HEALTH ANXIETY AND PERCEIVED VULNERABILITY TO ILLNESS

by

DANA S. THORDARSON

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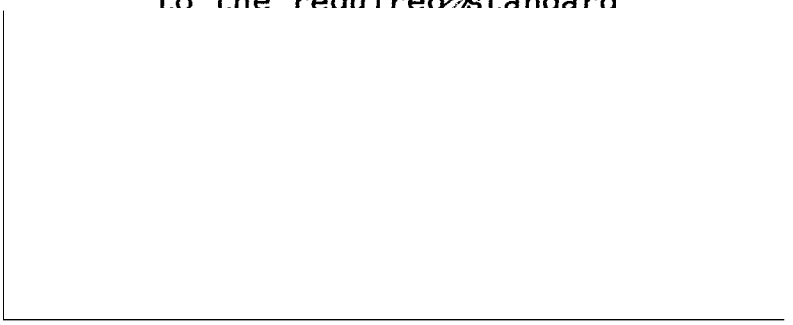

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Department of Psychology

The University of British Columbia
Vancouver, Canada

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Abstract

The purpose of this study was to test several hypotheses suggested by Warwick & Salkovskis's (1990) recently developed cognitive-behavioural theory of hypochondriasis and health anxiety. The main hypothesis of the study was that perceived vulnerability to illness, fear of bodily sensations and changes, and dysfunctional attitudes toward illness are the major components of health anxiety. University students (N=161) completed a questionnaire package with measures of health anxiety (including the Whitely Index), perceived vulnerability to illness, fear of bodily sensations, dysfunctional attitudes, depression (BDI), and trait anxiety (STAI-T). The results suggested that the most important of the hypothesized components was dysfunctional attitudes toward illness, followed by perceived vulnerability toward illness. However, these predictors did not account for a large proportion of the variance in health anxiety scores, and their contribution was further reduced by including depression as a covariate. The results are discussed regarding problems with measurement, sampling, and theory. Further research, especially studies devoted to the role of experience of illness in health anxiety, is suggested.

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Acknowlegment

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Introduction

Hypochondriasis is described in the Diagnostic and Statistical Manual of the American Psychiatric Association (DSM-III-R) as a preoccupation with the belief that one is seriously ill, or with the fear of having a serious disease. The patient's concerns must be disproportionate to any demonstrable medical problem, and not readily relieved by normal reassurance (American Psychiatric Association, 1987). It has been estimated that between 4% and 6% of medical outpatients (in a general practice setting) have met the criteria for hypochondriasis in the last six months (Barsky, Wyshak, Klerman, & Latham, 1990).

Recent research using well-operationalized definitions of hypochondriasis has indicated that hypochondriasis is not related to age, sex, or medical morbidity (Barsky, Wyshak, & Klerman, 1986; Barsky, Wyshak, Latham & Klerman, 1991). Hypochondriasis has been considered both as a disorder in its own right (i.e., primary hypochondriasis), and as a symptom of underlying psychopathology, most notably depression (secondary hypochondriasis). Historically, the existence of primary hypochondriasis has been controversial. The current DSM-III-R defines hypochondriasis as an Axis I disorder, placed in the group of somatoform disorders, and requires the absence of other Axis I disorders (such as a Major Depressive Episode) for its diagnosis. However, there

is evidence that even so-called primary hypochondriasis, based on the DSM-III-R description, is strongly correlated with depression (Barsky et al., 1986).

Included in the traditional (e.g., DSM-III-R) descriptions of hypochondriasis has been the assumption that hypochondriacal patients misinterpret normal bodily sensations and symptoms as indicative of serious disease. Noting this emphasis on misinterpretation of bodily sensations, Salkovskis and Warwick (1990) have developed a cognitive-behavioural theory of hypochondriasis, which they construe as a severe form of anxiety about one's health.

Cognitive-Behavioural Approach to Health Anxiety and Hypochondriasis

The novel and potentially important cognitive theory of hypochondriasis and health anxiety is derived from the influential cognitive theory of panic proposed by Clark (1986, 1988), which has made rapid progress (NIMH Consensus Development Conference, 1991; Rachman & Maser, 1988). According to Clark, "panic attacks result from the catastrophic misinterpretation of certain bodily sensations" (1986, p. 462), such as rapid heartbeats. So, for example, if a person misinterprets rapid beats as signs of an impending heart attack, panic may well ensue.

Recently, Warwick and Salkovskis (Salkovskis & Warwick, 1986; Warwick 1989; Warwick & Salkovskis, 1990) extended

this theory to health anxiety and hypochondriasis. The extended theory rests on a common assumption of the central importance of catastrophic misinterpretations of bodily sensations. According to their cognitive hypothesis of health anxiety, both physical changes and health related information are misinterpreted as indicating illness. As Salkovskis and Clark (in press) have stated, in health anxiety or hypochondriasis "health-relevant information is perceived as indicating more danger than is really the case, and is more likely to be noticed" because of the patients' selective attention to information which confirms their hypothesis that they are ill.

Warwick and Salkovskis' model of the development of health anxiety proposes that past experiences, such as illness in one's family, can lead to the formation of dysfunctional beliefs about health (e.g., "bodily changes are usually a sign of serious disease"). When critical incidents such as a symptom, or new information about an illness occur, the affected person is prone to interpret the health-related stimuli as threatening, resulting in anxiety. When innocuous physical sensations are misinterpreted as threatening to present or future health, the resulting health anxiety can be maintained or exacerbated by cognitive, behavioural, and physiological factors (Figure 1: Warwick & Salkovskis, 1990, p. 111).

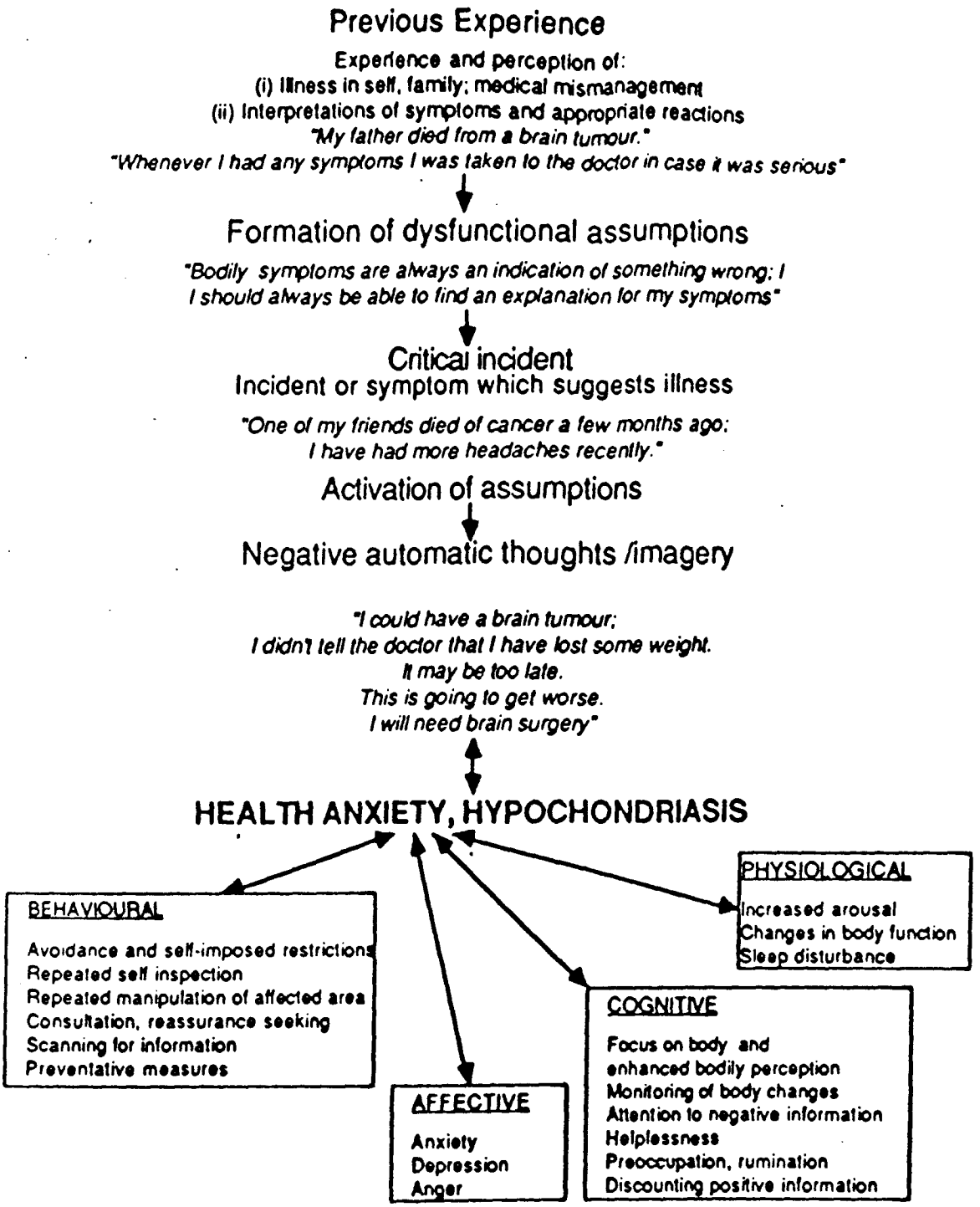

Figure 1: Cognitive model of the development of severe health anxiety (Warwick & Salkovskis, 1990, p. 111)

Cognitive factors include the affected person's selective attention to information confirming the hypothesis that he/she is ill; this increased focus on the body, and heightened perception of normal bodily sensations, are likely to result in misinterpretations and hence, anxiety. According to Warwick and Salkovskis, behaviour to avoid, check for, or attempt to exclude physical illnesses is likely to maintain anxiety (1990) because it keeps patients' attention focussed on their fears about health, and the behaviour potentially increases the scope of their misinterpretations if they acquire new information as a result. Examples of such behaviour include frequent medical consultations and reassurance-seeking, self-inspection and manipulation of affected areas, and self-imposed restrictions on behaviour. Finally, physiological arousal as typically associated with anxiety can cause increased perception of autonomic symptoms which may be misinterpreted as further evidence of disease.

