THE INFLUENCE OF SYMPTOM ATTRIBUTIONAL STYLE AND BELIEFS ABOUT VIRUSES ON THE REPORTING OF SYMPTOMS DURING AND AFTER INFECTION

Jan Banis

Doctorate in Clinical Psychology

The University of Edinburgh

1999

CONTENTS

LIST OF TABLES

ACKNOWLEDGEMENTS

The author would like to thank Katherine Cheshire and Dave Peck very much for their continuing help, support, and availability when it was needed. He would also like to thank the general practitioners, chemist, and practice nurses, and especially Sheena MacIntyre, for helping with the recruitment of participants and for making information concerning viral verification available for this study. Finally, he would like to thank all the participants for cooperating with this study.

"This thesis has been composed by myself and the work contained herein is my own"

Signed:

Jan Banis

ABSTRACT

Previous research has found that attributional style and beliefs people have about viruses can be related to symptom reporting and presentation. Especially in the area of chronic fatigue it has been shown repeatedly that patients' attribution of their illness is related to a worse outcome. This study investigates the influence of symptom attributional style and beliefs about the power of viruses on symptom reporting in people who think they suffer from influenza, using the Symptom Interpretation Questionnaire (SIQ) and the Viral Infection Research into Attitudes Scale (VIRAS). A visual analogue scale was used to measure the number and severity of physical and psychological symptoms of influenza. A follow-up was carried out to measure levels of fatigue after illness, using the Fatigue Scale. Results are presented and discussed, and conclusions are drawn.

CHAPTER 1 INTRODUCTION

Health behaviours are related to the health status of the individual (Ogden, 1996). Various definitions of health and illness behaviour have been described. Kasl & Cobb (1966) defined a health behaviour as "a behaviour aimed at preventing disease" (e.g. eating a healthy diet), and an illness behaviour as "a behaviour aimed at seeking a remedy" (e.g. going to the doctor). They also defined the sick role behaviour as "any activity aimed at getting well" (e.g. taking prescribed medication, resting). Mechanic (1986) defined illness behaviour more comprehensively as "the manner in which people monitor their sensations, define and interpret their symptoms, take remedial action, articulate their complaints, and utilise varying sources of assistance, including the formal health care system".

In order for health professionals to influence people's health positively, it seems important to investigate which factors would predict health or illness behaviours. Theories of attribution and of lay beliefs about health have contributed significantly to our understanding of health and illness behaviours. Beliefs about the causality of illness can influence an individual's illness behaviour 'coping style, their compliance with treatment, the emotional impact of their health problem, and probably the course of their illness' (Cathébras, Jacquin, Le Gal *et al.*, 1995, p.174). For example, the attribution that a patient ascribes to a somatic symptom may influence health-seeking behaviour, such as seeking medical help or ignoring the symptom and continuing with life as normal.

Some researchers have developed measures based on attributions and lay theories about health. They have used them to develop the understanding of the role of attributions and health beliefs in people's physical well-being. Robbins & Kirmayer (1991) were interested in investigating the existence of certain styles of symptom attributions as well as the impact of those styles on presenting symptoms. They developed the Symptom Interpretation Questionnaire (SIQ; see 1.3.2 below and Appendix 1 for more detail). Cope, David & Mann (1994) were specifically interested in viruses and developed a measure based on lay beliefs of viruses, called the Viral Infection into Attitudes Scale (VIRAS; see 1.3.4 below and Appendix 2). They used both the VIRAS and SIQ to test hypotheses about the relationship between virus beliefs, symptom attributional styles, and presenting complaints in the general population. As lay beliefs about viruses seemed 'particularly relevant to the understanding of "post-viral syndromes such as post-viral fatigue" (Cope, David & Mann, 1994), Cope and colleagues used the same design again to investigate possible predispositions for developing post-viral fatigue syndrome (Cope, David, Pelosi & Mann, 1994).

The present study has as its main topic the influence of health beliefs and attributional style on symptom presentation. This topic is based on several other studies, many of which are based on theories related to attributions and health beliefs. An overview of the relevant literature will now follow. This includes an outline of studies relating attribution and health beliefs to physical and psychological well-being, both in the general population and more specifically in patients who suffer from chronic fatigue. The psychological effects of infections as well as the

influence of stress on infections will also be discussed, as the present study will also investigate hypotheses relating to those issues. This chapter will then conclude with a presentation of several hypotheses concerning the relationship between attributions, beliefs about viruses and viral symptomatology.

1.1 Theoretical background: attribution theory and lay beliefs about health

Theories about attribution and lay theories about health form the theoretical basis for the several important previous studies, as well as for the present study. An outline of those theories will now follow.

1.1.1 Attribution theory

Attribution theory is concerned with research into the ways in which people explain why things happen (Booth Davies, 1992). As will become clear later, understanding how people arrive at common sense explanations is important in understanding how people may perceive or experience illness or symptoms. Heider (1944, 1958) was the first to argue that people have a need to understand causality. Kelley (1967, 1972) developed these ideas, and proposed a clearly defined attribution theory. As Ogden (1996) explains, Kelley suggested that attributions about causality depended on the interaction of the following factors:

- *consensus*: this reflects the extent to which other people share an attribution of causality.

- *consistency* (over time and modality): this reflects the extent to which an attribution about causality is made repeatedly over time and/or place.
- *distinctiveness*: this reflects the extent to which an attribution is specific to an individual.

These criteria determine how far the cause of a behaviour is regarded as stemming from something internal (e.g. personality) or external (e.g. the environment or situation) to the individual.

The above formulation of attribution theory has been developed and redefined. In his review of attribution theory Booth Davies (1992) explains how Weiner (1974) proposed an alternative attributional model, based on people's explanations of success and failure on achievement tasks. Weiner suggested the following dimensions of attribution:

- *internal vs external*: this reflects the extent to which a cause of an event is seen as originating from within a person or from within the environment.
- *stable vs unstable*: this reflects the extent to which a cause is seen as permanent or variable over time.
- *global vs specific*: this reflects the extent to which a cause is seen to influence other areas of a person's life or whether a cause is seen as specific to a specific event.
- *controllable vs uncontrollable*: this reflects the extent to which an individual sees a cause as controllable or uncontrollable.

