Copyright Statement

The digital copy of this thesis is protected by the Copyright Act 1994 (New Zealand). This thesis may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- Any use you make of these documents or images must be for research or private study purposes only, and you may not make them available to any other person.

- Authors control the copyright of their thesis. You will recognise the author's right to be identified as the author of this thesis, and due acknowledgement will be made to the author where appropriate.

- You will obtain the author's permission before publishing any material from their thesis.

To request permissions please use the Feedback form on our webpage. [http://researchspace.auckland.ac.nz/feedback](http://researchspace.auckland.ac.nz/feedback)

General copyright and disclaimer

In addition to the above conditions, authors give their consent for the digital copy of their work to be used subject to the conditions specified on the Library [Thesis Consent Form](http://researchspace.auckland.ac.nz/feedback)
A prospective investigation of cognitive-behavioural models of irritable bowel and chronic fatigue syndromes: Implications for theory, classification and treatment.

Meagan Jane Spence

A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Health Psychology
The University of Auckland
December 2005
Abstract.

The purpose of this study was to prospectively evaluate the application of the cognitive-behavioural model to two common functional somatic syndromes: irritable bowel syndrome (IBS) and chronic fatigue syndrome (CFS). A range of predisposing, precipitating and perpetuating variables operationalised from this model were assessed in two acutely ill samples. The significance and relative importance of these variables with regard to the development of post-infectious IBS and CFS were then examined. At the same time, information was gathered to assess the appropriateness of an overall conceptualisation for the functional somatic syndromes. Similarities and differences between the two syndromes were investigated, and the impact of differing thresholds and disability criteria were compared to determine the utility of current diagnostic criteria.

Patients with a positive laboratory test result for Campylobacter gastroenteritis or glandular fever were recruited through general practitioners. A total of 1018 participants completed a baseline questionnaire at the time of infection which included measures of anxiety, depression, perfectionism, somatisation, perceived stress, acute illness perceptions and illness related behaviours. Those previously diagnosed with CFS or IBS were excluded, along with participants experiencing any medical condition known to impact on fatigue levels or bowel function (n=183). Participants completed follow-up questionnaires at three (93% response rate) and six months (90% response rate) post-infection. At each point, cases of IBS and CFS were identified using published diagnostic criteria.

Results indicated that a range of cognitive, behavioural, physiological and emotional variables were significantly related to the development of both IBS and CFS. Whilst there were some similarities between the two conditions, there were also some key differences. Depression and somatisation were significant predisposing variables in the development of CFS, but not IBS, for which anxiety was a key predictor. Perceived stress and the type of acute infection were more important as precipitants of IBS than CFS. Campylobacter was a significant predictor of IBS at both timepoints, whilst the presence of this illness type also strengthened the association between IBS and the psychological variables. In contrast, glandular fever was a significant predictor of CFS at three months only, and this
association was outweighed by the inclusion of the psychological variables. With regard to perpetuating factors, negative illness perceptions at the time of acute infection were significantly related to both conditions, and all-or-nothing behaviour was also associated with IBS. When CFS and IBS cases at six month follow-up were compared, CFS cases had higher levels of disability, but not health care utilisation. Finally, when subthreshold cases of IBS and CFS were compared to their diagnosed counterparts, on the whole they did not differ with regard to the psychological risk factors, disability or health care utilisation.

These results support the application of the cognitive-behavioural model to IBS and CFS as a useful explanatory tool and guide for treatment. The results provide a degree of empirical detail that has previously been lacking with regard to these models. Comparing the application of the model to two separate conditions has demonstrated subtle but important differences between the development of post-infectious IBS and CFS. These findings suggest that an overall conceptualisation for the functional somatic syndromes may not be capable of determining and addressing such differences for individual conditions. With regard to the diagnostic criteria for IBS and CFS, results suggest that the current criteria may be unnecessarily restrictive and complex. Simplification or the formalised addition of subthreshold conditions may result in more widespread usage and clinical applicability of these criteria.
Acknowledgements.

The process of writing a doctoral thesis is like building a house: it takes twice as long to complete and the finished product looks nothing like the original plans. Without sound foundations and expert advice, the project will always be unsteady. In this, I realise I have been truly privileged. My supervisor, support crew, friends and family have been rock solid, each providing strength and stability in their own way. The core of this project’s support base has always been my supervisor, Dr Rona Moss-Morris. Your unfailing enthusiasm for this project and your belief in my ability to complete it, has sustained me throughout. Your commitment to the field and the high calibre of work that you have contributed to it has also been an inspiration to me, and I acknowledge with gratitude all you have done to include me in that.

