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Associations Between Hypochondriacal Symptoms and Illness Appraisals and their Moderation by Self-Focussed Attention

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Abstract

Hypochondriacal symptoms are associated with cognitive biases in the ways that illness is appraised. Self-focussed attention (SFA) may augment or reduce these biases. Using a healthy sample, this study examined relationships between hypochondriacal symptoms, assessed using the Illness Attitudes Scale, and illness appraisals, assessed using the Illness Perception Questionnaire-Revised. 170 participants were exposed to a SFA manipulation or a non-SFA control, given a health-message about influenza and asked to imagine having the disease. Hypochondriacal symptoms were linked to higher symptom perceptions, greater perceptions of personal and treatment control and higher disease coherence. SFA augmented the relationship between hypochondriacal symptoms and personal control. Findings are discussed in terms of illness appraisal biases and attentional components of these biases.

Key words: hypochondriasis; self-focussed attention; illness representations; cognitive bias.

Introduction

Hypochondriasis is an preoccupation with having a serious illness despite medical disconfirmation and reassurance (American Psychiatric Association, 1994). The prevalence of hypocondriasis, defined by the DSM-IV or ICD-10, in normal populations ranges from 0.02 - 7.7% (Noyes, Happel & Yagla, 1999; Bleichhardt & Hiller, 2007). One study showed that 10.35% of the population meet one or more DSM-IV hypochondriasis criteria (Martin & Jacobi, 2006), demonstrating the importance of undstanding factors behind the distribution of hypochondriacal symptoms in a normal population. It has been estimated that $20 billion per year is spent on those patients in the USA, with the majority spent on sub-clinical cases (Demopulous, Fava, McLean, et al., 1996).

Many theoretical accounts of hypochondriacal symptoms focus upon cognitive biases in the appraisal of illness (Markus, 2007; Salkovis & Warwick, 2001). Hypochondriacal symptoms are associated with illness schemata that cause catastrophic appraisals of illness-related stimuli or events (Lessi & Cohen, 2002; Owens et al., 2004; Hadjistavropoulos, Craig & Hadjistavropoulos, 1998). These biases lead to perceptions of more severe diseases (Haenen, Schmidt, Kroeze, et al., 1996), greater threat (Ferguson, Swairbrick, Clare, et al., 2000) and the anticipation of more severe outcomes (Hitchcock & Matthews, 1992; Rief, Hiller & Margraf, 1998). Compounding these biases, confirmatory biases may also occur, whereby information consistent with initial catastrophic appraisals is given greater weighting than disconfirming information (Rassin, Muris, Franken & van Straten, 2008).

Hypochondriacal symptomssis also involve the over-utilization of health care services. A search activity view posits that this may partly be a consequence of active efforts to cope with anxiety elicited by elevated threat appraisals (Rotenberg & Boucsein, 1992). Ferguson, et al. (2000) provided support for the active coping idea, linking hypochondriacal symptoms to higher perceptions of personal control over illness. Normally perceptions of control act as precursors to positive coping responses (Hagger & Orbell, 2003), but in this case they might be related to safety behaviours such as treatment seeking (Abramowitz & Moore, 2007). Together, current findings suggest that hypochondriacal symptoms are associated with cognitive biases that emphasise both threat perception and personal control over illness.

The Illness Attitude Scale (IAS - Kellner 1986) is a valid and frequently used measure of hypochondriacal symptoms. The most comprehensive structural study of the IAS (Hadjistavropolous, Frombach & Asmundson, 1999) suggests a four-factor structure, but it is not clear whether the best fit is achieved by four correlated factors or a hierarchical structure with a single higher order factor and four lower order factors. The four factors are: *Fear of illness and pain*, pertaining to worry;

Treatment experience, seeking medical assistance; *Disease conviction*, beliefs about illness; and *Symptom effects*, functional effects of symptoms. Patterns of associations with health anxiety and health care utilisation indictors show the fear of illness and death and symptom effects subscales to be more strongly associated with measures of anxiety and symptom effects and disease conviction being associated with health care utilisation (Fergus & Valentiner, 2009). Thus, the processes of threat perception and coping behaviours appear to be associated with different IAS profiles.

If the distribution of hypochondriacal symptoms in a normal population is partly determined by biased appraisals of illness likelihood, severity and control over illness, then higher scorers ought to also score more highly on measures of these. One aim of this study is to examine links between hypochondriacal symptoms and the ways in which a normal, healthy population appraise illness stimuli and their control over them. We then argue that the bias is influenced by self-focussed attention (SFA)A second aim is to test the idea that a simple manipulation of SFA will either augment or reduce the strength of these links.