A key feature of the theory is the linkage between elevated health anxiety and the disorder of hypochondriasis. Warwick has argued that a formulation of the processes involved in hypochondriasis should also be able to account for health concerns in non-hypochondriacal people (1989). Health concern appears to be distributed in a continuum in the general population (Costa & McCrae, 1985), and highly hypochondriacal patients do not differ strikingly from general medical patients, except for being significantly

more depressed (Barsky et al., 1986;). It has been estimated that normal people experience, on average, one functional somatic symptom per week (Kellner, 1985). Usually people assess these symptoms as innocuous and irrelevant. However, normal people occasionally experience transient hypochondriacal states, often when they are recovering from serious illness (Barsky, Wyshak, & Klerman, 1990), or when they acquire new information about illnesses (e.g., "medical students' disease": Woods, Natterson, & Silverman, 1966). Salkovskis and Warwick argue that hypochondriasis is not qualitatively different from normal health concerns, but rather represents an extreme form of health anxiety.

The cognitive theory of hypochondriasis states that panic and hypochondriasis are psychologically connected through the catastrophic and illness-related misinterpretations of bodily sensations, but differ in (1) the type of symptoms misinterpreted, (2) the imminence of the threat which the misinterpretations indicate, (3) avoidant, escape, and safety-seeking behaviours, and (4) the attitudes associated with misinterpretation. The theoretical link between panic disorder and hypochondriasis is supported by the demonstrated comorbidity of the two disorders. Salkovskis, Warwick and Clark found that 59% of hypochondriacal patients also fulfilled the DSM-III criteria for panic disorder (unpublished data, cited in Warwick & Salkovskis, 1990). Other researchers have found that panic

disorder patients with agoraphobia show levels of hypochondriacal concerns comparable to patients with a diagnosis of hypochondriasis (Fava, Kellner, Zielezny, & Grandi, 1988; Noyes, Reich, Clancy, & O'Gorman, 1986). Moreover, successful treatment of panic (with alprazolam in the Noyes study and exposure treatment in Fava et al.) was associated with the reduction of hypochondriacal concerns to normal levels, suggesting that there is a functional similarity between panic and hypochondriasis (Rachman, 1991).

As discussed above, Salkovskis, Warwick, and their colleagues have put forward a persuasive theory of health anxiety, which gains credence from its association with Clark's well-accepted cognitive theory of panic. Along with other researchers, they are investigating the theory's major tenets, such as the roles of misinterpretations of physical changes and dysfunctional attitudes about illness. However, there is an additional cognitive bias which has been mentioned but not emphasized in their formulations: an inflated sense of personal vulnerability toward illness.

The importance of exaggerated perceived vulnerability to illness in promoting health anxiety is suggested by two lines of research. First, as discussed in the following section, perceived vulnerability to illness has been shown to be an important predictor of health-related behaviour; it is possible that an excessive sense of vulnerability to illness plays role in the frequent health-related behaviour

exhibited by health anxious patients. Second, research has indicated that anxious patients tend to overestimate the probability of the occurrence of feared events (e.g., Butler & Mathews, 1983; Chambless, 1983). Because the cognitive hypothesis of health anxiety and hypochondriasis emphasizes that health anxiety shares elements with other anxiety problems such as panic and obsessive-compulsive disorder, it is likely that health anxious patients overestimate their risk of serious illness. Initial evidence in support of this hypothesis comes from Barsky and Klerman (1989), who found that a sense of bodily vulnerability to injury and disease was significantly related to scores on a self-report measure of hypochondriasis. In addition, Gagnon, Freeston, Ladouceur, and Thibodeau (1992) examined health-related intrusive thoughts in university students. They found that subjects' beliefs about the probability that the content of the thought would actually occur were strongly related to the frequency and worry associated with the intrusive thought.

Perceived Vulnerability to Illness

Extensive research on the Health Belief Model (Janz & Becker, 1984) has demonstrated that a person's perceived vulnerability to illness is one of the most important determinants of health-related behaviour. Perceived vulnerability to illness has been shown to be a powerful

predictor of utilization of health care resources, as measured by frequency of ambulatory care visits (e.g., Berkanovic, Telesky, & Reeder, 1981; Leavitt, 1979). To date almost all of the research has been devoted to people who perceive themselves to be at less risk than others for any particular illness, and therefore less likely to engage in preventive health behaviour (e.g., breast self-examination: Kosch & Spring, 1983; Wyper, 1990; pap smears: Hennig & Knowles, 1990; contraception: Burger & Burns, 1988). It is a striking fact that most people rate their own vulnerability to illness or other negative life events (e.g., being the victim of burglary) to be lower than that of other, similar people ("unrealistic optimism," see Weinstein, 1989).

Little research has been carried out at the other end of the spectrum; that is, people who perceive themselves to be at higher risk of illness than others. It can be deduced from the Health Belief Model that these people are likely to engage in excessive health behaviour, such as an increased frequency of visits to physicians. A recent study by Brody, Lerman and Jemmott (1992) of heterosexual subjects at low risk for HIV infection identified 8% who felt their risk of contracting AIDS was higher than average. Brody et al. found that risk beliefs significantly predicted AIDS anxiety and the frequency of office visits for AIDS concerns in this low-risk sample.

Current Study

The purpose of this study was to test several hypotheses suggested by the recently developed cognitive-behavioural theory of health anxiety and hypochondriasis (discussed above) by conducting a survey of health anxiety and perceived vulnerability to illness in a population of undergraduate students.

Warwick and Salkovskis' theory states that hypochondriasis is best understood as a form of health anxiety, bearing close resemblance to other states of anxiety, especially panic disorder. My examination of the theory led to the conclusion that three important factors determining health anxiety are (1) the fear of bodily sensations and changes, (2) dysfunctional attitudes about illness, and (3) heightened perceived vulnerability to illness. Anxiety in response to physical symptoms is a cornerstone of the cognitive-behavioural theory of health anxiety, which suggests that affected individuals make catastrophic misinterpretations of bodily sensations. Dysfunctional assumptions about illness are a hypothesized precursor of health anxiety, and Salkovskis and Warwick (personal communication) have demonstrated several assumptions which are common in hypochondriacal patients (e.g., "I must be able to find an explanation for any symptom"). Warwick and Salkovskis have stated that, "the cognitive hypothesis of health anxiety and hypochondriasis

proposes that bodily signs and symptoms are perceived as more dangerous than they really are, and that a particular illness is believed to be more probable than it actually is," (1990, p.110); however, this relationship between perceived vulnerability to illness and health anxiety has not been emphasized in previous research.

Hypotheses

Hypothesis I. The main hypothesis of the current study was that there are three major determinants of health anxiety: fear of bodily sensations and changes, dysfunctional assumptions about illness, and heightened perceived vulnerability to illness.

Hypothesis II. The second major hypothesis was that the fear of bodily sensations, dysfunctional attitudes about illness, and perceived vulnerability to illness are important predictors of health anxiety above and beyond the more general contribution of depression.

As described above, because health anxiety is conceptualized as a form of anxiety similar to other states such as panic, a variable representing general negative affectivity, such as depression, is likely to be related to health anxiety. However, in order to consider the fear of bodily sensations, dysfunctional attitudes about illness, and perceived vulnerability to illness to be main effects contributing to health anxiety, they must remain predictive

after controlling for the contributions of the more general, less theoretically important construct of depression.

Seriousness and controllability of illnesses. More tentative hypotheses were made concerning the effect of differences in seriousness and controllability of illnesses on the relationship between perceived vulnerability and health anxiety. Hypothesis III(A) states that excessive perceived vulnerability to serious illnesses is more strongly related to health anxiety than is excessive perceived vulnerability to trivial illnesses. This hypothesis is based on the logic that feeling vulnerable to a serious disease should cause more anxiety (due to increased threat) than vulnerability to a less serious illness.

Hypothesis III(B) states that perceived vulnerability to uncontrollable illnesses is more strongly related to health anxiety than is vulnerability to more controllable illnesses. This prediction was based on the idea that anxiety is greater when the person feels unable to exert control over a negative outcome.

Hypothesis IV. Because of the theoretical link between panic and health anxiety, it was hypothesized that there is a positive relationship between health anxiety and the frequency of spontaneous panic attacks. If such a relationship can be demonstrated, it will be interesting to note which of the hypothesized major variables determining health anxiety (fear of bodily sensations, dysfunctional

attitudes, and perceived vulnerability to illness) contribute(s) to the relationship.