The above dimensions are again interactive. As will be illustrated later, the interaction between the dimensions internal/external and controllable/uncontrollable has played an important role in research that aims to investigate the role of attributions in areas such as health and illness.

1.1.2 Lay beliefs about health

Research into lay theories about health aims to explore how individuals make sense of problems related to health and illness. Lay illness beliefs include ideas about causality, but, according to Leventhal, Nerenz & Steele (1984) also include ideas about duration (the chronicity factor) and consequences (the severity factor). They further claimed that three sources of information are used by the lay person to construct models of illness representation. They are (1) the generalised pool of illness information current in the culture, (2) social communication or information obtained in direct contact with other people, particularly practitioners, and (3) the individual's personal illness experiences. As Ogden (1996) points out, people's lay theories have important implications for interventions by health professionals, especially when those beliefs are in conflict with the professional's beliefs. Lay beliefs about illness aetiology can have 'a profound effect on someone's mode of presentation to medical services and subsequent adjustment to illness' (Cope, David & Mann, 1994, p.89).

Several studies have found that attributions may influence health-related behaviours. For example, a study by King (1982), examining the relationship between attributions for an illness and attendance at a clinic, found that if hypertension was seen as external but controllable by an individual, this person was more likely to

attend at a screening clinic. This shows how causal attributions of illness can influence the action taken by the patient, for better or for worse. Attributions and beliefs have also been investigated in relation to the presentation of common physical symptoms. The next section will discuss that topic in more detail.

1.2 Attributions and lay beliefs in relation to common physical symptoms

Several researchers have studied the influence of health beliefs and attributional style on symptom presentation in the general population. Some of those important studies will now be discussed.

1.2.1 Cause of illness versus cause of symptoms

Robbins & Kirmayer (1991) made the distinction between attributions of the cause of illness and attributions of the cause of symptoms. They argue that 'the disease label or diagnosis attached to such a condition already implies a specific cause, time course, probable outcome, and appropriate treatment' (p.1029-1030). They go on to say that 'In contrast, symptoms generally occur before a self or professional diagnosis has been made, are often experienced as a mix of confusing sensations, and are open to a variety of interpretations' (p.1030). Studying attributions and beliefs about symptoms, rather than about illnesses, could therefore be more predictive of illness behaviour. Studies that focus on symptoms rather than illnesses are rare. Those who have attempted to develop our understanding of beliefs about symptoms have provided interesting results.

For example, Bishop (1984) found that subjects from a healthy young population, who kept diaries of symptoms, experienced symptoms on an average of one in every five days. However, subjects sought help for only seven percent of the symptoms. To explain this, it was argued that 'people do not simply respond to the presence of the symptoms per se, but rather consider the nature of the symptom and what it might indicate' (Bishop, 1987, p.128). In an attempt to find out which dimensions or attributes people use to attach meaning to symptoms, Bishop (1987) used multi-dimensional scaling, as this technique does not make a priori assumptions about dimensions. It rather analyses subjects' intuitions about the similarity of symptoms to each other, and thus limits the researcher's bias (Bishop, 1987). He found four basic dimensions used by subjects to cognitively organise physical symptoms. One related to the cause of the symptom, and specifically whether it is caused by a virus; one related to psychological versus physical causation; one related to the symptom's location in the upper versus lower body; and the last one related to the extent to which the symptom is disruptive to the person's activities.

Bishop (1987) also found that these dimensions related to behaviour. Two of those relationships are particularly interesting. The first one is the positive relationship between self-care and perceived viral causation of symptoms (most commonly upper-respiratory tract symptoms and common cold symptoms). It has to be noted that the more commonly used word for virus is 'bug' or 'germ', as a virus is just a subclass. The second relationship is the positive relationship between professional care and the perception that a symptom is physically caused. The first finding may reflect the belief that doctors cannot treat viruses, and therefore no medical help is

needed or sought. The second finding suggests that symptoms attributed to a psychological cause do not lead to help-seeking behaviour. Bishop (1987) suggested that symptoms which are seen to be psychologically caused may go undetected or untreated and he highlighted the need for educating people about the nature of such symptoms and how they should be dealt with.

Helman (1978) was specifically interested in lay models of infections, as symptoms of infections 'are extremely common in the population at large, and are frequently encountered in general practice. As such, they provide a useful source of data for any study of the persistence of folk beliefs in a Western, urban community...' (p.132). He noted that the ideas patients had about viruses (e.g. invisible, partly remaining in the body until expelled or cured, uncontrollable by the host) made them feel victims, and therefore blameless.

It seems that the different ways in which people interpret or cognitively organise symptoms may account to at least some extent for how they experience a symptom. Researchers have tried to investigate those individually different interpretations in terms of attributional styles. The next section looks at different attributional styles in more detail.

1.2.2 Attributional styles

Robbins & Kirmayer (1991) studied attributions of common somatic symptoms. They investigated the possibility that people attribute symptoms according to

consistent symptom attributional styles. They used first year medical students and undergraduate sociology students to represent the normal population. Their study was divided into three parts: 1) an examination of whether a coherent style of causal attributions for somatic symptoms exists in a non-clinical population, using a questionnaire especially developed for that goal, 2) an examination of the stability of these attributional styles over time, and 3) an examination of possible antecedents of attributional style, especially previous illness, by studying this prospectively.

Using attribution theory as well as previous research into lay models of illness interpretation (e.g. Bishop, 1987), Robbins & Kirmayer (1991) felt that three symptom attribution dimensions were important:

(1) *psychological style*: this reflects the extent to which psychological factors (e.g. excessive stress) are believed to be causal.

(2) *physical style*: this reflects the extent to which physical factors (e.g. disease) are believed to be causal.

(3) *normalising style*: this reflects the extent to which environmental or situational factors (e.g. temperature or lack of sleep) are believed to be causal.