Illness Appraisal

The Common-Sense Model (CSM) of illness representations (Leventhal Nerenz & Steele, 1984, Leventhal, Leventhal & Contrada, 1998; Moss-Morris, Weinman, Petrie et al, 2002) provides an integrated and empirically well-established model of appraisals concerning both acute and chronic illnesses. According to the CSM, people are motivated to understand the nature and implications of illness, and use symptoms, professional advice and lay personal and social representations to do so. These stimuli are interpreted in parallel by two qualitatively differing, but interacting, modes of processing; cognitive and emotional. Cognitive representations refer to symbolic modes of processing, guided by conscious and effortful thought, that interpret stimuli with regard to potential threat and coping resources. Emotional representations encompass associative processing modes, where stimuli directly invoke emotional responses without conscious or effortful processing.

Based on Moss-Morris et al's (2002) configuration of the model, the cognitive component involves six categories of subjective beliefs. These influence both perceptions of threat and the choice of coping behaviours. The six beliefs are: *Identity* - perceptions of symptoms; *Causes* – the perceived causes of the symptoms; *Timeline* - beliefs about the anticipated duration and course of the illness; *Consequences* of the symptoms - any gains or losses to lifestyle or goals; *Controllability* of symptoms or experiences associated with the health threat; and *Coherence* - the extent to which patients perceive that they understand the illness and its implications. Identity, timeline and consequences are thought to reflect threat-related cognitions emphasising the potential severity of disease outcomes, whilst control perceptions appear to link to coping appraisals. Coherence refers to a meta-cognitive judgement of the extent to which the symptoms, course of disease and personal impact are perceived as comprehensible. Hypochondriacal symptoms might be related to higher coherence scores because the concept and experience of illness is congruent with illness-related schemata (Marcus, et al., 2007).

Self-Focussed Attention

Recent hypochondriasis research and therapeutic interest has focussed on the role of attentional processes in cognitive biases (Papageorgiou & Wells, 1998; Owens,et al., 2004; Rief, Hiller & Margraf, 1998). Whilst this interest has concentrated mainly on attention to symptomatic cues, it is also possible that attentional processes also affect illness interpretation. Self-focussed attention (SFA) refers to the orientation of attention to broad aspects of the self. SFA increases access to prominent self-referent information and the tendency to draw personal implications from this information, magnifying its effects (Eiser, Pahl & Prins, 2001). SFA manipulations influence a range of cognitive processes (Duval & Wicklund, 1972), and augments several self-referent processing biases, such as self-attribution (Duval & Silvia, 2002), biases toward personal (relative to average) outcome expectations (Kruger & Burrus, 2004) and negative biases in autographical memory (Pyszczynski, et al., 1989). SFA has been shown to increase negative processing biases in depression (Pyszczynski, Hamilton, Herring & Greenberg, 1989; Nix, Watson, Pyszczynski & Greenberg, 1995) and social anxiety (Zou, Hudson & Rapee, 2007). In the case of hypochondriacal symptoms, it is conceivable that SFA draws attention to prominent illness schemata involved in the appraisal of threat, personal vulnerabilities and coping resources.

Conversely, SFA can also have an opposite effect, where it inhibits biased thinking by eliciting introspective processes that undermine biases. Gibbons and McCoy (1991) suggest that self-awareness facilitates meta-cognitive processes, allowing a more close and objective examination of thought processes. This enables people to detect and correct biases that may otherwise be overlooked. Examples of this include the alleviation of stereotypical thinking (Macrae, Bodenhausen & Milne, 1998) and biases relating to the availability heuristic (Buontempo & Brockner, 2008). Thus, the effect of SFA on processing bias might depend upon the nature of the cognitive process. Bias inhibition appears to occur during tasks requiring the monitoring of thought and self-reflective insight, such as attempting to override stereotypic thought processes (Macrae, Bodenhausen & Milne, 1998). In the case of hypochondriacal symptoms symptoms, inhibition might occur during more deliberate metacognitive appraisals of illness (Gibbons & McCoy, 1991), such as those that are made about illness coherence.

Study Aim and Hypotheses

We aimed to identify links between hypochondriacal symptoms and cognitive illness appraisals on dimensions specified by Moss-Morris et al's (2002) configuration of the CSM. A second aim was to establish if the induction of SFA in moderates or facilitates the above links. A potential confound to the interpretation of links between hypochondriacal symptoms and illness appraisals is that higher scorers on hypochondriasis measures show greater physiological reactivity to bodily sensations (Gramling, Clawson & McDonald, 1996). Thus, we cannot tell if their greater illness appraisals are attributable to biased cognitive processing or greater physiological sensitivity to illness. Rather than focussing on actual illness symptoms, we used a method similar to that of Gramling, Clawson and McDonald (1996), asking a sample of healthy participants to imagine experiencing a moderately serious but well-known and understood illness.