Validating results with a widely-used measure of hypochondriasis

In addition to testing the four hypotheses outlined above, this study gave the opportunity to examine the relationship between Salkovskis and Warwick's recently-developed construct of health anxiety, and a self-report measure of clinical hypochondriasis, the Whitely Index. I determined the relationship between the two scales and examined whether the pattern of results was similar for the two scales.

Method

Subjects

Undergraduate students in psychology classes at the University of British Columbia completed the questionnaire package for course credit. All subject pool students were eligible to participate; the subjects were not selected in any way. Of approximately 210 questionnaire packages picked up by subject pool students, 174 were completed and returned, for a return rate of about 83%. Thirteen subjects were excluded from the sample due to significant current medical conditions (e.g., epilepsy, ulcers, asthma, heart defects), leaving a sample of 161 subjects (75 men, 83 women, sex missing for 3 subjects) whose average age was 21 years.

Procedures

Subjects were given a package of questionnaires including measures of health anxiety and hypochondriasis, perceived vulnerability to illness, dysfunctional beliefs about illness, fear of bodily sensations, depression, and frequency of panic attacks. Subjects completed the package at their convenience and returned them to a drop-box at the laboratory.

Measures

Health anxiety (HA) was measured using a 23-item scale developed for clinical use by Salkovskis (Appendix A). For each item, the subject chooses a statement from a group of four statements, which are in order of increasing health anxiety. The following is a sample item:

1. Generally I am not afraid of developing an illness
2. I am afraid of developing an illness only when I have symptoms
3. I am afraid of developing an illness most of the time
4. I am afraid of developing an illness all of the time.

Subjects' scores were the sum of their responses to the 23 items. This scale has been found to discriminate well between hypochondriasis patients and both normal and anxious controls (Salkovskis, personal communication, July 1993). Some overlap is found with panic disorder, as expected because of the demonstrated comorbidity between the disorders.

Because Salkovskis's health anxiety scale was developed only recently and its properties are still under investigation, the Whitely Index (WI), an established self-report measure of hypochondriasis (Pilowsky, 1967), was included so that its relationship to the health anxiety scale and the other constructs of interest could be investigated (Appendix B). The WI comprises 14 items which reflect hypochondriacal attitudes, e.g., I often worry about

the possibility that I have got a serious illness. The WI has good test-retest reliability in a psychiatric sample (0.81 over a testing interval of several months; Pilowsky, 1967). A principal components analysis with Varimax rotation of Pilowsky's original sample's responses identified three main dimensions of hypochondriasis, which he labelled bodily pre-occupation, disease phobia, and conviction of the presence of disease with non-response to reassurance. The Whitely Index has been shown to discriminate between psychiatric patients with and without hypochondriasis, and is highly correlated with spousal ratings of hypochondriasis (Pilowsky, 1967).

To increase the variability among scores in the present sample of non-clinical subjects, the response format was changed from the original yes/no to a 7-point scale with anchors not at all, moderately, and a great deal. Subjects' responses on each item were summed to form a total score.

Measurement of perceived vulnerability to illness was based on the procedures used by Weinstein (1982), who assessed college students' estimates of their relative susceptibility to a large group of illnesses and injuries. Perceived vulnerability to illness (PV) was measured by asking subjects to rate how likely they would be (compared to other UBC students of their sex) to experience each of 15 illnesses which vary in severity (Appendix C). Subjects rate their vulnerability to each on a 0 to 8 point scale (0=much below average; 4=average for other UBC students;

8=much above average). The subject's ratings for each illness were summed to obtain a total PV score. Perceived vulnerability to other life events (e.g., going insane, being injured in a car accident, being the victim of a burglary) was also assessed for comparison purposes. So that the illnesses could be divided into groups based on seriousness and controllability, subjects also rated how controllable and how serious each illness would be (Appendix D).

Subjects' fear of bodily sensations and changes (FBS) was assessed using a scale of 61 physical and psychological symptoms recently developed by Steven Taylor (personal communication, 1993) (Appendix E). For each symptom (e.g., difficulty breathing in hot environments; a bright red rash on your neck), subjects rated how frightened they would be on a 0 to 4 scale (0 = not at all; 4 = very much). A total FBS score was derived by summing the 61 ratings.

Subjects' dysfunctional attitudes toward health (DA) was assessed using a 14-item scale also developed by Salkovskis (Appendix F). Each item consists of a dysfunctional attitude toward illness (e.g., bodily changes are always a sign that something is wrong), which subjects rate on a 7 point scale (from totally agree to totally disagree). Thus, low scores on this scale represent high endorsement of dysfunctional attitudes. The item ratings were summed to obtain a total DA score.

Depression was assessed using a standard questionnaire. The Beck Depression Inventory (BDI: Beck, Rush, Shaw, & Emery, 1979), a widely used 21-item self-report measure, has been used extensively with samples ranging from college students to psychiatric inpatients, and its reliability and validity have been clearly demonstrated (Beck, Steer, & Garbin, 1988) (Appendix G).

Frequency of panic attacks in the last six months was estimated with a series of questions (Appendix H). First, a panic attack is described, and the subject is asked whether this has ever happened to them. Then, the subject is asked whether these feelings have ever occurred "out of the blue" or unexpectedly, and the subject reports how many such episodes they have had in the last six months.

Missing data

For all the scales, subjects who missed one item on the scale had their scores pro-rated based on the scores from the remaining items. For example, if a subject missed one of the 23 items on the HA scale, that subject's score on 22 complete items was calculated, and then pro-rated (by multiplying by 23/22) to estimate what the subject would have scored on 23 items. Scores were also pro-rated for subjects who missed two items on the FBS scale, which contains 61 items. Overall, 5 subjects missed 1 item on the HA scale, 2 subjects missed 1 PV item, 16 subjects missed 1 or 2 items on the FBS scale, 3 subjects missed 1 item on the

DA scale, 3 subjects missed a BDI item, and 6 subjects missed 1 item on the WI scale. A subject who missed a large number of items on the FBS scale was given a missing value for this scale.

This approach to missing data prevented the large loss of subjects during multivariate procedures such as multiple regression analyses, which require listwise deletion of missing data; although the number of subjects who missed items on any one scale is small, losing data from any subject who missed any item on any scale would have reduced the sample size considerably. Estimating total scores based on items completed provided the most accurate estimate of subjects' true scores, especially considering the high internal consistency of the scales (see Results section).

Results

Scale Statistics and Data Screening

All scales were calculated as the sum of their items. Items on the PV scale were recoded by subtracting 4 from each response so that a response of 4 (Average for other UBC students) would be represented by a value of zero; thus, negative scores indicate "below average" vulnerability estimates, positive scores "above average" vulnerability estimates. In addition, the BDI item 20, which assesses health worries, was omitted from the calculation of total BDI scores because of the content overlap between this item and the HA and WI scales.[1] Means, standard deviations, and estimates of internal consistency (Cronbach's alpha) for the scales are presented in Table 1. All scales displayed satisfactory internal validity. The mean for the BDI, for which norms are available, is well within the normal range. Salkovskis has reported means on the HA scale of 35-38 for social phobic and normal control groups, and 58 for a sample of hypochondriasis patients (personal communication, 1993). The mean HA score in my sample is similar to the mean of Salkovskis' normal group.

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[1]Leaving this item in the BDI scale could cause inflation of the correlation between the BDI and the HA or WI scales.

Table 1

Scale Means, Standard Deviations, and Estimates of Internal Consistency

Scale	N	Mean	S.D.	Range	Alpha[a]
Health Anxiety (HA)	161	37.9	5.7	27-55	.80 (156)[b]
Whitely Index (WI)	161	34.5	11.0	16-69	.84 (158)
Perceived Vulnerability (PV)	161	-14.6	14.9	-56-16	.88 (159)
Fear of Bodily Sensations (FBS)	160	99.5	37.9	12-208	.97 (145)
Dysfunctional Attitudes toward Illness (DA)	161	67.2	9.4	39-92	.76 (157)
Beck Depression Inventory (BDI)	161	7.9	6.1	0-32	.85 (158)

[a]Cronbach's Alpha

[b]Number in parentheses indicates N on which reliability estimate is based

Several items on the scales were found which had poor item-total correlations, and their presence on the scale therefore reduces its internal consistency. The 9th item (Is it easy for you to forget about yourself, and think about all sorts of other things?) had a corrected item-total correlation near zero. The dysfunctional attitudes about illness scale (DA) contained two items with poor item-total correlations: It is possible to know, with absolute certainty, that you are not ill, and Doctors often miss serious illnesses. In future studies, researchers should consider removing these items, or decide a priori to evaluate the scale with and without these items. The current analyses included all of the items.

Visual inspection of distributions of the scales indicated no univariate outliers. In addition, to screen for multivariate outliers, multiple regression analyses were performed using the HA and WI scales as dependent variables, and the other scales as independent variables. Visual inspection of the plots of the residuals from these equations indicated no multivariate outliers.

Several of the scales (HA, WI, PV, and BDI) were significantly skewed (all positively except PV, which was negatively skewed). In multiple regression, skewness tends to reduce the size of the effect, thereby reducing power. However, even slight skewness is often statistically significant, especially in large samples (Tabachnick &

Fidell, 1989). Normal probability plots of the residuals from multiple regression analyses indicated that the residuals were approximately normally distributed, despite slight underlying skewness in the original variables. When multiple regression analyses were re-performed using scales transformed to correct for skewness (logarithmic transformation of HA scale, square root of BDI and WI scales, reflection and square root of PV scale), the results were only trivially affected. Therefore, for simplicity of interpretation, all further analyses will be reported based on original, untransformed scales.