Robbins & Kirmayer (1991) had several interesting findings. They mentioned Kelley's (1972) Discounting Principle of attribution theory, which suggests that 'wherever possible, symptoms will be normalised'. In their study, Robbins & Kirmayer (1991) developed the Symptom Interpretation Questionnaire (SIQ). The SIQ, which consists of 13 common somatic symptoms, each followed by a likely physical, psychological or normalising cause, was found sufficiently valid and

internally reliable. The mean score for the normalising scale was higher compared to psychological and somatic scales. This was seen to be consistent with the idea that symptoms will be normalised 'wherever possible'. Using a forced-choice format of the SIQ to eliminate acquiescence bias, they also found evidence for enduring attributional styles. Finally they found evidence for their hypothesis that previous illness influences the manner in which new symptoms are interpreted: previous physical illness predicted more somatic attributions, while previous psychiatric problems predicted more psychological attributions. This finding also provides evidence for Leventhal *et al.* (1984), who saw previous illness experience as an important influence on lay illness representation. One may argue about the 'lay-ness' of medical students however. Their background and reasons for doing a medical degree may have had some influence on their attributional style. Studying medicine in itself may also have had an influence on their beliefs and attributions, depending on how much first year graduate students have learned at the time of their involvement in the study described above.

The research mentioned above found some evidence for the existence of different attributional styles. The next section discusses in more detail the connection between attributional style and the presentation of certain types of symptoms.

1.2.3 Attributional style and symptom presentation

Robbins & Kirmayer (1991) were also interested in the influence of attributional styles and how this reflected on the presentation of certain types of symptoms. They

demonstrated that the tendency to make psychological attributions for common symptoms was associated with increased reporting of both somatic symptoms and symptoms of depression. There was no evidence for an association between the somatic attributional style and symptom presentation. However, Robbins & Kirmayer (1991) also found that the tendency to interpret symptoms as somatically caused was predictive of the number of somatic symptoms presented over a period of six months.

The idea that certain attributional styles are associated with the presentation of certain symptoms is important. Although causation cannot be assumed, it may tell us that non-physical variables, such as beliefs about the causation of symptoms or illnesses, may influence the presentation, or possibly the perceived presence of symptoms of an individual. This perceived presence of symptoms could then lead to visits to the general practice, which, depending on the true severity of the symptoms, may or may not be a justified use of resources. Robbins & Kirmayer (1991) studied a 'healthy' population. It would be interesting to also investigate how attributions relate to symptom presentation or severity in an 'ill' population, such as people suffering from an infection.

Attributional styles and lay-beliefs about illnesses may well be related, and if so, they both may account for some of the individual differences in the reporting of symptoms of individuals. This issue will be looked at next.

1.2.4 Attributional style, lay beliefs and symptom presentation

Cope, David & Mann (1994) were interested in developing further the influence of attribution and lay beliefs on symptom presentation in the general population. They were particularly interested in beliefs about viruses, as a viral infection is 'one of the most commonly cited attributions for physical symptoms and ill health' (p.89). Although not life-threatening, viruses are common and may lead to a visit to the general practice, depending on beliefs people have about viruses, or about the symptoms of them. For their study Cope, David & Mann (1994) developed the Viral Infection Research into Attitudes Scale (VIRAS). This is a questionnaire assessing beliefs about viruses based on commonly held beliefs such as those reported by Helman (1978). A principal components analysis showed that three components accounted for 57.2 % of the variance. The first one related to a belief of personal vulnerability to virus; the second one concerned more general beliefs about prevention and treatment; and the third related to attribution of ill health to a viral cause. Overall the VIRAS measures the power attributed to viruses. This study also took into account psychological morbidity, using the GHQ-3 (Goldberg, 1972), as well as attributional styles, using a shortened version of the SIQ.

Significant differences in scores between males and females were found on component two: women had a lesser belief in the ability to prevent and treat viruses. In addition, women had a higher total VIRAS score, which meant that women

attributed more power to viruses. No other sex or age differences on the VIRAS were found.

Cope, David & Mann (1994) did not include data about reported infection symptoms in their study. However, Macintyre (1993) found an interesting gender difference in the reporting of infection symptoms. She found that when infection symptoms were self-assessed and assessed by clinical observers, the difference between self-reported symptoms and observer-reported symptoms was significantly bigger for men. The conclusion was that men were significantly more likely to over-rate their symptoms. Macintyre gave several explanations for this observation, such as the 'whingeing male' hypothesis (p.18). However, it could also be that men, whose beliefs make them feel less vulnerable to viruses, perceive viral symptoms as more severe, because they may have been less 'prepared' for them.

Cope, David & Mann's study (1994) further revealed a relationship between the presence of infection symptoms and item B, a 'personal vulnerability' item on the VIRAS ('I get viruses if I am run down or under stress'). It is unclear if those who really had an infection had also experienced stress prior to infection. A measure of previous stress could have been included in the study to investigate the possibility of previous stress being related to certain beliefs or attributions. Nevertheless, the relationship between infection symptoms and item B on the VIRAS may indicate that people suffering from infection are more likely to attribute their symptoms to a psychological cause. Indeed, when looking at correlations between the VIRAS and SIQ, a positive relationship was found for psychologising and personal vulnerability to viruses (component one) as well as for total VIRAS score and psychologising:

powerlessness to viruses was related to the attribution of physical symptoms to psychological factors. In addition, a negative relationship was found between normalising and total VIRAS scores as well as between normalising and personal vulnerability scores.

The association between the VIRAS and psychological attributional style was unexpected by the authors, who had hypothesised that powerlessness to viruses would relate to a somatic attributional style. However, no relationships between the VIRAS and somatic attributional style were found. The study also showed that higher scores on the personal vulnerability component related positively to psychological morbidity. In addition, those scoring high on the VIRAS (defined as VIRAS > 11) showed higher levels of psychological distress and were more likely to psychologise compared to those scoring low (defined as VIRAS < 7). This group was also less likely to normalise.