After undergoing a manipulation designed to invoke SFA, validated by Silvia and Eichstaedt (2004), participants were provided with a description of the causes, course and symptoms of influenza infection, and asked to *imagine* experiencing this illness and complete a measure based on the CSM. Based on our postulate that hypochondriacal symptoms are associated with biases toward higher threat, control and coherence appraisals, links with higher perceptions of illness symptomology, more severe appraisals of timeline and consequences, and perceptions of greater control and coherence were expected.

We also predicted that any links between hypochondriacal symptoms and symptom perception and appraisals would be affected by SFA. Focussing attention on personal characteristics increases existing biases associated with threat and coping appraisal processes and should augment perceptions of threat and control. This should facilitate links between hypochondriasis scores and threat and coping appraisals. However, illness coherence is a metacognitive judgement where individuals' make appraisals of their understanding of disease processes and their responses to them. SFA may reduce metacognitive error, thus moderating any coherence biases. No predictions were made for the direct effect of the SFA manipulation on illness appraisals.

Method

Design

Participants completed the IAS, then were randomly allocated to the SFA manipulation or a control group. After the attentional manipulation, participants were given a health message describing the causes, symptoms and treatment of influenza, and were asked to imagine suffering from the virus.

The DVs were the eight IPQ-R subscales worded appropriately to the hypothetical case of influenza, and administered directly after being asked to imagine suffering from influenza.

We were not able to administer the IAS and experimental protocol on different days. It was decided to administer the IAS before the protocol. Completion of the IAS might affect responses to the IPQ-R, but it would do so equally for both SFA groups. If the protocol was to be administered first, the SFA manipulation may differentially affect the way that participants respond to the IAS. This would be a serious internal validity issue. We do, however, caution that external validity may be affected because participants completed the protocol after completing the IAS.

Participants

Participants were 170 students (54 male; 116 female) recruited by personal approaches made in public areas of a university campus. The mean age of the participants was 23.4 years (*SD* = 7.12). All participants reported being healthy and appeared, to the experimenter (S.W.), to be free of cold or influenza symptoms.

Materials

Measurement of hypochondriacal symptoms: The Illness Attitude Scale (Kellner 1986) is a dimensional measure of hypochondriacal symptoms, applicable to a normal population. Items solicit responses to questions about illness worries, illness preventive behaviours, and medical help seeking. As IAS factors appear to differentially predict illness anxiety and coping appraisals (Fergus & Valentiner, 2009), we used the four factor structure found and confirmed by Hadjistavropolous, Frombach and Asmundson (1999 – see introduction). We used the sub-scales Fear of illness and pain (9 items), Treatment experience (4 items), Disease conviction (4 items), and Symptom effects (4 items). The response format was as follows: 0 = no, 1 = rarely, 2 = sometimes, 3 = often, and 4 = most of the time. Higher scores indicate greater hypochondriacal symptoms. Supporting the decision to treat the factors as separate, we found only low to medium intercorrelations (.17 to .47) amongst the sub-scales (Table 1).

Measurement of symptom perception and illness appraisal: The Revised Illness Perception Questionnaire (IPQ-R, Moss-Morris et al., 2002) is a dimensional measure of illness representations. Participants rate their perceptions of seven symptoms specific to influenza (e.g., high temperature, joint stiffness). The response format was: 0 = not at all; 1 = a little; 2 = moderately; 3 = a lot with a possible range of 0-21. Appraisal sub-scales are timeline (6 items, range 6-30), cyclical timeline (4 items range 4-20), consequences (6 items, range 6-30), personal control (6 items, range 6-30), treatment control (5 items, range 5-25) and illness coherence (5 items, range 5-25), scored on a response format 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree.

A potential confound to interpretation of this study is that hypochondriacal symptoms cause negative affective responses to illness stimuli (Lecci & Cohen, 2002). Thus, rather than biases being related to pre-existing schema content, differences between high and low hypochondriacal symptoms scores could reflect heightened negative affect. The IPQ-R elicits illness-specific emotional representations (6 items, same response format as illness appraisal dimensions, possible range 6-30). These assess the extent to which an illness induces negative affect (e.g., 'imagining having influenza makes me feel afraid'). This sub-scale was used to statistically control participants' negative affective responses to the hypothetical illness.

Stimulus: The stimulus material (health message) was a three-page leaflet dealing with prevention, and treatment of colds and influenza. It was designed and issued by the U.S. Department of Health and Human Services Food and Drug Administration for the general public. The leaflet describes and defines influenza, describes the symptoms and presents vaccination, prevention and treatment information. Neither emotive language nor imagery are used. Whilst there are precedents in hypochondriasis research for asking participants to imagine illnesses (Gramling, Clawson & McDonald, 1996), and it improves internal validity, implications of this method for external validity must be borne in mind.

Procedure

The research was subjected to a formal process of peer ethical review at the university where the study was conducted. Participants were taken to a private area, briefed and the experimental protocol was individually administered. They first completed the IAS, the SFA manipulation administered, the hypothetical illness induced and the IPQ-R completed. They were then debriefed and thanked.