Perceived Vulnerability

A one-sample Hotelling's T^2 analysis was performed to attempt to replicate previous findings (Weinstein, 1982) that students are biased in their judgements of their relative perceived vulnerability to illness. Comparing the mean ratings on the 15 illness-related items with a null vector representing the null hypothesis of unbiased responding (i.e., ratings of average risk) resulted in a significant T^2 ($T^2 = 389.02$; $F(15,144) = 23.64$, $p < .001$). Bonferroni-adjusted univariate t-tests for each illness were conducted (see Table 2). T-test results for mental illness and non-illness life events are included. As predicted, significant optimistic bias was present for all illnesses except ulcers and common colds. Weinstein's finding of a

Table 2

Bias in Judgements of Perceived Vulnerability

Event	Mode	Mean	*t*	*p*(2-tailed)
Illnesses:				
Heart attack	0	- .90	- 6.45	<.001
Skin cancer	0	- .87	- 6.48	<.001
Stroke	0	-1.17	- 9.18	<.001
Diabetes	0	-1.02	- 6.97	<.001
Multiple sclerosis	0	-1.79	-13.70	<.001
HIV-infection	0	-1.79	-12.89	<.001
Epilepsy	-4	-2.13	-15.58	<.001
STD's	-2	-1.80	-13.55	<.001
Brain tumour	0	- .98	- 8.27	<.001
Ulcers	0	- .20	- 1.84	n.s.
Common cold	0	.17	1.53	n.s.
Heart trouble	0	- .71	- 5.55	<.001
High blood pressure	0	- .40	- 3.09	<.002
Cancer	0	- .40	- 3.31	<.001
Any serious disease	0	- .63	- 6.64	<.001
Mental illnesses:				
Going insane	0	-1.55	-10.33	<.001
Serious depression	0	- .60	- 4.42	<.001
Non-illness events:				
Injured in car accident	0	.04	.39	n.s.
Burglary victim	0	- .17	- 1.92	n.s.
Winning lottery	0	-1.13	- 9.02	<.001

Note. Bonferroni-adjusted alpha = .05/20 = .0025

significant pessimistic bias for ulcers was not replicated. Interestingly, there was no bias in perceived vulnerability to negative life events (burglary, car accident), but a significant pessimistic bias toward winning the lottery.

Health Anxiety and its Predictors

Intercorrelations among health anxiety and hypochondriasis measures (HA and WI) and their hypothesized predictors (PV, FBS, DA, and BDI) are presented in Table 3. The HA and WI scales are highly intercorrelated (r = .67), and, in general, more highly correlated with depression than with the hypothesized major predictors.

Multiple regression using HA as dependent variable

A standard multiple regression was performed between the HA scale as the dependent (or outcome) variable and PV, FBS, and DA as independent (or predictor variables), following the forced entry of Sex and Age variables (acting as covariates for the analysis). The results are summarized in Table 4. The addition of the predictor variables significantly improved the regression based on covariates alone (F_{change} = 3.96, $p < .01$). However, only 9% of the variance in HA scores was explained by the full regression equation. Only DA and PV had (marginally) significant beta coefficients; FBS did not contribute significantly to the regression.

Table 3

Intercorrelations among HA, WI, PV, FBS, DA,and BDI Scales

	WI	PV	FBS	DA	BDI
HA	.67***	.17*	.13	-.20*	.34***
WI		.11	.22**	-.42***	.43***
PV			.05	.01	.22**
FBS				-.07	.20*
DA					-.20*

*p < .05

**p < .01 all probability estimates are 2-tailed

***p < .001

Note. Abbreviations for scales are as follows:
HA = Health Anxiety Scale
WI = Whitely Index
PV = Perceived Vulnerability to Illness scale
FBS = Fear of Bodily Sensations scale
DA = Dysfunctional Attitudes about Illness scale
BDI = Beck Depression Inventory

Table 4

Multiple Regression Analysis of Health Anxiety (HA) Scale[a]

Predictor	r_{xy}	β_j	t	p	b_j
Age	-.01	-.02	-.22	.83	-.03
Sex	.13	.14	1.77	.08	1.58
FBS	.13	.08	.95	.34	.01
DA	-.20	-.20	-2.54	.01	-.12
PV	.17	.17	2.07	.04	.06
				b_0=	44.10

Multiple R = .30

R^2 = .09 $F(5,143) = 2.92$, $p<.02$

R^2 (corrected) = .06

[a]Listwise deletion of missing data left 149 cases for this analysis.

The analysis was repeated adding a second covariate (BDI) following Age and Sex, and then adding the predictor variables PV, FBS and DA. The results of this analysis are summarized in Table 5. Adding BDI to the regression equation after Age and Sex resulted in significant improvement in the prediction of HA scores (R^2_{change} = .11; F = 18.91, p<.0001). Further addition of PV, FBS and DA did not significantly improve the prediction over the contribution of the covariate variables (R^2_{change} = .03; F = 1.66, n.s.). The full equation explained about 16% of the variance in HA scores, but most of the prediction was due to the contribution of BDI scores.

Multiple regression using WI as dependent variable

The two multiple regression analyses reported above were repeated using WI instead of HA as the dependent variable. These results are summarized in Tables 6 and 7. Overall, the pattern of results was similar: adding the predictor variables (PV, FBS and DA) significantly improved the regression over Age and Sex alone, but the additional covariate BDI also made a large contribution. However, in contrast to the analyses using HA, the addition of PV, FBS and DA following BDI significantly improved the prediction. The final regression equation without BDI explained approximately 22% of the variance in WI scores; the equation with BDI as well as the predictor variables explained about

Table 5

Multiple Regression Analysis of Health Anxiety (HA) Scale including Depression as Covariate[a]

Predictor	r_{xy}	β_j	t	p	b_j
Age	-.01	-.02	-.26	.80	-.03
Sex	.12	.13	1.62	.11	1.39
BDI	.34	.28	3.38	.00	.25
FBS	.13	.03	.42	.67	.00
DA	-.20	-.15	-1.87	.06	-.09
PV	.17	-.10	1.28	.20	.04
				b_0=	40.60

Multiple R = .40

R^2 = .16 $F(6,142) = 4.51$, $p<.001$

R^2 (corrected) = .12

[a]Listwise deletion of missing data left 149 cases for this analysis.

Table 6

Multiple Regression Analysis of Hypochondriasis (WI) Scale[a]

Predictor	r_{xy}	β_j	t	p	b_j
Age	-.10	-.08	-1.04	.30	-.25
Sex	-.02	.02	.31	.76	.49
FBS	.22	.16	2.15	.03	.04
DA	-.42	-.41	-5.48	.00	-.47
PV	.11	.13	1.80	.07	.10
				b_0=	67.68

Multiple R	= .47	
R^2	= .22	$F(5,143) = 8.21$, $p<.0001$
R^2 (corrected)	= .20	

[a]Listwise deletion of missing data left 149 cases for this analysis.

Table 7

Multiple Regression Analysis of Hypochondriasis (WI) Scale Including Depression as Covariate[a]

Predictor	r_{xy}	β_j	t	p	b_j
Age	-.10	-.08	-1.16	.25	-.26
Sex	-.02	.00	.04	.97	.06
BDI	.43	.33	4.51	.00	.58
FBS	.22	.10	1.46	.15	.03
DA	-.42	-.34	-4.78	.00	-.39
PV	.11	.06	.80	.42	.04
				b_0=	59.49

Multiple R = .57

R^2 = .32 $F(6,142) = 11.17$, $p<.0001$

R^2 (corrected) = .29

[a]Listwise deletion of missing data left 149 cases for this analysis.

32%. DA emerged as the predictor making the most significant contribution.

Seriousness and Controllability of Illnesses

Subjects' ratings of the seriousness and controllability of the illnesses were used to determine the top and bottom quartiles of serious/non-serious and controllable/uncontrollable illnesses. The correlations between perceived vulnerability and the HA and WI scales were calculated for each quartile (see Table 8). The correlations for the most and least serious illnesses were compared using the formulas for testing the difference between two paired correlation coefficients (Glass & Hopkins, 1984, p. 311). Contrary to my hypothesis, there was a larger relationship between perceived vulnerability and HA or WI for non-serious illnesses than for serious illnesses; however, this difference was not significant. Nor was there any significant difference between the correlations of perceived vulnerability and HA or WI for controllable/uncontrollable illnesses.

These findings suggested that the items of the PV scale were varying widely, and in unexpected ways, in terms of their correlations with health anxiety. To explore this possibility, I examined the correlations between each item and both the HA and WI scale (these results are available in Appendix I). Due to the potentially high experiment-wise

Table 8

Correlations between Perceived Vulnerability to Serious/Nonserious and Controllable/Uncontrollable Illnesses and HA and WI

	HA	WI
Perceived vulnerability to most serious illnesses	.20*	.15
Perceived vulnerability to least serious illnesses	.23**	.17*
Perceived vulnerability to most controllable illnesses	.07	.03
Perceived vulnerability to least controllable illnesses	.15	.04

* p (2-tailed) < .05

**p (2-tailed) < .01

error rate involved in making such a large number of correlations, any interpretation of the results must be considered tentative. However, it did appear that, in general, the illnesses which were most highly associated with health anxiety were either not serious, or not necessarily fatal: colds, heart trouble, ulcers, and hypertension. Finding that vulnerability to serious depression was also highly correlated with HA and WI can be easily understood considering the strong relationship between both these scales and the BDI.