I would like to thank every participant in this study, all of whom endured ongoing questionnaires, phone calls and reminder letters with patience and good humour. Without their commitment and that of their GPs, this study would not have been possible. I sincerely thank Dr. Susan Taylor and Mrs Maggie Shum of Diagnostic-Medlab, who managed the huge task of screening laboratory results in order to recruit our participants, and who did so with great competence and never-ending helpfulness. Special thanks go to Grant Sutcliffe who designed the database tracking programme for this study, making the most mundane and time consuming tasks of this study both efficient and manageable. I would also like to thank Ethne Thomas, who covered the mechanics of tracking participants when I was unable to; Elizabeth Robinson, whose statistical advice was always in a language I could understand; and Andrew Lavery, who solved many a computer glitch with never a hint of panic.

I would like to acknowledge the financial support I have received from the University of Auckland Doctoral Scholarship and the Foundation for Research Science and Technology Top Achiever Doctoral Scholarship. Without this funding, the quality of this project would have undoubtedly suffered.
My sincere thanks also go out to the fabulous friends I have made in the department during the last four years. Geraldine, Jude, Kirsten, Katrina and Wendy, you have all been so generous in your support of me, through both good times and bad - I admire you all and thank you for spurring me on when I most needed it.

Finally, I wish to acknowledge my family, who have been unfailing in their support and their belief in me during this long haul. I thank my Mum and Dad, who instilled in me the desire to extend myself and to achieve in whatever I chose to do. I thank my children, Sam, Anna and Cate, who have put up with so much and asked for no more than I could give. You have constantly reminded me of how important the small things in life are, and have made sure that I have taken the time to admire them. Most of all, I thank my husband John from the depths of my heart and soul. I am overwhelmed by the unstinting support you have given me on every level of this project. Without you, this thesis would have faltered on many occasions. It is as much your success as mine, and I dedicate it to you.
Table of Contents.

Abstract...........................................................................................................................................ii
Acknowledgements. .........................................................................................................................iv
List of Tables. ...............................................................................................................................xi
List of figures.................................................................................................................................xiv
List of abbreviations. ...................................................................................................................xv

Chapter 1. Introduction. ..............................................................................................................1

Chapter 2. Classification of the functional somatic syndromes.............................................5
  2.1. Historical overview ........................................................................................................... 5
  The purpose of classification. ................................................................................................. 5
  Terminology. ......................................................................................................................... 6
  The role of aetiology in classification. ............................................................................... 7
  Cultural influences. ............................................................................................................. 9
  Diagnostic proliferation. .................................................................................................... 10
  2.2. Functional somatic syndromes: different manifestations of the same underlying
      condition? ......................................................................................................................... 13
  Statistical analysis of symptom clusters. ............................................................................ 15
  The nature and extent of overlap between individual conditions ..................................... 16
  ‘One’ or ‘many’ functional somatic syndromes; or both? ............................................. 18

Chapter 3. IBS and CFS: Development of diagnostic criteria and associated
           methodological issues ...................................................................................................... 21
  3.1. Development of diagnostic criteria for CFS and IBS ................................................... 22
      Chronic fatigue syndrome .............................................................................................. 22
      Irritable bowel syndrome .............................................................................................. 24
  3.2. Methodological issues .................................................................................................. 28
      Consistency of application of criteria ......................................................................... 28
      Subthreshold conditions. ............................................................................................... 30
      Recruitment and study setting. ..................................................................................... 32

Chapter 4. Functional somatic syndromes: The cognitive-behavioural model ................. 37
  4.1. Historical overview ....................................................................................................... 37
      ‘Mind over matter’ in the functional somatic syndromes ........................................... 37
The need for more comprehensive models.............................................................38

4.2. The cognitive-behavioural model. ..................................................................39
  Historical origins. ............................................................................................40
  Core concepts. .................................................................................................41
  Adaptation of the cognitive-behavioural model to the functional somatic
  syndromes: ..................................................................................................44

Chapter 5. The cognitive-behavioural model of chronic fatigue syndrome........48

5.1. Predisposing factors.....................................................................................49
  Biology ............................................................................................................50
  Premorbid psychiatric disorder and psychological distress........................51
  Personality and premorbid behaviours .........................................................54
  Early experience and the development of dysfunctional cognitions and
  behaviours.....................................................................................................55

