts	1	2	3	4
32. I lack self-confidence	1	2	3	4
33. I feel secure	1	2	3	4
34. I make decisions easily	1	2	3	4
35. I feel inadequate	1	2	3	4
36. I am content	1	2	3	4
37. Some unimportant thought runs through my mind and bothers me	1	2	3	4
38. I take disappointments so keenly that I can't put them out of my mind	1	2	3	4
39. I am a steady person	1	2	3	4
40. I get in a state of tension or turmoil as I think over my recent concerns and interests	1	2	3	4

Appendix 11: Social Desirability Scale (MCS)

Name:

PERSONAL REACTION INVENTORY (X1)

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is True or False as it pertains to you personally, then circle that answer.

(1) I like to gossip at times. TRUE FALSE

(2) There have been occasions when I took advantage of someone. TRUE FALSE

(3) I am always willing to admit it when I make a mistake. TRUE FALSE

(4) I always try to practice what I preach. TRUE FALSE

(5) I sometimes try to get even with people rather than forgive and forget. TRUE FALSE

(6) At times, I have really insisted on having things my own way. TRUE FALSE

(7) There have been occasions when I felt like smashing things. TRUE FALSE

(8) I never resent being asked to return a favour. TRUE FALSE

(9) I have never been irritated when people expressed ideas very different from my own. TRUE FALSE

(10) I have never deliberately said something that hurt someone's feelings. TRUE FALSE