Panic Attacks

Of 161 subjects, 125 (78%) reported never having experienced a panic attack out of the blue. Among subjects who had experienced panic attacks, the number of attacks in the last six months ranged from 1 to 60. The distribution of frequency of panic attacks is, because of the nature of the variable, very badly skewed, and not amenable to transformation. Therefore the variable was dichotomized into two groups: subjects who have and subjects who have not experienced a panic attack in the past 6 months. Point-biserial correlation coefficients were calculated between the panic variable and the HA and WI scales. Subjects who had had a panic attack tended to score slightly higher on the HA scale, but this correlation only approached

significance (r = .13, $p < .10$). Panic subjects also tended to score higher on the WI (r = .22, $p < .005$).

To investigate the contribution of hypothesized health anxiety predictors on the panic/no panic dichotomy, a discriminant function analysis was performed using PV, FBS and DA as discriminating variables. The discriminant function was not significant, indicating that a linear combination of the discriminating variables could not be found which would discriminate well between the groups.

Discussion

The major hypothesis of this study, that important components of health anxiety include perceived vulnerability to illness, fear of bodily sensations, and dysfunctional attitudes about illness, was not supported by the results. Using a recently-developed scale of health anxiety (HA) as the outcome measure, multiple regression analyses indicated that perceived vulnerability to illness (PV) and dysfunctional attitudes toward illness (DA) were significant predictors of HA (fear of bodily sensations [FBS] was not). However, the regression equation accounted for only a small (though significant) proportion of the variance in HA scores, indicating that these variables were not major components of health anxiety. Furthermore, once depression and anxiety were entered as covariates in the analysis, PV and DA no longer made a significant contribution.

Interpretation of the importance of predictor variables from multiple regression analysis is a difficult issue. Darlington (1968) suggests examination of both the predictor validities (i.e., predictor-outcome correlation coefficients) and beta-weights. Examination of the bivariate correlation coefficients and the beta-weights in the multiple regression analysis suggests that depression was the most important variable in predicting HA. That depression and health anxiety should be highly related is

not surprising, given the well known positive relationship between depression and anxiety in general, and the well documented strong correlation between hypochondriasis and depression (e.g., Barsky, Wyshak, & Klerman, 1986). Nevertheless, this result is disappointing in terms of the Salkovskis and Warwick cognitive theory of health anxiety and hypochondriasis, which argues that hypochondriasis is best construed as a severe form of anxiety about one's health.

The negative findings with respect to health anxiety as measured by the HA scale led me to interpret the corresponding results using health anxiety measured by the Whitely Index (WI) with greater interest. Because the HA scale was recently developed, it is possible that it's construct validity with respect to health anxiety is not ideal. Although the WI was developed over 20 years ago using a clinical sample of hypochondriacs (with unknown diagnostic validity), its content closely matches the traditional construct of hypochondriasis, such as provided in the DSM-III-R description of hypochondriasis.

The two measures of health anxiety/hypochondriasis (i.e., HA and WI) were highly correlated. However, the results of the multiple regression analyses using WI as the outcome measure were more encouraging in terms of the hypothesized major variables, PV, DA, and FBS. These variables produced a regression equation which accounted for about one fifth of the variance in WI scores. Furthermore,

DA remained an important variable following the introduction of depression and trait anxiety as covariates. If we consider the WI scale to more closely match the construct of health anxiety, it appears that the major correlates of health anxiety are depression and dysfunctional attitudes toward illness, and the inclusion of perceived vulnerability to illness as an important component of health anxiety is not warranted.

The overall failure of these results to fully support the hypotheses of this study, including the weak findings with regard to the relationship between panic and the hypothesized determinants of health anxiety, can be discussed with regard to three potential problem areas: problems with measurement, problems with sampling, and problems with the validity of the perceived vulnerability to illness and fear of bodily sensations as components of health anxiety.

As most of the major variables in this study (except depression and anxiety) were assessed using very recently-developed scales of uncertain reliability and validity, part of the weakness in the results is very likely due to measurement error. The results in terms of the HA and WI scale have already been discussed; it appeared that, for the purposes of my study, WI seemed to be a more satisfactory measure of health anxiety. However, it should be noted that the DA scale and the WI scale, as they were presented to the subjects, had very similar response formats, and these

formats were different from those of any other scales. It is possible that the significant contribution of the DA scale to variance in WI scores was partially a function of subjects' response styles, given the similar response format.

The fear of bodily sensations and symptoms scale (FBS) was found to be very highly internally consistent. It's use in my study was to reflect the idea that health anxious people become fearful in response to sensations, presumably because they interpret them as signs of serious illness. However, the FBS scale may not be weighted toward symptoms of particular importance to health anxious people. For example, the scale includes a number of more psychological symptoms, such as feelings of confusion and unreality. Although Barlow and others have demonstrated that these kinds of symptoms often cause fear in panic patients (see Barlow & Craske, 1988), they may not be important in health anxious patients. Alternative ways of tapping the construct of fear in response to bodily sensations, presumably due to their misinterpretation, should be developed for use in health anxious as opposed to panic patients. Hitchcock and Mathews (1992), for example, gave subjects scenarios including ambiguous bodily sensations, and asked them to report how likely they would be to make any of several possible interpretations of the sensations. They found that subjects' ratings of how likely they would be to make an interpretation of catastrophic illness accounted for a large

proportion of the variance in their scores on a measure of hypochondriasis. Their technique may be a more valid and useful measure of the construct of fear and misinterpretation of bodily sensations than the FBS scale used in the current study.

The validity of my measure of perceived vulnerability to illness is open to question. Although the item format was based on the work of Weinstein (1982), he used subject's perceived ratings to examine differences among illnesses, not among subjects. My attempt to transform his rating scheme into a personality variable did not appear entirely successful, given the generally poor performance of the PV scale in the multiple regression analyses. Different results may have been obtained using a different selection of illnesses, or a different format.

Measurement of perceived vulnerability to illness as an individual difference variable could be done in a variety of ways. To develop a scale to be used in a nonclinical population, it may be informative to ask subjects to generate illnesses to which they feel highly vulnerable or relatively invulnerable. Alternatively, one could ask subjects to rank a list of illnesses and other events in order of perceived vulnerability.

The surprising direction of the results from the third hypothesis (that health anxiety and perceived vulnerability would be more strongly correlated for serious illnesses) may be partially due to an interaction of my selection of

illnesses and of my sample. Although this difference was not significant, there was a higher correlation between the health anxiety scales (HA and WI) and non-serious illnesses than between these scales and more serious illnesses. Correlations between each item of the PV scale and both health anxiety scales suggested that health anxiety was indeed correlated mostly with relatively non-serious illnesses. On the other hand, both theory and clinical wisdom suggest that actual hypochondriacs worry and consider themselves vulnerable to very serious illnesses. My findings may be understandable in light of the general, nonclinical sample used. Given hindsight, it appears likely that in a sample with a normal range of health anxiety, increases in anxiety would be related to perceived vulnerability to less serious and more common illnesses, perhaps illnesses which the subjects are more familiar with. In addition, the young age of the vast majority of the subjects may have meant that they have never seriously considered their risk of or worried about serious illnesses (such as heart attacks) which typically occur later in life.

The use of a general sample, as opposed to a design involving comparing a highly health anxious sample to a control group, could have caused attenuation in the results. Because depression is probably a more common phenomenon in university students than is health anxiety (and, even without the inclusion of one item, the distribution of BDI scores indicated a fair number of slightly to moderately

depressed students), it is possible that the health anxiety present in my sample was largely a function of depression. Comparing a health anxious sample with a nonanxious control group might shed more light on the components of health anxiety.

It is also possible that the variables I chose, especially the new variable, perceived vulnerability to illness, are not crucial components of health anxiety. A variable which was not included in the study, but which could play a major role not only in promoting health anxiety but also in increasing fear of bodily sensations, dysfunctional attitudes toward illness, and perceived vulnerability to illness, would be the experience of illness, especially its mismanagement, in oneself or in family members. Research on the effect of experience of illness and its possibly mediating role between perceived vulnerability to illness and health anxiety would be an interesting next step for this research.

The weak relationships between health anxiety and fear of bodily sensations, dysfunctional attitudes toward illness, and perceived vulnerabilty toward illness suggest that the cognitive model of health anxiety and hypochondriasis may be inappropriately emphasizing cognitive, rather than affective, processes. Traditional ideas about hypochondriasis, which describe it as usually secondary to depression, appeared more plausible in light of my results, which suggested that depression made a larger

contribution to health anxiety than the theoretically related constructs. Despite the allure of the cognitive theory, caution is warranted in assuming that hypochondriasis is more closely related to the anxiety disorders, such as panic, than to affective or somatoform disorders.

Further research in this area should be conducted to resolve several important issues. First, the psychometric properties of measures of health anxiety, perceived vulnerability to illness, fear or misinterpretation of bodily sensations, and dysfunctional attitudes toward illness need to be established. Without better information regarding these measures, hypotheses about the cognitive theory of health anxiety cannot be rigorously tested. In particular, the reliability (including test-retest) and validity of Salkovskis' health anxiety scale (HA) require investigation, because of the central importance of this construct to his cognitive-behavioural theory of health anxiety.