5.2. Precipitating factors.....................................................................................57
  Infection .........................................................................................................57
  Life events and stress......................................................................................58

5.3. Perpetuating factors.....................................................................................60
  Cognition ........................................................................................................61
  Behaviour ......................................................................................................63
  Emotion .........................................................................................................66

Chapter 6. The cognitive-behavioural model of irritable bowel syndrome........68

6.1. Predisposing factors.....................................................................................71
  Biology ............................................................................................................71
  Premorbid psychiatric disorder and psychological distress........................72
  Personality and premorbid behaviours .........................................................74
  Early experience and the development of dysfunctional cognitions and
  behaviours.....................................................................................................75

6.2. Precipitating factors.....................................................................................77
  Infection .........................................................................................................77
  Life events and stress......................................................................................80

6.3. Perpetuating factors.....................................................................................81
  Cognition ........................................................................................................82
  Behaviour ......................................................................................................83
  Emotion .........................................................................................................85

Chapter 7. Rationale for the current study. .........................................................87
7.1. Overview of the literature ................................................................. 87
   Taxonomic debates ................................................................. 88
   Utility of the cognitive-behavioural model ........................................ 89
   The prospective investigation of post-infectious populations ................ 90
   Stages of illness development .................................................. 92
7.2. The design of this study ................................................................ 93
7.3. Specific hypotheses investigated .................................................. 94

Chapter 8. Preliminary study: The development and validation of the Behavioural Responses to Illness Questionnaire. ......................................................... 96
8.1. Initial item selection .................................................................. 96
   Methodology ............................................................................ 96
   Results .................................................................................. 99
8.2. Validation of the questionnaire ................................................... 101
   Method .................................................................................. 101
   Results .................................................................................. 103
8.3. Discussion ............................................................................... 107

Chapter 9. Methodology: Main study .................................................. 111
9.1. Sample information ................................................................. 111
   Participants ............................................................................. 111
   Inclusion criteria .................................................................... 112
   Exclusion criteria ................................................................. 113
   Response rate ........................................................................ 115
   Demographics ........................................................................ 116
9.2. Procedure ............................................................................... 118
   Recruitment ............................................................................ 118
   Follow-up .............................................................................. 119
9.3. Measures ............................................................................... 121
   Initial Questionnaire ............................................................. 121
   Three month Follow-up Questionnaire ........................................ 126
   Six month Follow-up Questionnaire .......................................... 132

Chapter 10. Results: Main study .......................................................... 134
10.1. Data screening and preliminary analyses ...................................... 135
10.2. Risk factors for IBS: Campylobacter group ................................... 140
Psychological risk factors for the development of IBS: Results of univariate analyses.......................... 143
Relative importance of psychological risk factors in the development of IBS: Results of multivariate analysis.................................................. 145

10.3. Risk factors for CFS: Glandular fever group.................................................. 147
Psychological risk factors in the development of CFS: Results of univariate analyses .......................................................... 150
Relative importance of psychological risk factors in the development of CFS: Results of multivariate analysis.......................................................... 152

10.4. The importance of the nature of the infection in the development of post-infectious IBS and CFS.................................................. 154
Comparison of prevalence rates ................................................................. 155
Acute infection type as a risk factor in the development of IBS and CFS ............ 156
Comparison of infectious and psychological risk factors in the development of CFS and IBS post-infection .......................................................... 158
Relative importance of psychological risk factors three and six months post-infection: Comparison of IBS vs. CFS............................................. 161

10.5. IBS and CFS: Comparison of prevalence, demographics, disability, and health care utilisation in a post-infectious sample........................................ 163
Prevalence, age and gender ............................................................................ 164
Disability levels and health care utilisation .................................................... 165

10.6. Comparing irritable bowel syndrome and chronic fatigue: Does removing disability-related criteria make a difference?................................. 172
Patient characteristics ................................................................................... 173
Disability levels and health care utilisation behaviour .................................... 173
Psychological risk factors ............................................................................. 175

10.7. IBS, CFS and their subthreshold conditions: Comparison of prevalence, demographics, disability and psychological risk factors ......................... 176
Prevalence ..................................................................................................... 177
Demographics ............................................................................................... 178
Disability levels and health care utilisation .................................................... 179
Importance of the psychological factor scores as risk factors for IBS, CFS and their subthreshold conditions .............................................................. 184