Experimental Manipulation: After administration of the Illness Attitude Scale, SFA was induced using a manipulation devised by Silvia and Eichstaedt (2004). Participants were asked to provide written answers to questions concerning how they perceive themselves as being different from others: 1. "What is it about you that makes you different from your family?" 2. "What is it about you that makes you different from your friends?" and 3. "What is it about you that makes you different from people in general?". Participants were provided with text boxes that occupied about a third of an A4 sheet with the question printed above. The object of the control condition was to provide a control for the act of writing, not to encourage outwardly focussed attention. Thus, participants in the control condition were asked to answer questions that did not explicitly affect focus. Based on Silvia and Eichstaedt they were: 1. *"Please tell us about your university education."* 2. *"Please describe the last time you went out to eat."* Text boxes were half a page in length. Silvia and Eichstaedt (2004) showed that computer and group administration of the SFA manipulation enhanced SFA as assessed using self-awareness and self-consciousness scales and a behavioural measure of self-focus.

Results

Initial Analyses: Table 1 shows the means and standard deviations of study variables. Means of the four hypochondriacal symptom subscales were higher than comparable student samples (Fergus & Valentiner, 2009). We also computed a full scale score of 36.87 (SD=13.01), which was lower than the clinical cut-off score of 43 advocated by Hiller, Reif and Fichter (2002). Thus, our sample could be characterized as a relatively high-scoring normal sample. The IPQ-R symptoms scale showed a substantial positive skew (2.22) which was transformed using a square root transformation (skew=0.49). The means and *SD*s in Table 1 are untransformed values, but all inferential analyses were conducted on values that had undergone transformation.

INSERT TABLE 1 ABOUT HERE

Although we did not predict a main effect for the SFA manipulation, we conducted a MANOVA, using illness representations sub-scales as DVs, finding no effect (F=0.70, df=8,155, p=.688). Table 1 also presents Pearson correlations between all variables. It is notable that intercorrelations among illness representation variables are similar to those obtained in previous literature (e.g., Hagger & Orbell, 2003), suggesting that the imaginary illness induction elicited illness representations that are structured in a similar way to real illnesses.

Univariate Analysis: Consistent positive correlations were observed between hypochondriacal symptom scores and appraisal and coping representations. Other positive correlations were observed between some sub-scales and consequences and cyclical timeline. Four interaction terms were computed by centring the subscales and multiplying them by a condition variable coded as 1 (control) and 2 (SFA manipulation). The interaction terms were most consistently associated with higher emotional representations, although individual terms were positively associated with consequences, cyclical timeline and negatively with coherence.

Multivariate Analysis*:* Multivariate analyses were used to assess whether hypochondriacal symptom scores predict IPQ-R subscale scores independently of demographic variables and emotional representations. We predicted that the relation between hypochondriacal symptoms and illness representations would be moderated or facilitated by SFA. Aiken and West (1991) recommend that an interaction term be computed from the product of the two main effects, and assessing its unique relationship to the dependent variable controlling the two main effects. As we had several interaction terms, we used a hierarchical regression to enter all interactions as a single block after entry of covariates and the main effect terms. We only examined the effects of interactions if the block produced a significant increase in R^2. Hierarchical moderated multiple regression analyses were conducted, with age, gender and emotional representations entered in block 1, condition in block 2, the hypochondriacal symptoms main effects as block 3 and the four interaction terms as block 4. It will be noted that we did not impose correction for groupwise error. Such correction is highly conservative when dependent variables are correlated (see Table 1 for correlations). Added to the well-known problem of Type-2 error in moderated multiple regression, induced by partialling main effects and inflated error for interaction terms (McCelland & Judd, 1993), correction was believed to be too conservative.

Table 2 shows three-level hierarchical regression analyses. Age, gender and emotional representations were significant predictors, explaining 4.1 to 17.5% of variance on illness representation dimensions. The entry of the main effect variables predicting symptoms showed significant increase of R^2, with positive standardised betas showing that higher fear of illness and pain scorers imagined greater symptomology for the imaginary illness. Increases of R^2 were also noted for personal and treatment control, where disease conviction was a positive predictor. There was a main effect for illness coherence, but the direction of relationships was difficult to identify due to the presence of both positive and negative standardised βs, suggesting possible suppressor effects. Supplementary analyses were conducted by examining relationships between Fear of illness and pain and Symptom effects and Coherence scores controlling age gender and emotional representations. Symptom effects showed a positive significant partial correlation ($r_{partial}$=.18, p<.05) but fear of illness and death showed no correlation ($r_{partial}$=-.06, p=.422), suggesting that symptom effects was a positive predictor of coherence in the regression analysis.