One issue concerning symptom presentation in people suffering from viruses has to be kept in mind. Previous literature, which has investigated viral symptomatology, has shown that viral symptoms may be different depending on the type of virus, and they do not only consist of physical symptoms such as fever, headaches, or a sore throat, but also of psychological symptoms. Hashimoto, Kellner & Kapsner (1987) found that patients with upper respiratory tract infections, regardless of the type of virus, had higher self-ratings of hostility, anxiety and depression, compared with those who did not have an infection. Smith, Tyrrell & Barrow *et al.* (1992) found that influenza produced a general negative mood state, but that coronavirus, producing

common cold, was associated with a reduction in alertness, and not with mood. Hall & Smith (1996), however, found that patients suffering from a common cold reported a significant increase in negative mood, as well as impaired psychomotor speed, in the first week. Performance on attention tasks was impaired during the second week of illness. Thus, the above literature suggests that psychological symptoms may be part of viral symptomatology. If this were true, then the influence of beliefs and attributional style on symptoms may vary, depending on the kind (physical or psychological) of symptom.

Although the results presented by Cope, David & Mann (1994) are interesting, generalisation to the normal population may be unreliable. The majority of participants (78.8 %) were women, and all participants were attenders of a general practice. As beliefs and attributions may influence a person's health behaviour, such as attending the general practice, the beliefs of the participants was only representative of general practice attenders. This study would have benefited from a higher proportion of men as well as from a control group consisting of participants who were not attending a clinic. Nevertheless, the results do suggest a link between an increased belief in the potency of viruses and a psychological attributional style as well as increased psychological morbidity. Cope, David & Mann (1994) explained this by suggesting that 'a person suffering from a viral infection develops ideas at that time which predispose them to prolonged disability, such as the belief that once infected viruses remain in the body indefinitely' (p.97). The idea is that the presence of an infection, or the belief of such a presence, can be a psychological trigger for a later development of an illness such as a fatigue syndrome. In fact, part of Cope,

David & Mann's (1994) motivation for developing the VIRAS was 'to aid further understanding of the disorder whose defining characteristic is the belief (as opposed to demonstration) of a viral aetiology: the post-viral fatigue syndrome (PVFS)' (p.96).

Studies by Robbins & Kirmayer (1991) and Cope, David & Mann (1994) have shown how beliefs and attributions may relate to symptom reporting. Although measures of symptom presentation were taken, the studies do not tell us how beliefs and attributions relate to perceived severity of viral symptoms. Macintyre (1993) showed that perceived severity of common colds was different for males and females. It could be argued that the perceived severity of a symptom, rather than just the presence of a symptom, has implications for health-seeking behaviour and for illness adaptation. Therefore, a study investigating beliefs and attributions in relation to viral symptom severity would be a useful addition to the current literature. In addition, people suffering from an infection appear to believe more than others that they get infections when run down or under stress. It would be useful, therefore, to investigate the level of stress prior to infection, and how this relates to attributions, beliefs, and symptoms. The issue of previous stress and infection will be discussed later. Also, as Cope, David & Mann (1994) pointed out, beliefs and attributions may be particularly relevant in studying variables of post-viral fatigue. A sample of people suffering from a virus, or believing they do so, would be needed to test out hypotheses about viral symptomatology, beliefs and attribution and the development of fatigue. The role of beliefs and attribution in relation to fatigue will be discussed in more detail next.

Hirsch *et al.*, 1995; White, Thomas & Amess *et al.*, 1995) but conclusive evidence of such a cause has not been found. A sub-type of CFS, *post-infectious fatigue*, has also been suggested (e.g. Sharpe *et al.*, 1991) that follows, or is associated with, a current infection corroborated by laboratory evidence, and not just the self-report of an infection.

In a prospective study 38 years ago Imboden, Canter & Cluff (1961) presented pioneering evidence that people differed in their rate of recovery from a virus. They measured psychological factors of army clerical workers before an outbreak of an influenza epidemic and found that personality and psychological functioning before viral illness were predictive of delayed recovery after illness. Thus, Imboden *et al.* (1961) showed that psychological variables might contribute to the rate of recovery after a viral illness. This concept is also important with regard to chronic fatigue. The role that attributions play in relation to fatigue has been investigated as a possible important non-physical variable.

1.3.2 Attributions and fatigue

A survey by David *et al.* (1990) showed that people in a general practice in London gave varied reasons for being tired, but those who were more severely affected by fatigue gave reasons associated with ill health, including a past or present infection with a virus.

Several studies that investigated CFS and associated factors showed that many people suffering from CFS attribute their difficulty to a physical cause, mainly a viral infection. Wessely & Powell (1989) showed that 18 patients with post-viral fatigue syndrome (86%) attributed their illness to physical factors, compared to three with major depressive disorder (14%), although these numbers are too small to enable generalisation. Sharpe, Hawton, Seagroatt & Pasvol (1992) had a bigger sample. They followed up 144 people with an initial major complaint of fatigue of at least six weeks' duration and found that 135 (94%) believed that infection had been a major causal factor, while 120 (83%) suggested a viral illness to be the infection agent. However, 97 (67%) felt that stress had played an important part in causing their illness. The sample, however, may have been a-typical, as they were all patients attending an infectious diseases clinic, so it could be expected that patients believe their illness was caused by a viral illness.

It has been suggested that attributing fatigue to a physical cause may be adaptive. Goldberg & Bridges (1988) argued that, with regard to somatisation, a key factor is that a focus on the body avoids blame or guilt, feelings that could be associated with a psychological attribution. Powell, Dolan & Wessely (1990) also explained that attributing the cause to a virus reduces the experience of guilt, as was also mentioned by Helman (1978). However, the external somatic attribution has its drawbacks as it increases the experience of uncontrollability, which may have implications for health-seeking behaviour and subsequent adjustment to illness.