Chapter 11. Discussion of specific hypotheses investigated.......................... 187

Hypothesis 1: .................................................................................................. 187
Hypothesis 2: .................................................................................................. 194
Hypothesis 3: .................................................................................................. 200
Hypotheses 4 and 5: ....................................................................................... 204
Hypothesis 6: .................................................................................................................206

Chapter 12. General discussion. .....................................................................................209

Theoretical and clinical implications .............................................................................209

The cognitive-behavioural model. .................................................................209

The ‘one or many’ debate ....................................................................................213

Classification issues............................................................................................. 215

Limitations and future directions .............................................................................. 216

Conclusion. ....................................................................................................................220

References.........................................................................................................................222

Appendices........................................................................................................................246

Appendix 1. The Behavioural Responses to Illness Questionnaire - Pilot study. ....246
Appendix 2. Ethics approval..........................................................................................248
Appendix 3. Letter to individual General Practitioners............................................. 249
Appendix 4. Publicity information..............................................................................250
Appendix 5. Participant information sheet ...............................................................253
Appendix 6. Consent form.........................................................................................255
Appendix 7. Welcome letter .......................................................................................256
Appendix 8. Follow-up covering letter .....................................................................257
Appendix 9. Reminder letter.....................................................................................258
Appendix 10. Baseline questionnaire .......................................................................259
Appendix 11. Three month follow-up questionnaire.................................................269
Appendix 12. Six month follow-up questionnaire....................................................276
List of Tables.

Table 1. Functional somatic syndromes; key symptoms and medical specialty. ..........11
Table 2. Commonly used diagnostic criteria for chronic fatigue syndrome.............23
Table 3. Accepted diagnostic criteria for irritable bowel syndrome.....................25
Table 4. Proposed subscales and items used in the pilot study..........................98
Table 5. Principal components analysis of the Behavioural Responses to Illness Questionnaire: Pilot study, student sample (n=314)...100
Table 6. Principal components analysis of the Behavioural Responses to Illness Questionnaire: Campylobacter sample (N=758)....104
Table 7. Correlation Matrix of the BRIQ subscales, Campylobacter sample (N=758) 105
Table 8. Results from the analyses of covariance across new IBS cases and non-cases for the BRIQ subscales................................................106
Table 9. Results from logistic regression analysis of the BRIQ subscales, gender, age and Campylobacter symptom total, with regard to new cases of IBS 3 months post illness................................................107
Table 10. Medical conditions known to impact on bowel function or fatigue that were present in the original sample and because of which patients were excluded...114
Table 11. Self-report information used to determine caseness groupings for CFS and chronic fatigue. .................................................................128
Table 12. Self-report information used to determine caseness groupings for IBS........130
Table 13. Pearson's correlations among the psychological variables (n=975)..........137
Table 14. Principal components analysis of the psychological variables: Total sample (N=1012).........................................................................139
Table 15. Comparison of IBS cases and non-cases at three and six months post- Campylobacter on relevant demographic and illness variables...............141
Table 16. Mean scores and standard deviations on each psychological variable for IBS cases and non-cases at three and six months post-Campylobacter ..........142
Table 17. Individual logistic regression analyses of IBS outcome at three and six months post-Campylobacter as a function of individual psychological variables..............................................................144
Table 18. Logistic regression analyses of IBS outcome at three and six months post-
*Campylobacter*; as a function of psychological factor scores, gender, age
and *Campylobacter* symptoms at the time of acute illness..............................146

Table 19. Comparison of CFS cases and non cases at three and six months post
glandular fever on relevant demographic and illness variables......................148

Table 20. Mean scores and standard deviations on each psychological variable for CFS
cases and non-cases at three and six months post glandular fever. .................149

Table 21. Individual logistic regression analyses of CFS outcome at three and six
months post glandular fever as a function of individual psychological
variables.............................................................................................................151

Table 22. Logistic regression analyses for CFS outcome at three and six months post
glandular fever as a function of psychological factor scores, gender, age and
glandular fever symptoms at the time of acute illness.....................................153

Table 23. Percentage and frequency of outcome according to acute illness type......155

Table 24. Multinomial logistic regression analyses of outcome (CFS and IBS compared
to non-cases) at three and six months post-infection as a function of acute
illness type, gender and age................................................................................157