In addition, scales or structured interviews to assess illness experience should be developed to investigate the contribution of this theoretically important variable. Warwick and Salkovskis's theory of the development of health anxiety and hypochondriasis suggests that the perception and experience of illness and symptoms in one's family lead to the development of attitudes toward illness which may predispose a person to develop health anxiety. It is

possible that the vicarious experience of illness (e.g., illness in a family member) plays as important a role as direct experience. The demonstration of a relationship between illness experience and health anxiety, attitudes toward illness, and perceived vulnerability to illness would be important steps in the validation of the cognitive-behavioural theory.

Finally, although there is some evidence that characteristics of hypochondriasis are distributed continuously in the population (e.g., Barsky et al, 1986), the hypothesis that hypochondriasis represents an extreme form of normal health anxiety, which is central to Salkovskis and Warwick's theory, requires further testing. Once valid and reliable measures of health anxiety have been established, their distribution in the general population and in hypochondriasis patients should be examined. In addition, prospective studies will enable us to determine whether antecedent health anxiety or depression effects the future development of hypochondriasis.

References

American Psychiatric Association (1987). Diagnostic and statistical manual of mental disorders (3rd ed., revised). Washington, DC: Author.

Barsky, A. J., Wyshak, G., & Klerman, G. L. (1986). Hypochondriasis: An evaluation of the DSM-III criteria in medical outpatients. Archives of General Psychiatry, 43, 493-500.

Barsky, A. J., Wyshak, G., & Klerman, G. L. (1990). Transient hypochondriasis. Archives of General Psychiatry, 47, 746-752.

Barsky, A. J., Wyshak, G., Klerman, G. L., & Latham, K. S. (1990). The prevalence of hypochondriasis in medical outpatients. Social Psychiatry and Psychiatric Epidemiology, 25, 89-94.

Barsky, A. J., Wyshak, G., Latham, K. S., & Klerman, G. L. (1991). The relationship between hypochondriasis and medical illness. Archives of Internal Medicine, 151, 84-88.

Barlow, D. H., & Craske, M. G. (1988). The phenomenology of panic. In S. Rachman & J. D. Maser (Eds.), Panic: Psychological perspectives. Hillsdale, NJ: Erlbaum.

Beck, A. T., Rush, A. J., Shaw, B. G., & Emery, G. (1979). Cognitive therapy of depression. New York: Guilford Press.

Beck, A. T., Steer, R. A., & Garbin, M. G. (1988). Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. Clinical Psychology Review, 8, 77-100.

Berkanovic, E., Telesky, C., & Reeder, S. (1981). Structural and social psychological factors in the decision to seek medical care for symptoms. Medical Care, 19, 693-709.

Brody, D. S., Lerman, C., & Jemmott, J. B. (1992). AIDS concerns among low-risk heterosexuals. Medical Care, 30, 276-281.

Burger, J. M., & Burns, L. (1988). The illusion of unique invulnerability and the use of effective contraception. Personality and Social Psychology Bulletin, 14, 264-270.

Butler, G. & Mathews, A. (1983). Cognitive processes in anxiety. Advances in Behaviour Research & Therapy, 5, 51-62.

Chambless, D. (1988). Cognitive mechanisms in panic disorder. In S. Rachman & J. D. Maser (Eds.), Panic: Psychological perspectives. Hillsdale, NJ: Erlbaum.

Clark, D. M. (1986). A cognitive approach to panic. Behaviour Research and Therapy, 24, 461-470.

Clark, D. M. (1988). A cognitive model of panic attacks. In S. J. Rachman & J. Maser (Eds.), Panic: Psychological perspectives. Hillsdale, NJ: Erlbaum.

Costa, P. T., & McCrae, R. R. (1985). Hypochondriasis, neuroticism, and aging: When are somatic complaints unfounded? American Psychologist, 40, 19-28.

Darlington, R. B. (1968). Multiple regression in psychological research and practice. Psychological Bulletin, 69, 161-182.

Fava, G. A., Kellner, R., Zielezny, M., & Grandi, S. (1988). Hypochondriacal fears and beliefs in agoraphobia. Journal of Affective Disorders, 14, 239-244.

Gagnon, F., Freeston, M. H., Ladouceur, R., & Thibodeau, N. (1992, June). Health-related thoughts: The role of appraisal. Paper presented at the Annual Convention of the Canadian Psychological Association, Quebec City, Canada.

Glass, G. V., & Hopkins, K. D. (1984). Statistical methods in education and psychology (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.

Hennig, P., & Knowles, A. (1990). Factors influencing women over 40 years to take precautions against cervical cancer. Journal of Applied Social Psychology, 20, 1612-1621.

Hitchcock, P. B., & Mathews, A. (1992). Interpretation of bodily symptoms in hypochondriasis. Behaviour Research & Therapy, 30, 301-306.

Janz, N. K., & Becker, M. H. (1984). The Health Belief Model: A decade later. Health Education Quarterly, 11, 1-47.

Kellner, R. (1985). Functional somatic symptoms and hypochondriasis. Archives of General Psychiatry, 42, 821-833.

Kosch, S. G., & Spring, A. (1983). Breast self-examination of women with and without benign breast disease. Family Practice Research Journal, 2, 171-180.

Leavitt, F. (1979). The Health Belief Model and utilization of ambulatory care services. Social Science and Medicine, 13A, 105-112.

Lopatka, C. (1993). Responsibility in Obsessive-Compulsive Disorder: Is it worth checking? Unpublished Ph.D. thesis, University of British Columbia.

National Institute of Mental Health (NIMH). (1991). Treatment of panic disorder. Consensus Development Conference, Bethesda MD, September 25-27.

Noyes, R., Reich, J., Clancy, J., & O'Gorman, T. W. (1986). Reduction in hypochondriasis with treatment of panic disorder. British Journal of Psychiatry, 149, 631-635.

Pilowsky, I. (1967). Dimensions of hypochondriasis. British Journal of Psychiatry, 113, 89-93.

Rachman, S. (1991). A psychological approach to the study of comorbidity. Clinical Psychology Review, 11, 561-464.

Rachman, S. J., & Maser, J. (Eds.). (1988). Panic: Psychological perspectives. Hillsdale, NJ: Erlbaum.

Salkovskis, P. M., & Clark, D. M. (in press). Panic disorder and hypochondriasis. Behaviour Research and Therapy.

Salkovskis, P. M., & Warwick, H. M. C. (1986). Morbid preoccupations, health anxiety and reassurance: A cognitive-behavioural approach to hypochondriasis. Behaviour Research and Therapy, 24, 597-602.

Spielberger, C. D. (1983). State-Trait Anxiety Inventory (Form Y). Palo Alto: Consulting Psychologists Press.

Tabachnick, B. G., & Fidell, L. S. (1989). Using multivariate statistics (2nd ed.). New York: Harper & Row.

Warwick, H. M. C. (1989). A cognitive-behavioural approach to hypochondriasis and health anxiety. Journal of Psychosomatic Research, 33, 705-711.

Warwick, H. M. C., & Salkovskis, P. M. (1990). Hypochondriasis. Behaviour Research and Therapy, 28, 105-117.

Weinstein, N. D. (1982). Unrealistic optimism about susceptibility to health problems. Journal of Behavioral Medicine, 5, 441-460.

Weinstein, N. D. (1989). Effects of personal experience on self-protective behavior. Psychological Bulletin, 105, 31-50.

Woods, S. M., Natterson, J., & Silverman, J. (1966). Medical students' disease: Hypochondriasis in medical education. Journal of Medical Education, 41, 785-790.

Wyper, M. A. (1990). Breast self-examination and the Health Belief Model: Variations on a theme. Research in Nursing and Health, 13, 421-428.

Appendix A

Health Questionnaire

Each question in this section consists of a group of four statements. Please read each group of statements carefuly and then select the one which best describes your feelings over the last six months. Identify the statement by circling its letter. It may be that more than one statement applies, in which case, please circle any that are applicable.

1. a. I do not worry about my health.
   b. I occasionally worry about my health.
   c. I spend much of my time worrying about my health.
   d. I spend most of my time worrying about my health.

2. a. Worries about my health do not stop me from thinking about other things.
   b. Worries about my health sometimes stop me from thinking about other things.
   c. Worries about my health often stop me from thinking about other things.
   d. I am so worried about my health that I can think of nothing else.

3. a. I have only fleeting thoughts about my health.
   b. I have to do something to take my mind off thoughts about my health.
   c. Very few activities can take my mind off thoughts about my health.
   d. Nothing can take my mind off such thoughts.

4. a. The idea that I have a serious illness is senseless.
   b. The idea that I have a serious illness might be sensible.
   c. The idea that I have a serious illness is probably sensible.
   d. The idea that I have a serious illness is realistic.

5. a. The idea that I have a serious illness never seems sensible.
   b. The idea that I have a serious illness sometimes seems sensible.
   c. The idea that I have a serious illness often seems sensible.
   d. The idea that I have a serious illness always seems sensible.

6. a. Generally I am not afraid of developing an illness.
   b. I am afraid of developing an illness only when I have symptoms.
   c. I am afraid of developing an illness most of the time.
   d. I am afraid of developing an illness all of the time.