INSERT TABLE 2 ABOUT HERE

A significant R^2 increase was also observed after entry of interaction terms for the prediction of personal control. Again suppressor effects are suspected, as standardised βs for fear of illness and pain and symptom effects interactions were negative and positive respectively. This was not resolved by partial correlation analyses. As we could not isolate the effect to a single sub-scale, we derived unitary scores that combined the four main and four interactive predictors into two separate variables. Simple slopes analysis (Aiken & West, 1991) was used to analyse this interaction. We regressed personal control onto the four hypochondriacal symptoms main effect variables and saved the predicted scores as separate variables. The process was repeated for the four interaction terms. These were entered, with group membership, into regression equation from which simple slopes were calculated. The figure shows these slopes, where the positive relationship between hypochondriasis symptom scores and personal control was accentuated by the SFA manipulation.

INSERT FIGURE 1 ABOUT HERE

Discussion

The present study examined relationships between hypochondriacal symptoms and the appraisal of a hypothetical of influenza infection. Moderation or facilitation of these relationships by SFA was also investigated. Hypochondriacal symptoms were linked to higher perceptions of symptoms, personal and treatment control and coherence. The link between hypochondriacal symptoms and personal control scores was stronger after SFA induction. As we used an asymptomatic sample and controlled negative emotional responses to disease, we have reduced the likelihood that findings are confounded by either physiological sensitivity or negative affect.

We predicted that hypochondriacal symptoms would be linked to greater threat appraisals. Fear of illness and pain was associated with greater symptom appraisals, lending some support to this idea. However, this conclusion must be qualified, as links were not found with other threat appraisal indicators; acute or cyclical timeline or consequences. We also found positive associations between disease conviction and perceptions of personal and treatment control over the hypothetical case of influenza. A search activity account (Rotenberg & Boucsten, 1992) suggests that hypochondriacal symptoms may represent an attempt to actively cope by treatment seeking, albeit in ways that may ultimately be dysfunctional for both individuals and the medical system. Ferguson et al. (2000), who also found enhanced control perceptions. The relationship between hypochondriacal symptoms personal control was greater under SFA, supporting our prediction that SFA can augment hypochondriacal biases.

Fergus and Valentinier (2009) suggest that threat and coping appraisals in hypochondriasis are predicted by differing combinations of IAS subscales. We found a similar pattern of associations to them, where fear of illness and pain predicted symptom appraisals and disease conviction predicted personal and treatment control. Our and Fergus and Valentinier's findings can be taken as evidence supporting the idea that IAS subscales may differentially predict threat and coping appraisals. Future researchers are advised to examine the possibility of differential prediction of threat and coping cognitions by IAS subscale scores.

We also found that symptom effects uniquely predicted coherence scores, suggesting that high scorers are more confident in their understandings of the causes, course and consequences of influenza. The coherence literature links general (Veenstra, Moum & Royslamb, 2005) and illness-specific (Lehto, 2007) coherence to adaptive coping responses. Thus, similar to control appraisals, a search activity account would suggest that coherence is a precursor of active coping, and that higher coherence scores may be associated with medical treatment seeking.

The actions of SFA demonstrate some attentional component to these biases. We posited two theoretically-based, but opposed, influences. First, that SFA increases focus on self-referent information, such as vulnerability and personal resources, which increases bias (Duval & Silvia, 2002; Kruger & Burrus, 2004). Second, that SFA stimulates a metacognitive awareness that reduces bias (Gibbons & McCoy, 1991). We predicted that the first process would affect threat and coping appraisals and the second metacognitive judgements relating to illness coherence. The first explanation is consistent with the interactions between hypochondriacal symptoms and SFA predicting higher personal control, where a greater prediction of control from hypochondriacal symptoms was evident under SFA. However, we did not find that SFA augmented or moderated relationships between hypochondriacal symptoms and either threat perceptions or coherence.

It is notable that hypochondriacal symptoms predicted influenza symptom perceptions, but we did not find any effects on threat interpretation variables, such as acute timeline, cyclical timeline or consequences. This was the case for both univariate and multivariate predictors. One possible reason is that an imaginary illness induction is insufficiently powerful to trigger sunbstantive threat representations. The amplification of existing sensory information appears to be an important mediating process in the process of experiencing actual symptoms and the appraisal of threat (Ferguson, et al., 2000). Whilst we did find somewhat stronger symptom representations in higher hypochondriacal symptom scorers, we suspect that the use of an imaginary disease in a normal population may not have generated sufficient symptomatology for amplification compared to a real disease.

Whilst invoking an imaginary illness was intended to improve internal validity by reducing the confounding effects of experienced symptomology, it might also place some constraints on the external validity of the findings. Imagining illness is not the same as perceiving symptoms. However, studies have shown that imagining illness causes greater physiological and affective disturbances in high hypochondriacal symptoms (Gramling, Clawson & McDonald, 1996; Brownlee, Leventhal & Balban, 1992). Also, the imagination based task acted in a similar way to a real disease in this study, in that it created greater perceived symptomology in higher hypochondriacal symptoms scorers and similar intercorrelation patterns to real illness in illness representation variables. Another potential threat to external validity is that the experimental manipulation was performed after completion of the IAS. Thus, all participants were effectively primed with illness and hypochondriasis-related material. This may limit the applicability of findings in contexts where such priming does not occur.