Table 25. Multinomial logistic regression analyses according to IBS outcome at three
and six months post-infection as a function of acute illness type, gender, age
and psychological factor scores. .......................................................................159

Table 26. Multinomial logistic regression analyses according to CFS outcome at three
and six months post-infection as a function of acute illness type, gender, age
and psychological factor scores. .......................................................................160

Table 27. Binary logistic regression analysis of CFS or IBS outcome at three months
post-acute illness as a function of psychological factor scores, gender and age
at the time of acute illness.................................................................................161

Table 28. Binary logistic regression of CFS or IBS outcome six months post-acute
illness, as a function of psychological factor scores, gender, and age at the
time of acute illness..........................................................................................162

Table 29. Age and gender comparisons according to group membership six months
post-infection. ......................................................................................................173

Table 30. Percentage and frequency of IBS cases, CF/CFS cases and non-cases
according to level of disability measures.........................................................174

Table 31. Results of logistic regression analysis comparing CF/CFS group with cases
of IBS at six months post-acute illness, as a function of psychological factor
scores at the time of acute illness.....................................................................175

Table 32. Frequency and percentage of bowel and fatigue symptoms in post-infectious
sample according to standard criteria and subthreshold conditions. ............178
Table 33. Gender ratio according to group membership. ..................................................179

Table 34. Percentage and frequency of participants by level of disability according to fatigue-related symptom groupings six months post-infection ($n=65$).............. 180

Table 35. Percentage and frequency of participants by level of disability according to bowel-related symptom groupings six months post-infection ($n=190$)............. 182

Table 36. Results of binary logistic regression analysis comparing fatigue symptom groupings at six months post-acute illness, as a factor of psychological factor scores, gender, and glandular fever symptoms at the time of acute illness. ...... 185

Table 37. Results of binary logistic regression analysis according to bowel symptom groupings at six months post-acute illness, for psychological factor scores, gender, and Campylobacter symptoms at the time of acute illness. ...................185
List of figures.

Figure 1. Five part cognitive-behavioural model ................................................................. 41
Figure 2. Cognitive-behavioural model of the development and maintenance of symptoms and illness. ........................................................................................................................................ 42
Figure 3. Exclusions for *Campylobacter* gastroenteritis group and glandular fever group. 115
Figure 4. Frequency of IBS, CFS, and non-cases in the total sample (N=748) ................. 164
Figure 5. Gender ratio according to group membership six months post-infection ............. 165
Figure 6. Frequency and percentage of cases according to level of WSAS impairment ...... 166
Figure 7. Frequency and percentage of cases according to level of MHI-5 psychological wellbeing .................................................................................................................................... 167
Figure 8. Frequency and percentage of cases according to level of poor physical health ... 168
Figure 9. Frequency and percentage of cases according to level of poor mental health ..... 169
Figure 10. Frequency and percentage of cases according to level of inactivity due to poor physical or mental health ........................................................................................................ 170
Figure 11. Frequency and percentage of level of help-seeking according to group membership .................................................................................................................................. 171
List of abbreviations.

AGA American Gastroenterological Association
ANCOVA analysis of covariance
BRIQ Behavioural Responses to Illness Questionnaire
CBT cognitive-behavioural therapy
CDC Centers for Disease Control and Prevention
CF chronic fatigue
CF/CFS chronic fatigue/chronic fatigue syndrome
CFS chronic fatigue syndrome
CG Campylobacter gastroenteritis
CI confidence interval
DBF disturbed bowel function
DSM-III Diagnostic and Statistical Manual of Mental Disorders – 3rd Edition
DSM-IV Diagnostic and Statistical Manual of Mental Disorders – 4th Edition
EBV Epstein-Barr virus
FGID functional gastrointestinal disorders
GF glandular fever
GP general practitioner
HADS Hospital Anxiety and Depression Scale
IBS irritable bowel syndrome
IBQ Illness Behaviour Questionnaire
IPA Independent Practitioners Association
IPQ Illness Perceptions Questionnaire
IPQ-R Illness Perceptions Questionnaire - Revised
ME myalgic encephalomyelitis
MHI-5 Five Item Mental Health Inventory
PANPS Positive and Negative Perfectionism Questionnaire
PSS Perceived Stress Scale
RET rational emotive therapy
SAIB Scale for the Assessment of Illness Behaviour
SS Support Seeking
UK United Kingdom
USA United States of America
VCA Viral Capsid Antigen
WSAS Work and Social Adjustment Scale