7. a. Generally I do not think about illness.
   b. Most of the time I put thoughts of illness out of my mind.
   c. I try to resist thoughts of illness but am unable to do so.
   d. I never try to resist thoughts of being ill.

8. a. I do not have mental pictures of myself being ill.
   b. I occasionally have images of myself being ill.
   c. I frequently have images of myself being ill.
   d. I constantly have images of myself being ill.

9. a. Generally I do not avoid situations where illness is prominent.
   b. I sometimes avoid situations where illness is prominent.
   c. I often avoid situations where illness is prominent.
   d. I always avoid situations where illness is prominent.

10. a. As a rule I am not aware of changes in my body.
    b. Sometimes I am aware of changes in my body.
    c. I am often aware of changes in my body.
    d. I am constantly aware of my bodily state.

11. a. I do not examine my body.
    b. I examine my body as generally recommended.
    c. I often examine my body.
    d. I examine my body daily.

12. a. I take less notice of aches and pains than most other people.
    b. I notice aches and pains as much as most other people.
    c. I notice aches and pains more than most other people.
    d. I am aware of aches and pains in my body all the time.

13. a. Bodily changes are usually normal
    b. Bodily changes can be normal but need to be watched.
    c. Bodily changes are often a sign of illness.
    d. Bodily changes are always a sign of illness.

14. a. I am never afraid of visiting my doctor.
    b. I am sometimes afraid of visiting my doctor because of my health worries.
    c. I am often afraid of visiting my doctor because of my health worries.
    d. I am too afriad to visit my doctor because of my health worries.

15. a. My previous illnesses were properly treated.
    b. My previous illnesses could have been slightly better treated.
    c. My previous illnesses could have been much better treated.
    d. My previous illnesses were seriously mismanaged.

16. a. If I feel a sensation in my body I rarely wonder what it means.
    b. If I feel a sensation in my body I sometimes wonder what it means.
    c. If I feel a sensation in my body I always wonder what it means.
    d. If I feel a sensation in my body I must know what it means.

17. a. I do not think I have a physical illness.
    b. I sometimes think I have a physical illness.
    c. I often think I have a physical illness.
    d. I am convinced that I am physically ill.

18. a. My family and friends would say I do not worry enough about my health.
    b. My family and friends would say I have a normal attitude to my health.
    c. My family and friends would say I worry too much about my health.
    d. My family and friends would say I am a hypochondriac.

19. a. My physician would say I do not worry enough about my health.
    b. My physician would say I have a normal attitude to my health.
    c. My physician would say I worry too much about my health.
    d. My physician would say I am a hypochondriac.

20. a. I think I worry too little about my health.
    b. I think I have a normal attitude to my health.
    c. I think I worry too much about my health.
    d. I think I am a hypochondriac.

21. a. If I hear an illness discussed I never think I have it myself.
    b. If I hear an illness discussed I sometimes think I have it myself.
    c. If I hear an illness discussed I often think I have it myself.
    d. If I hear an illness discussed I am convinced I have it myself.

22. a. My health worries do not interfere with my life.
    b. Occasionally my health worries stop me from doing things.
    c. Often health worries stop me from doing things.
    d. I am unable to do anything because of my health worries.

23. a. I am lastingly relieved if my doctor tells me there is nothing wrong.
    b. I am initially relieved but the worries sometimes return later.
    c. I am initially relieved but the worries always return later.
    d. I am not relieved if my doctor tells me there is nothing wrong.

Appendix B

Whitely Index

Please answer each question according to the scale below.

1	Do you worry about the possibility that you have got a serious illness?	1----2----3----4----5----6----7 Not at all Moderately A great deal
2	Are you bothered by many pains and aches?	1----2----3----4----5----6----7 Not at all Moderately A great deal
3	Do you find that you are often aware of various things happening in your body?	1----2----3----4----5----6----7 Not at all Moderately A great deal
4	Do you worry a lot about your health?	1----2----3----4----5----6----7 Not at all Moderately A great deal
5	Do you often have the symptoms of very serious illnesses?	1----2----3----4----5----6----7 Not at all Moderately A great deal
6	If a disease is brought to your attention (through the radio, television, newspapers or someone you know) do you worry about getting it yourself?	1----2----3----4----5----6----7 Not at all Moderately A great deal
7	If you feel ill and someone tells you that you are looking better, do you become annoyed?	1----2----3----4----5----6----7 Not at all Moderately A great deal
8	Do you find that you are bothered by many different symptoms?	1----2----3----4----5----6----7 Not at all Moderately A great deal
9	Is it easy for you to forget about yourself, and think about all sorts of other things?	1----2----3----4----5----6----7 Not at all Moderately A great deal
10	Is it hard for you to believe the doctor when he/she tells you there is nothing for you to worry about?	1----2----3----4----5----6----7 Not at all Moderately A great deal
11	Do you get the feeling that people are not taking your illness seriously enough?	1----2----3----4----5----6----7 Not at all Moderately A great deal
12	Do you think that you worry about your health more than most people?	1----2----3----4----5----6----7 Not at all Moderately A great deal
13	Do you think there is something seriously wrong with your body?	1----2----3----4----5----6----7 Not at all Moderately A great deal
14	Are you afraid of illness?	1----2----3----4----5----6----7 Not at all Moderately A great deal

Appendix C

Health Estimates Questionnaire

Below there is a list of some health problems which could happen to you at some time in the future. Included in this list are some non-illness life events, such as being the victim of burglary.

For each item on the list, estimate HOW LIKELY IT IS THAT THIS WILL HAPPEN TO YOU, COMPARED TO OTHER UBC STUDENTS OF YOUR SEX. We don't want to know if you think it's likely or unlikely, but whether you feel your own risk is greater than, less than, or about the same as other students' risks. Using the scale below, write a number beside each item. (If this is a chronic disease you already have, e.g. epilepsy, please leave blank.)

THE CHANCES I WILL EXPERIENCE _____ IN THE FUTURE ARE:

0	1	2	3	4	5	6	7	8
Much below average		Somewhat below average		Average for other UBC students		Somewhat above average		Much above average

_____Heart attack
_____Skin cancer
_____Stroke
_____Injured in car accident
_____Diabetes (adult-onset)
_____Multiple sclerosis
_____Going insane
_____HIV-infection (AIDS virus)
_____Epilepsy
_____Sexually transmitted disease (e.g., chlamydia, herpes)
_____Brain tumour
_____Ulcers
_____Common cold
_____Heart trouble
_____Victim of a burglary
_____High blood pressure
_____Win over $1000 in a lottery
_____Cancer
_____Any serious disease
_____Serious depression

Appendix D

Now, please rate these health problems and other events in terms of how CONTROLLABLE they are, according to the following scale:

1: I can't do anything that affects the chances of this happening
2: My actions have a small effect on the chances that this will happen
3: My actions have a moderate effect on the chances that this will happen
4: My actions have a large effect on the chances that this will happen
5: Completely controllable

____Heart attack	____Brain tumour
____Skin cancer	____Ulcers
____Stroke	____Common cold
____Injured in car accident	____Heart trouble
____Diabetes (adult-onset)	____Victim of a burglary
____Multiple sclerosis	____High blood pressure
____Going insane	____Win over $1000 in a lottery
____HIV-infection (AIDS virus)	____Cancer
____Epilepsy	____Any serious disease
____Sexually transmitted disease (e.g., chlamydia, herpes)	____Serious depression

Finally, please rate these problems and events according to how SERIOUS they are, according to the following scale.

IF THIS HAPPENED TO ME IT WOULD BE:

1	2	3	4	5
Not at all serious	Slightly serious	Serious	Very serious	Extremely serious or fatal

____Heart attack	____Brain tumour
____Skin cancer	____Ulcers
____Stroke	____Common cold
____Injured in car accident	____Heart trouble
____Diabetes (adult-onset)	____Victim of a burglary
____Multiple sclerosis	____High blood pressure
____Going insane	____Win over $1000 in a lottery
____HIV-infection (AIDS virus)	____Cancer
____Epilepsy	____Any serious disease
____Sexually transmitted disease (e.g., chlamydia, herpes)	____Serious depression

Appendix E

Emotions & Symptoms Questionnaire

Directions. The items in this questionnaire refer to symptoms that may cause anxiety or fear. Circle the number that describes how much you would be frightened by each of the following, if it happened to you.

	Not at all	A little	Some	Much	Very much
1. Burning sensations in your stomach and throat	0	1	2	3	4
2. Difficulty swallowing	0	1	2	3	4
3. Feeling that your chest is so tight that it is difficult to take a deep breath	0	1	2	3	4
4. People or objects seeming far away when they're actually nearby	0	1	2	3	4
5. Difficulty breathing in hot environments	0	1	2	3	4
6. Your heart pounding even though you haven't been exerting yourself	0	1	2	3	4
7. Painful urination	0	1	2	3	4
8. Feeling like your body is not real	0	1	2	3	4
9. Your heart skipping a beat	0	1	2	3	4
10. Feeling like your voice is far away when you speak	0	1	2	3	4
11. Pain in your chest whenever you exert yourself	0	1	2	3	4
12. Diarrhea	0	1	2	3	4
13. Difficulty catching your breath after exercise	0	1	2	3	4
14. Dizzy spells	0	1	2	3	4
15. Wheezing	0	1	2	3	4
16. Difficulty putting your thoughts into words	0	1	2	3	4
17. Gas problems (excessive belching or flatulence)	0	1	2	3	4
18. Blood in your urine	0	1	2	3	4
19. Feeling our of breath even when you haven't been exerting yourself	0	1	2	3	4
20. Forgetting appointments	0	1	2	3	4
21. Feeling as if you're going to pass out	0	1	2	3	4
22. Senseless thoughts that you can't get rid of	0	1	2	3	4
23. A mole that has become darker	0	1	2	3	4
24. Your heart racing even though you haven't been exerting yourself	0	1	2	3	4
25. Constipation	0	1	2	3	4
26. Thoughts of performing personally repulsive sexual acts	0	1	2	3	4
27. Forgetting the names of familiar people	0	1	2	3	4

Circle the number that describes how much you would be frightened by each of the following, if it happened to you.