There is substantial research and therapeutic interest in biased thought processes in hypochondriacal symptoms and how attentional factors can contribute to these (Owens,et al., 2004; Papageorgiou & Wells, 1998; Rief, Hiller & Margraf, 1998). This study has contributed to this literature by showing links between hypochondriacal symptoms and illness appraisals and that focussing attention on the self affects might augment hypochondriacal in personal control perceptions. However, we did not assess specific bias processes that might cause hypochondriacal symptoms, and further research could attempt to do this and explain how their actions might be changed by SFA.

From an intervention viewpoint, this study raises a number of issues. SFA has been shown to augment pathological processes in depression (Pyszczynski, et al., 1989) and social anxiety (Zou, Hudson & Rapee, 2007). Although we found SFA to cause higher perceptions of a cyclical timeline in higher hypochondriacal cognition scorers, we also found a greater bias toward personal control which may carry positive connotations. Thus, the clinical consequences of SFA appear to be unclear. Also, attentional focus on external stimuli has been shown to reduce depression (Nix, et al, 1995) and social anxiety (Zou, Hudson & Rapee, 2007), and this may have some potential for both further research and intervention. Research is needed to better understand the implications of SFA and how it may guided to optimise clinical outcomes.

References

Abramowitz, J.S. & Moore, E.L. (2007). An experimental analysis of hypochondriasis. *Behaviour Research and Therapy, 45*, 413-424.

Aiken, L. S. & West, S. G. (1991). *Multiple Regression: Testing and Interpreting Interactions.* Newbury Park, CA: Sage.

American Psychiatric Association (1994). Diagnostic and statistical manual of mental disorders (4th ed.). Washington DC: American Psychiatric Association.

Asmundson, G. J. G., Taylor, S., Sevgur, S., & Cox, B. J. (2001). Health Anxiety: Classification and Clinical Features. In G. J. G. Asmundson, S. Taylor, & B. J. Cox (Eds.), *Health Anxiety – Clinical and Research Perspectives on Hypochondriasis and Related Conditions* (pp. 3-21). Chichester: Wiley.

Bleichhardt, G. & Hiller, W. (2007). Hypochondriasis and health anxiety in the German population. *British Journal of Health Psychology, 12,* 511-523.

Brownlee, S., Leventhal, H. & Balban, M. (1992). Autonomic correlates of illness imagery. *Psychophysiology, 29*, 142-153.

Buontempo, G. & Brockner, J. (2008). Emotional intelligence and the ease of recall judgement bias: The role of private self-focussed attention. *Journal of Applied Social Psychology, 38*, 159-172.

Demopulos, C., Fava, M., McLean, N. E., Alpert, J. E., Nierenberg, A. A. & Rosenbaum, J. F. (1996). Hypochondriacal Concerns in Depressed Outpatients. *Psychosomatic Medicine, 58,* 314-320.

Duval, T.S. & Silvia, P.J. (2002).Self-awareness, probability of improvement and the self-serving bias. *Journal of Personality and Social Psychology, 82*, 49.61.

Eiser, J.R., Pahl, S. & Prins, Y.R.A. (2001). Optimism, pessimism and the direction of self-other comparisons. *Journal of Experimental Social Psychology, 37*, 77-84.

Fergus, T.A. & Valentiner, D.P. (2009). Reexamining the domain of hypochondriasis: Comparing the Illness Attitudes Scale to other approaches. *Journal of Anxiety Disorders, 23*, 760-766.

Ferguson, E., Swairbrick, R., Clare, S, Robinson, E., Bignell, C.J. & Anderson, C. (2000). Hypochondriacal concerns, somatosensory amplification, and primary and secondary cognitive appraisals. *British Journal of Medical Psychology, 73*, 355-369.

Gibbons, F.X. & McCoy, S.B. (1991). Self-presentation and self-deception: The role of affect in suggestibility processes. In J.F. Schumaker, *Human Suggestibility: Advances in Theory, Research, and Application*. (185-199). Florence KY: Taylor & Frances/Routledge.

Gramling, S.E., Clawson, E. & McDonald, M.K. (1996). Perceptual and cognitive abnormality model in hypochondriasis: Amplification and physiological reactivity in women. *Psychosomatic Medicine, 58*, 423-431.

Hadjistavropoulos, H. D., Craig, K. D., & Hadjistavropoulos, T. (1998). Cognitive and behavioral responses to illness information: The role of health anxiety. *Behaviour Research and Therapy, 36,* 149-164.