1.3.3 Attributions and the onset of fatigue development

Although studies so far have given some insight into the role of attributions in CFS, they have not informed us when beliefs and attributions actually start to play this role. Cathébras *et al.* (1995) investigated the influence of somatic attributional style on response to treatment in a French sample of patients with fatigue complaints in primary care. These patients did not suffer from CFS. Patients were allocated to a placebo or treatment group. The treatment was based on 'an association of vitamins, deanol, ginseng and trace elements in 'functional fatigue' in primary care' (p.175). Patients with an acute chronic illness, such as an infection, were excluded. A scale was developed measuring somatic attributional style specifically for fatigue, based on the SIQ. High and low scorers were compared on fatigue levels measured at initial assessment and after 42 days follow-up. No significant difference was found between somatic attributional style and response to treatment. A higher level of somatic causal attributions at initial assessment was associated with a higher level of fatigue at initial assessment, but no significant association was found between somatic attributional style and outcome after 42 days. Therefore, as follow-up fatigue levels were the same for low and high-scorers on somatic attributional style, somatic attributional style appears not be a risk factor for chronic fatigue.

A few points have to be made. The researcher is unaware of other studies looking at the effect of attributions on early post-infectious fatigue development, and therefore more research needs to be carried out. The previous study should perhaps be replicated with a British sample to enable generalisation to British population, but

more importantly, the allocation of a patient with fatigue to a treatment group could have shaped a patient's belief that the problem is treatable. This may have influenced outcome positively. In addition, patients with an infective illness were excluded from the sample. It may well be that people with an infection have different attributions and beliefs about health and illness. For example, Cope, David & Mann (1994) found higher personal vulnerability scores on the VIRAS in people with infections, which may also be associated with post-infectious fatigue. Therefore, a population suffering from a viral illness should be looked at, or at least included in a study to increase our understanding about when and how attributions and beliefs may start to have an effect on fatigue development. Nevertheless, the results of the study by Cathébras *et al.* (1995) are interesting and might mean that somatic attributions do not start to have an influence on the development of fatigue before 42 days after initial assessment. This could mean that the influence of somatic attributions on fatigue has its onset later, for example when the fatigue gets increasingly chronic and uncontrollable, or when a diagnosis of CFS is made by the GP. Cope, David, Pelosi & Mann (1994) investigated the latter hypothesis and found that sick certifications were a risk factor for the development of CFS, but providing a definite diagnosis of viral infection was protective. They suggested that the effect of a viral illness is mediated by a patient's health beliefs and by the action taken by the GPs. More research is needed to develop our understanding in how attributions and beliefs are influenced and how they may be able to mediate the effect of a viral illness.

1.3.4 Attributions and the development of CFS

In a study using the same design and measures (SIQ, VIRAS, GHQ-3) as in their previous study described earlier (Cope, David & Mann, 1994), Cope, David, Pelosi & Mann (1994) investigated prospectively a sample of people who received a diagnosis of a viral illness. They looked at the relationship between a GP diagnosis of viral illness and subsequent development of chronic fatigue six months later, but also replicated some of their previous findings relating to attributions and virus beliefs. No specific viral symptoms at initial presentation were associated with increased fatigue at six months follow-up. VIRAS scores and psychological morbidity were both positively correlated with fatigue scores. No difference was found between VIRAS scores for chronic fatigue cases versus non-cases. In addition, a somatic attributional style was an important risk factor for developing CFS. CFS cases did report that they felt more likely to catch viruses when run down or under stress (item B on the VIRAS). This confirms the result found in the earlier study by Cope, David & Mann (1994), and may suggest that CFS cases and people suffering from an infection have in common that they generally feel more vulnerable to viruses. Wessely, Chalder & Hirsch *et al.* (1995), however, did not confirm the above results. They also criticised Cope, David, Pelosi & Mann (1994) because that study relied on retrospective accounts of fatigue. Wessely *et al.* (1995) studied patients with and without a viral illness prospectively and found no evidence that viral illness or a somatic attributional style was a risk factor for the development of fatigue.

1.3.5 Attributions and prognosis in CFS

Several other researchers have found an association between attribution of fatigue to a physical cause, such as a viral illness, and worse outcome. Sharpe *et al.* (1992) found that, among other factors, belief in a viral illness was associated with a poorer prognosis at two-year follow-up. Wilson, Hickie & Lloyd *et al.* (1994) looked at predictors of outcome of chronic fatigue longitudinally and found that a strong conviction in a physical disease process at initial assessment was associated with poorer outcome. In a treatment trial developed for patients suffering from CFS (Butler, Chalder, Ron, & Wessely, 1991), a strong somatic attribution was associated with poor outcome.

Chalder *et al.* (1996) provided further evidence that people suffering from chronic fatigue mentioned a previous viral illness as well as stress as causes, which mirrors Sharpe *et al.*'s (1992) finding. Thus, people suffering from CFS do not only attribute their illness to a physical cause, but many do, and it seems to be associated with poorer prognosis. Chalder *et al.* (1996) also found that citing a social attribution (e.g. work pressures or family commitments), rather than a psychological attribution (e.g. feeling depressed) was a protective factor. A psychological attribution was related to higher levels of depression and anxiety as well as to a higher fatigue score. It would appear that a somatic attribution and a psychological attribution both have their advantages and disadvantages. As a point of interest, social attributions as mentioned by Chalder *et al.* (1995) could be interpreted as normalising attributions (Robbins & Kirmayer, 1991), because normalising arguably includes similar external environmental or situational reasons for common symptoms, including fatigue.

Therefore, using the SIQ for research into the development of (chronic) fatigue as done by Cope, David, Pelosi & Mann (1994), and indirectly by Cathébras *et al.* (1995), seems to make sense.

The studies mentioned above have all looked at fatigue, but the type of fatigue was not always the same. The influence of attributions on the development and prognosis of fatigue has been investigated, both on chronic post-viral fatigue as well as on fatigue immediately after an infection illness. It is important to keep in mind that the different types of fatigue are likely to be different entities with different clinical presentations and levels of severity. However, it is the researcher's opinion that studying variables associated with post-infectious fatigue would enhance our understanding of how those variables might also reveal important information about the development or maintenance of the more severe and chronic forms of fatigue.