	Not at all	A little	Some	Much	Very much
28. Difficulty concentrating	0	1	2	3	4
29. A bright red rash on your neck	0	1	2	3	4
30. An urge to attack someone with a knife	0	1	2	3	4
31. Nausea	0	1	2	3	4
32. Small white lumps on your hands	0	1	2	3	4
33. Difficulty understanding things you read	0	1	2	3	4
34. Feeling like time has slowed down	0	1	2	3	4
35. Pain in your chest whenever you get angry or anxious	0	1	2	3	4
36. Tingling sensations in your hands	0	1	2	3	4
37. Undigested food in your stools	0	1	2	3	4
38. Difficulty urinating even when your bladder is full	0	1	2	3	4
39. Suddenly feeling hot all over	0	1	2	3	4
40. Red blotches on your legs	0	1	2	3	4
41. Choking sensations	0	1	2	3	4
42. Feeling like you're going to vomit	0	1	2	3	4
43. Sore, itchy skin on your arms	0	1	2	3	4
44. Burning sensations when you urinate	0	1	2	3	4
45. A wart that has grown in size	0	1	2	3	4
46. Pain just above your genital region (bladder pain)	0	1	2	3	4
47. Feeling like your surroundings are unreal	0	1	2	3	4
48. Shooting pains in your chest and arms	0	1	2	3	4
49. Chills sweeping all over your body	0	1	2	3	4
50. Thoughts of jumping in front of a moving car	0	1	2	3	4
51. Sweating a lot even when you're not in a hot environment	0	1	2	3	4
52. Urinating more frequently than usual	0	1	2	3	4
53. Cramps in your intestines/bowels	0	1	2	3	4
54. Stomach cramps	0	1	2	3	4
56. An urge to shout out swear words	0	1	2	3	4
57. Feeling "spacey" or "spaced out"	0	1	2	3	4

Circle the number that describes how much you would be frightened by each of the following, if it happened to you.

	Not at all	A little	Some	Much	Very much
58. Bloating in your stomach	0	1	2	3	4
59. Blood in your stools	0	1	2	3	4
60. Senseless images intruding into your mind	0	1	2	3	4
61. Confusing right and left when you're giving directions	0	1	2	3	4

Appendix F

ATTITUDE QUESTIONNAIRE

This questionnaire lists different attitudes or beliefs which people sometimes hold. Read EACH statement carefully and decide how much you agree or disagree with each statement.

For each of the attitudes, show your answer by putting a circle around the words which BEST DESCRIBE HOW YOU THINK. Be sure to choose only one answer for each attitude. Because people are different, there is no right or wrong answer to these statements.

To decide whether a given attitude is typical of your way of looking at things, simply keep in mind what you are like MOST OF THE TIME.

If medication doesn't take away a symptom then I must have a serious illness.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

If I experience an unexpected physical symptom I must be ill.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

It is possible to know, with absolute certainty, that you are not ill.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

I or my doctor must be able to find an explanation for any physical symptom.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

Bodily changes are always a sign that something is wrong.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

Real symptoms can be produced by anxiety.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

If I don't worry about my health, something will go wrong.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

Doctors often miss serious illnesses.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

Detailed tests are the only way to really rule out an illness.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

The commonest cause of feeling unwell is serious illness.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

If I don't keep a careful watch on my health something terrible will happen.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

If the doctor sends me for any tests, he/she is convinced that there is something wrong.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

If my symptoms come and go, a test will only be accurate if done when the symptoms are present.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

Having symptoms means I am weak, defective, flawed or inferior.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

Appendix G

Beck Inventory

On this questionnaire are groups of statements. Please read each group of statements carefully. Then pick out the one statement in each group which best describes the way you have been feeling the **PAST WEEK, INCLUDING TODAY!** Circle the number beside the statement you picked. If several statements in the group seem to apply equally well, circle each one. **Be sure to read all the statements in each group before making your choice.**

1. 0 I do not feel sad.
   1 I feel sad
   2 I am sad all the time and I can't snap out of it.
   3 I am so sad or unhappy that I can't stand it.

2. 0 I am not particularly discouraged about the future.
   1 I feel discouraged about the future.
   2 I feel I have nothing to look forward to.
   3 I feel that the future is hopeless and that things cannot improve.

3. 0 I do not feel like a failure.
   1 I feel I have failed more than the average person.
   2 As I look back on my life, all I can see is a lot of failures.
   3 I feel I am a complete failure as a person.

4. 0 I get as much satisfaction out of things as I used to.
   1 I don't enjoy things the way I used to.
   2 I don't get real satisfaction out of anything anymore.
   3 I am dissatisfied or bored with everything.

5. 0 I don't feel particularly guilty.
   1 I feel guilty a good part of the time.
   2 I feel quite guilty most of the time.
   3 I feel guilty all of the time.

6. 0 I don't feel I am being punished.
   1 I feel I may be punished.
   2 I expect to be punished.
   3 I feel I am being punished.

7. 0 I don't feel disappointed in myself.
   1 I am disappointed in myself.
   2 I am disgusted with myself.
   3 I hate myself.

8. 0 I don't feel I am any worse than anybody else.
   1 I am critical of myself for my weaknesses or mistakes.
   2 I blame myself all the time for my faults.
   3 I blame myself for everything bad that happens.

9. 0 I don't have any thoughts of killing myself.
   1 I have thoughts of killing myself, but I would not carry them out.
   2 I would like to kill myself.
   3 I would kill myself if I had the chance.

10. 0 I don't cry any more than usual.
    1 I cry more now than I used to.
    2 I cry all the time now.
    3 I used to be able to cry, but now I can't cry even though I want to.

11. 0 I am not more irritated now than I ever am.
    1 I get annoyed or irritated more easily than I used to.
    2 I feel irritated all the time now.
    3 I don't get irritated at all by the things that used to irritate me.

12. 0 I have not lost interest in other people.
    1 I am less interested in other people than I used to be.
    2 I have lost most of my interest in other people.
    3 I have lost all of my interest in other people.

13. 0 I make decisions about as well as I ever could.
    1 I put off making decisions more than I used to.
    2 I have greater difficulty in making decisions than before.
    3 I can't make decisions at all anymore.

14. 0 I don't feel I look any worse than I used to.
    1 I am worried that I am looking old or unattractive.
    2 I feel that there are permanent changes in my appearance that make me look unattractive.
    3 I believe that I look ugly.

15. 0 I can work about as well as before.
    1 It takes an extra effort to get started at doing something.
    2 I have to push myself very hard to do anything.
    3 I can't do any work at all.

16. 0 I can sleep as well as usual.
    1 I don't sleep as well as I used to.
    2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.
    3 I wake up several hours earlier than I used to and cannot get back to sleep.

17. 0 I don't get more tired than usual.
    1 I get tired more easily than I used to.
    2 I get tired from doing almost anything.
    3 I am too tired to do anything.

18. 0 My appetite is no worse than usual.
    1 My appetite is not as good as it used to be.
    2 My appetite is much worse now.
    3 I have no appetite at all anymore.

19. 0 I haven't lost much weight, if any, lately.
    1 I have lost more than 5 pounds.
    2 I have lost more than 10 pounds.
    3 I have lost more than 15 pounds

    I am purposely trying to lose weight by eating less.
    Yes_____ No_____

20. 0 I am no more worried about my health than usual.
    1 I am worried about physical problems such as aches and pains; or upset stomach; or constipation.
    2 I am very worried about physical problems and it's hard to think of much else.
    3 I am so worried about my physical problems that I cannot think about anything else.

21. 0 I have not noticed any recent change in my interest in sex.
    1 I am less interested in sex than I used to be.
    2 I am much less interested in sex now.
    3 I have lost interest in sex completely.

Appendix H

Have you had times when you have felt a SUDDEN RUSH of INTENSE fear or anxiety or feeling that a disaster is about to occur? Yes_____ No_____

If Yes:

Have you had these feelings come "from out of the blue,", or in situations where you did not expect them to occur? Yes_____ No_____

If Yes:

How many of these episodes have you had in the last 4 weeks?_____
How many in the last six months?_____

Appendix I

Correlations between each PV item and the HA and WI scales

Illness	HA	WI
Heart attack	.08	.16
Skin cancer	-.02	-.15
Stroke	-.09	.06
Diabetes	-.02	-.07
Multiple sclerosis	.02	-.06
HIV-infection	.05	.04
Epilepsy	-.02	-.07
STD's	.07	.02
Brain tumour	.21	.02
Ulcers	.28	.19
Common cold	.28	.22
Heart trouble	.21	.18
High blood pressure	.10	.14
Cancer	.23	.10
Any serious disease	.25	.14