Hadjistavropoulos, H.T., Frombach, I.K. & Asmundson, G.J.G. (1999). Exploratory and confirmatory factor analytic investigations of he Illness Attitudes Scale in a non-clinical sample. *Behaviour Research and Therapy, 37*, 671-684.

Haenen, M.-A., Schmidt, A. J. M., Kroeze, S., & van den Hout, M. A. (1996). Hypochondriasis and Symptom Reporting – The Effect of Attention versus Distraction. *Psychotherapy and Psychosomatics, 65,* 43-48.

Hagger, M.S. & Orbell, S. (2003). A meta-analytic review of the common-sense model of illness representations. *Psychology and Health, 18*, 141-184.

Hitchcock, P.B. & Matthews, A. (1992). Interpretation of bodily symptoms in hypochondriasis. *Behaviour Research and Therapy, 30*, 223-234.

Kellner, R. (1986). *Somatization and Hypochondriasis*. NY: Praeger.

Kruger, J. & Burrus, J. (2004). Egocentrism and focalism in unrealistic optimism (and pessimism). *Journal of Experimental Social Psychology, 40*, 332-340.

Lecci, L. & Cohen, D.J. (2002). Perceptual consequences of an illness-concern induction and its relation to hypochondriacal tendencies. *Health Psychology, 21*, 147-156.

Lehto, R. (2007). Causal attributions in individuals with suspected lung cancer: Relationships to illness coherence and emotional responses. *Journal of the American Psychiatric Nurses Association, 13*, 109-115.

Leventhal, H., Leventhal, E. & Contrada, R.J. (1998). Self-regulation, health and behaviour: A perceptual-cognitive approach. *Psychology and Health, 13,* 717-734.

Leventhal, H., Nerenz, D. R. & Steele, D. F. (1984). Illness representations and coping with health threats. In A.Baum and J. Singer (Eds). *A Handbook of Psychology and Health* (pp.229-252). New Jersey: Erlbaum.

Marcus, D.K., Gurley, J.R., Marchi, M.M. & Bauer, C. (2007). Cognitive and perceptual variables in hypochondriasis and health anxiety. *Clinical Psychology Review, 27*, 127-139.

Macrae, C.N., Bodenhausen, G.V. & Milne, A.B. (1998). Saying no to unwanted thoughts: Self-focus and the regulation of mental life. *Journal of Personality and Social Psychology, 74*, 578-589.

Martin, A. & Jacobi, F. (2006). Features of Hypochondriasis and Illness Worry in the General Population in Germany. *Psychosomatic Medicine, 68,* 770-777.

McClelland, G.H. & Judd, C.M. (1993). Statistical difficulties in detecting interaction and moderator effects. *Psychological Bulletin*, 114, 376-390.

Moss-Morris, R., Weinman, J., Petrie, K. J., Horne, R., Cameron, L.D., & Buick, D. (2002). The Revised Illness Perception Questionnaire (IPQ-R). *Psychology and Health*, *17*, 1-16.

Nix, G., Watson, C., Pyszczynski, T. & Greenberg, J. (1995). Reducing depressive affect through external focus of attention. *Journal of Social and Clinical Psychology, 14*, 36-52.

Noyes, R., Happel, R. L., & Yagla, S. J. (1999). Correlates of Hypochondriasis in a Non-clinical Population. *Psychosomatics, 40,* 461-469.

Owens, K. M. B., Asmundson, G. J. G., Hadjistavropoulos, T., & Owens, T. J. (2004). Attentional Bias Toward Illness Threat in Individuals With Elevated Health Anxiety. *Cognitive Therapy and Research, 28,* 57-66.

Papageorgiou, C. & Wells, A. (1998). Effects of attention training on hypochondriasis: A brief case series. *Psychological Medicine, 28*, 193-200.

Pyszczynski, T., Hamilton, J.C., Herring, F.H. & Greenberg, J. (1989). Depression, self-focussed attention, and the negative memory bias. *Journal of Personality and Social Psychology, 57*, 351-357.

Rassin, E., Muris, P., Franken, I. & van Straten,M. (2008). The feature-positive effect and hypochondriacal concerns. *Behaviour Research and Therapy, 46*, 263-269.

Rotenberg, V. & Boucsein, W. (1992). Adaptive versus maladaptive emotional tension. Genetic, *Social and General Psychology Monographs, 119*, 207-232.

Rief, W., Hiller, W., & Margraf, J. (1998). Cognitive Aspects of Hypochondriasis and the Somatization Syndrome. *Journal of Abnormal Psychology, 107,* 587-595.

Salkovskis, P. M., & Warwick, H. M. C. (2001). Making Sense of Hypochondriasis: A Cognitive Theory of Health Anxiety. In G. J. G. Asmundson, S. Taylor, & B. J. Cox (Eds.), *Health Anxiety – Clinical and Research Perspectives on Hypochondriasis and Related Conditions* (pp. 46-64). Chichester: Wiley.