1.3.6 Summary on attributions and beliefs in relation to symptom presentation

Previous literature has found some evidence that health beliefs and symptom attribution are positively associated with symptom presentation in relation to common symptoms (Cope, David & Mann, 1994; Robbins & Kirmayer, 1991), fatigue (Cope, David, Pelosi & Mann, 1994), and the prognosis and outcome of CFS (e.g. Sharpe *et al.*, 1992; Chalder *et al.*, 1996). No evidence was found for an association between attributional style and post-infectious fatigue within 42 days of onset of infection (Cathébras *et al.*, 1995), although this study has its limitations. As beliefs and attributions could be risk factors in the development or maintenance of

fatigue syndromes, it seems important to continue to investigate their role in more detail. Not many studies have looked at how attributions and beliefs relate to the actual symptom presentation or perceived severity of an 'ill' population, as opposed to presentation of 'common' symptoms in the normal population.

The literature discussed above has also mentioned that previous stress may also have some role to play with regard to people's attributions of their symptoms. This issue will now be discussed.

1.4 Previous stress, infections and fatigue

As mentioned earlier, Cope, David & Mann (1994) had found evidence of an association between infection symptoms and the believe that stress and 'feeling run down' make people more vulnerable to those symptoms. In addition, Sharpe *et al.* (1992) found that stress was often given as an important causal factor for CFS. However, the kind of stress, or the severity of it, suffered by those who believed that stress was an influence, remained unknown. Several studies have investigated the role of stress on the susceptibility of infections as well as on fatigue. An outline of those studies will now follow.

1.4.1 Stress and infections

Not all individuals who are exposed to an infectious agent become ill. One of the variables that may explain the individual differences is stress. Stress is 'generally

thought to influence the pathogenesis of physical disease by causing negative affective states (such as anxiety and depression), which in turn exert direct effects of biological processes or behavioral patterns that increase disease risk' (Cohen & Williamson, 1991, p.7). The influence of stress, often measured in terms of life events, on infection has been extensively investigated. In their review of research on the role of stress in infectious disease, Cohen & Williamson (1991) conclude that there is substantial evidence for an association between stress and infection, both in terms of illness behaviours (e.g. seeking medical care) as well as in terms of viral pathology verified by a laboratory. Before discussing studies relating to this topic, we need to know what is actually meant by stress in the literature.

1.4.1.1 How is stress being investigated?

The focus of studies which investigate correlations between stress and infection has mostly been on negative life events as measured by various life event checklists (e.g. Stone, Bovbjerg & Neale *et al.*, 1992; Totman, Kiff & Reed *et al.*, 1980; Turner Cobb & Steptoe, 1996). However, other researchers have also looked at the influence of positive versus negative life events (Evans, Doyle & Hucklebridge *et al.*, 1996); of different types of stressors (Cohen, Frank & Doyle *et al.*, 1998); of the duration of stress (Lepore, Miles & Levy, 1997); or of the effects of minor life events (Evans, Pitts & Smith, 1988). Thus, studies investigating the role of stress on infections have not only looked at the actual life event, but also at other variables of those events.

Several prospective studies have been carried out. In prospective studies 'subsequent disease is predicted from stress levels in *initially healthy* persons' (p.10). These studies presented interesting findings.

1.4.1.2 Stress and infections: research findings

The literature reviewed by Cohen & Williamson (1991) suggests that stress may play a role in the onset of infectious diseases and reactivation of latent viruses. For example, Stone, Reed & Neale (1987) studied 79 married couples, who completed a checklist of life events daily for three months. They found that undesirable events increased significantly three to four days prior before the actual onset of an episode of infection. In addition, desirable events decreased significantly four to five days before onset of infection. A study by Linville (1987) reported that in 106 undergraduate students, those with more negative life events were more likely to report having had the 'flu' in the two-week period after completing the life events measure. Again in the same year, Glaser, Rice, Sheridan *et al.* (1987) found that in a sample of medical students, more upper respiratory tract infections were reported during examination periods (high-stress) than at one month before the exam (low-stress).

A limitation of the studies mentioned above is that they relied on self-report of infection symptoms, rather than on laboratory verification. The results, however, are still interesting as they may indicate a mechanism whereby stress prior to infection may make people generally more vulnerable. This increased feeling of vulnerability

could well be confirmed on a measure such as the VIRAS (Cope, David & Mann, 1994). As previously discussed, research showed that people presenting with infection symptoms scored significantly higher the vulnerability factor of the VIRAS and felt they were more likely to catch a virus when run down or under stress.

Studies that included verification of a virus also showed evidence of a link between stress and infection. An early study by Meyer & Haggerty (1962) looked at stressful life events over a 12-month period. They found that chronic family stress was related to greater number of infections. Graham, Douglas & Ryan (1986) that daily events were positively related to verified infection episodes, while life events were positively associated with the number of days when symptoms were experienced. Stone *et al.* (1992) presented a study where volunteers were experimentally exposed to a mild rhinovirus, which elicits classic common cold symptoms (sneezing, headache, malaise, chilliness, nasal discharge and obstruction, sore throat, cough). This procedure 'lends itself to investigation of individual differences in responses to infection because many of the confounding variables associated with natural infections can be eliminated' (p.116). The influence of past life events, perceived stress and current mood on the development of cold symptoms was investigated. Participants who developed colds reported having experienced more major life events during the previous year than those who did not develop colds. There was no significant association between perceived stress or current mood and cold development. However, the small sample size of this study (N = 17) limited the statistical power.

More recently, Turner, Cobb & Steptoe (1996) also investigated life events and infections, but also measured psychological coping, family environment and social support. However, verification of the virus did not take place for practical and ethical reasons. Again, risk of infection was positively associated with life event stress experienced both during previous 12 months as well as during the study itself. However, psychological coping style modulated this effect, with avoidant coping style being protective under conditions of high life event stress. Social support was found less of a modulator, and family environment did not interact with life event stress.