Silvia, P. J., & Abele, A. E. (2002). Can positive affect induce self-focused attention? Methodological and measurement issues. *Cognition and Emotion, 16,* 845-853.

Silvia, P. J., & Eichstaedt, J. (2004). A self-novelty manipulation of self-focused attention for Internet and laboratory experiments. *Behaviour Research Methods, Instruments, & Computers, 36,* 325-330.

Stewart, S. H., & Watt, M. C. (2001). Assessment of Health Anxiety. In G. J. G. Asmundson, S. Taylor, & B. J. Cox (Eds.), *Health Anxiety – Clinical and Research Perspectives on Hypochondriasis and Related Conditions* (pp. 95-131). Chichester: Wiley.

Veenstra, M., Moum, T. & Royslamb, E. (2005). Relationships between health domains and sense of coherence: A two-year cross-lagged study in patients with chronic illness. *Quality of Life Research, 14*, 1455-1465.

Zou, J.B., Hudson, J.L. & Rapee, J.M. (2007). The effect of attentional focus on social anxiety. *Behaviour Research and Therapy, 45*, 2326-2333.

Table 1: Correlations between Hypochondriasis, Illness Representations and Interactions

	Mean (SD)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Fear of illness and pain	11.02(6.74)																
2 Treatment experience	6.30 (3.05)	.25**															
3 Disease conviction	4.73 (1.97)	.32**	.17*														
4 Symptom effects	4.45 (3.05)	.47**	.26**	.24**													
5 Symptoms identity	6.26 (7.99)	.33**	.23**	.12	.28**												
6 Timeline Acute	13.29 (3.68)	.07	.08	.06	-.03	.09											
7 Consequences	14.37 (4.07)	.18*	.06	-.01	.17*	.17*	.47**										
8 Personal control	22.29 (3.65)	-.07	.00	.15	.02	.03	-.21**	-.13									
9 Treatment control	18.86 (3.09)	-.01	.02	.14	-.02	.03	-.18*	-.13	.63**								
10 Illness coherence	19.33 (3.44)	-.19*	-.04	.02	.02	-.01	-.34**	-.38**	.24**	.23**							
11 Timeline cyclical	11.94 (2.87)	.16*	.19*	.14	.20**	.27**	.21**	.27**	-.02	-.01	-.21**						
12 Emotional representations	15.07 (4.73)	.37**	.37**	.18*	.33**	.28**	.21**	.49**	-.11	-.14	-.42**	.39**					
13 Condition*Fear Illness		.63**	.24**	.08	.35**	.15	.05	.15	-.13	-.08	-.17*	.08	.27**				
14 Condition*Treat. Exper.		.22**	.70**	.03	.09	.10	.14	.09	.00	-.01	-.12	.12	.24**	.35**			
15 Condition*Dis. Conv.		.09	.04	.56**	.15	.01	.04	-.05	.02	.10	-.01	-.08	.06	.14	.06		
16 Condition*Symp. Effects		.30**	.09	.12	.72*	.09	-.02	.17*	.08	.00	-.13	.20**	.24**	.48**	.13	.21**	

Note: * $p < .05$ (two tailed); ** $p < .01$ (two tailed)

Table 2: Three-level hierarchical regression analyses showing changes in R^2 final standardized beta weightings and their significance

	Symptoms	Timeline	Timeline Cyclical	Consequences	Personal control	Treatment control	Illness coherence
Control Variables ΔR^2	.098**	.059**	.162**	.251**	.047**	.041**	.175**
Condition ΔR^2	.000	.000	.000	.000	.005	.002	.001
Fear Illness & pain	.25*	.05	.07	.07	-.12	-.07	-.20*
Symptom effects	.09	-.13	.06	.07	.05	-.03	.19*
Treatment experience	.11	.04	.05	-.14	.06	.10	.11
Disease conviction	.01	.02	-.03	-.14	.17*	.23*	.15
Main Effects ΔR^2	.092*	.013	.012	.030	.033*	.066*	.069*
Condition*Fear illness & pain	.00	.01	-.25	-.07	-.65*	-.40	.14
Condition*Symptom effects	-.21	-.01	.57*	.11	.77*	.29	-.60*
Condition*Treatment experience	.32	.32	-.08	.26	.07	-.05	-.17
Condition*Disease conviction	-.06	-.06	-.38	-.04	-.28	.10	-.13
Interaction Effects ΔR^2	.020	.009	.033	.008	.063*	.016	.041†
Overall R^2	.210**	.081	.207**	.289**	.143**	.125*	.285**

Note: * $p < .05$; ** $p < .01$; †p=.06

Figure 1: Simple Slope Graph for the Prediction of Personal Control from Hypochondriacal symptoms and SFA Group.