As mentioned earlier, other aspects of life events have been looked at in relation to susceptibility to infections. Evans *et al.* (1996) found that positive events, rather than negative events, predicted subsequent upper respiratory tract infection, independent of variables such as personality, self-reported stress, smoking, and alcohol consumption. Cohen *et al.* (1998) investigated the idea that different types of stressors may be related differently to susceptibility of infections. They induced an infection in previously healthy volunteers and measured life events, using the Life Events and Difficulties Schedule (LEDS; Brown & Harris, 1989) before virus induction. Personality and social network ties were also examined. The researchers found additional evidence that supported the role of life events in susceptibility to infection. Furthermore, they found that acute stress (lasting less than one month) did not alter susceptibility to colds, while enduring stressors (lasting one month or longer) were associated with greater susceptibility. This result supported evidence presented by Lepore *et al.* (1997), who found that in a student population chronic

stressors (lasting nine or more months) were associated with worse outcome on various health measures, including illness reporting. Cohen *et al.* (1998) also found that chronic stress related to interpersonal conflicts and to problems at work (mainly under- and unemployment) were primarily responsible for the association with increased susceptibility. The finding that chronic stressors appear to be more important in relation to the development of colds is inconsistent with a study by Evans *et al.* (1988). They found a significant decrease in positive daily events 4 days prior to symptom onset in first year undergraduates. Cohen *et al.* (1998) gave several possible reasons for this discrepancy, including the possibility of premorbid influences of infection on daily events. However, it is worth noting that the samples used in some of the studies mentioned above consist of students, whose average age could be an important mediating factor. Older people will probably have had more exposure to infections and thus more chance to strengthen their immune system. Therefore, the effects of stress on susceptibility of infections may be different for different age groups.

The role of stress on fatigue has also been investigated. This issue has not often been studied, but the results may suggest directions of future research.

1.4.2 Life events and CFS

Not many studies have looked at the influence of life events on the development of a fatigue syndrome. A prospective study by Bruce-Jones, White, Thomas *et al.* (1994) compared participants with glandular fever with those who had ordinary upper

respiratory tract infection, using the Schedule of Affective Disorders and Schizophrenia (SADS; Endicott & Spitzer, 1978) as well as the LEDS (Brown & Harris, 1989). Participants were examined at 2 months and 6 months after onset of the infection. Although an association between life events and psychiatric disorder was found, a significant relationship between the experience of more than one significant stressor and the development of a fatigue syndrome was only found at two months, and not at six months. This was true for the whole sample. Therefore, this study did not find evidence for an association between 'social adversity' and a chronic fatigue syndrome.

In another prospective study, Ray, Jefferies & Weir (1995) investigated the relationship between life events and symptomatology in patients currently suffering from CFS, rather than looking at the onset of fatigue. At time 1 the severity of fatigue, among other variables, was measured. At time 2 (one year later) fatigue was measured again, as well as life events that had occurred during the previous using the PERI list of life-events (Dohrenwend, Krasnoff & Askenasy *et al.*, 1978). Events were also rated for desirability and implications for change in the participant's life. Dohrenwend *et al.* found that negative life events were unrelated to the severity of fatigue. Positive events, however, were significantly and negatively related to fatigue severity. The authors rightly comment on the fact that recall of events may not be error free. They found a significant difference between the number of events recalled from the first six-month period compared to the second six months, when more events were reported. The problem of unreliable recall is an issue for many studies looking at the impact of major life events on illness onset or development and has to

be taken into account when drawing conclusions about possible associations between events and symptoms of illness.

1.4.3 Summary on life events, infections and fatigue

Although it seems unclear which kind of life events are positively related to risk of infection, there does seem to be a body of evidence supporting the hypothesis that stress, often measured by life events scales, does increase the susceptibility to infection. Life events have so far been found to be unrelated to the onset or severity of a fatigue syndrome, but their effect may be mediated by other factors, such as personality, coping style or health beliefs and attributions. It may be possible that life events actually influence the development of health beliefs or attributions. For example, it could be hypothesised that the increased feeling of vulnerability in people with infections (Cope, David & Mann, 1994) is, at least partly, due to a feeling of vulnerability caused by exposure to stressful life events. As far as the researcher is aware, the influence of life events on the development or change of health beliefs has not been studied yet.

1.5 Unexplored issues in presented literature

The literature discussed above presents us with some evidence that beliefs, attributions and life events may have a role to play in relation to the onset or perceived presence of common physical symptoms, viral symptoms or post-viral

fatigue. Nevertheless, more research is needed in this area. For example, the following points are yet still to be investigated:

(1) The influence of attributional style and beliefs about viruses on perceived severity of common symptoms in an 'ill' population, such as people suffering from a viral illness. To date, this has only been investigated in a *healthy* normal population. This relates to the next point;

(2) The individual differences in the perceived severity of viral symptoms in a 'viral population' have yet to be studied in relation to attributional style and virus beliefs. Ideally, such an investigation should include verification of a virus.

(3) It has been found that people suffering from infections seem to believe that they are more likely to get a virus when they are run down or under stress. The influence of previous stress in relation to attributions and virus beliefs has not been yet been investigated, although other studies have provided evidence for an association between increased susceptibility to a viral infection and previous stress;

(4) Little is known about when beliefs and attributions start to have a significant influence on the development of fatigue. The study by Cathébras *et al.* (1995) *excluded* people suffering from an infection. They also did not investigate 'natural recovery' from fatigue but looked at outcome after treatment versus no treatment. The relationship between virus beliefs and attributions, and the 'natural' course of fatigue after infection has not yet been investigated, in the general population or a 'viral population'.

1.6 Main aims and hypotheses of the present study

Health beliefs and attributions may be at the core of deciding what to do about a symptom. It is important for health professionals to be aware of patients' beliefs and attributions about their symptoms. As mentioned earlier, Bishop (1987) highlighted the danger that symptoms that are believed to be psychologically caused may go undetected, as patients do not seek help for them. On the other hand, if help is sought but 'psychological attributions are neither offered nor accepted by patients, physicians may fail to recognize somatized psycho-social distress and thus, fail to offer potentially effective psychological intervention' (Robbins & Kirmayer, 1991, p.1041). Techniques, such as those described by Goldberg, Gask & O'Dowd (1989), which help encourage patients to reattribute symptoms may be useful. A conflict between professionals' and patients' beliefs about symptoms may have implications for doctor-patient communication and thus for subsequent adjustment to illness. The importance of studying the influence of beliefs and attributions, therefore, seems evident.

Beliefs about viruses and attributional styles have previously been shown to be non-physical variables that may influence symptom presentation. Furthermore, a somatic attributional style predicted somatic symptom presentation over a six-month period. Beliefs about viruses also have been found to be associated with fatigue at six months follow-up. In addition, a somatic attribution has often been found to be positively related to a poor prognosis in patients suffering from CFS.

The current study aims to further develop our understanding about the role of attributional style and beliefs about viruses by looking at people who believe they suffer from 'flu' or influenza. Patients suffering from a fatigue syndrome often mention a previous viral illness as a cause for their fatigue. Since the evidence for a viral cause of post-viral fatigue is not conclusive, it could be argued that it may not be the virus itself, but a modulating factor, such as a person's attributions or beliefs, that makes people more vulnerable to post-infectious or chronic fatigue. One aim of this study is, therefore, to investigate the attributions and virus beliefs of people suffering from an infection in order to understand if their attributional styles or virus beliefs are related to subsequent development of post-infectious fatigue. Virus beliefs and attributional style will also be looked at in relation to differences in reported severity of symptoms of people who are still suffering from an infection, in order to clarify if virus beliefs or attributional style have an impact on symptoms during illness.

Previous life stress has been associated with increased vulnerability to infections, but not to chronic fatigue. However, CFS sufferers have mentioned previous stress as a possible cause for their symptoms. Therefore, the current study also aims to investigate the possible association of previous life stress with virus beliefs and attributional style, as these were believed to be associated with fatigue. It is proposed that previous life stress may influence beliefs or attributions and as such, also the possible subsequent development of fatigue.

This study aims to take the comments made in section 1.6 above into account by including the following factors:

- Investigation of a population suffering from viral symptoms (see 1.6, points 1, 2 and 4).
- Viral verification of at least part of the sample (see point 2).
- A self-report measure of viral symptomatology, which includes psychological symptoms (see point 2).
- A measure of life events (see point 3).
- Measures of beliefs about viruses (VIRAS) and attributional style (SIQ) and a prospective investigation of subsequent post-infectious fatigue levels (see point 4).

The following main hypotheses will be investigated:

(1) A psychological attributional style will be positively associated with the reported severity of both somatic and psychological viral symptoms, while a normalising attributional style will be negatively associated with reported symptom severity;

(2) VIRAS score, as well as the score on subscale 1 of the VIRAS (items related to believed personal vulnerability to viruses), will be positively associated with a psychological attributional style, while subscale 1 will also be positively associated with reported severity of psychological viral symptoms;

(3) The number of previous life events, as well as their perceived distress levels, will be positively associated with total VIRAS score, and in particular with item B of the VIRAS B ('I get viruses if I am 'run down' or under stress'), as well as with a psychological attributional style;

(4) A psychological attributional style will be positively related to post-infectious fatigue. It is further hypothesised that a normalising attributional style will be negatively associated with the reported level of post-infectious fatigue;

(5) Total VIRAS score, as well as the score on item B ('I get viruses if I am 'run down' or under stress') will be positively associated with post-infectious fatigue scores.

CHAPTER 2 METHOD

2.1 Design

The current study has a correlational design, with a prospective element to it. Participants filled out postal questionnaires (time 1), and were followed up by telephone (time 2) to be asked about their levels of fatigue, which had not been measured at time 1.

2.2 Participants

2.2.1 Inclusion and exclusion criteria

People who complained of 'flu'-like symptoms, such as fever, a runny nose, aching muscles, or a sore throat, and believed they had 'the flu' were included in this study. There was not a minimum number or symptoms that had to experienced before people could take part in this study, as one of the aims of this study was to investigate the influence of certain variables on the *perceived severity* of symptoms, which was measured as part of the investigation. In addition, as a 'flu'-epidemic was well underway at the time of recruitment, it was expected that people complaining of 'flu'-like symptoms would have a good chance of 'really having' those symptoms. People who reported that they had received help for psychological or psychiatric difficulties would be excluded from the study, as it has been shown that those difficulties can influence one's attributional style (Robbins & Kirmayer, 1991).

2.2.2 Recruitment

This investigation was aimed at people suffering from 'flu'-like symptoms. In order to get access to those people, a local general practitioner (GP) in Dingwall (Highlands of Scotland) was contacted and asked for his help in recruitment of participants for this project. This revealed that the surgeries in Dingwall and Fort-William were involved in a separate research project, coincidentally also investigating patients with 'flu'. These surgeries were asked if they would be willing to let this project run in parallel to their study and recruit participants for both projects at the same time. This was very helpfully agreed by both the involved surgeries as well as by the local ethics committee. The researcher was also invited to a research meeting, where GPs from some other surgeries were also present. There, the current project was briefly presented to the GPs, as well as to one chemist. This resulted in four GP surgeries from the Fort-William, Dingwall, and Inverness area being involved in recruiting the participants, as well as one chemist. Thus, the participants were recruited in the Highlands of Scotland (Fort-William, Dingwall, and Inverness) by GPs and practice nurses, and a chemist. Participants were asked to cooperate with this study when they visited the general practice or chemist, or they when they contacted the general practice by telephone themselves, complaining of symptoms of a possible infection.

The GPs started recruitment for their study roughly at the beginning of a 'flu' epidemic. Due to a delay caused by the time the researcher had to wait for the next available ethics committee meeting, as well as by difficulties regarding the actual

preparation of this project, recruitment for this project started later than was hoped for. Unfortunately, this meant that a considerable number of potential participants were not recruited, as they did not experience 'flu'-like symptoms any more. As progressively fewer responses were received weekly, it became clear that it would be unrealistic to expect many more responses. Therefore, in order to increase the sample size, a decision was made to include people who had been ill previously. This created two groups of participants: 'group 1' ($N = 30$) are those who experienced 'flu'-like symptoms when filling in the questionnaires, while 'group 2' ($N = 23$) are those who have experienced 'flu'-like symptoms in the recent past.

Although group 2 filled in the questionnaires retrospectively, there has been some evidence to suggest that people can remember their symptoms reliably. Hunter, Phillips & Rachman (1979) showed that patients were able to remember pain symptoms reliably over a one-day and a five-day period. In addition, a study by Kisely, Faragher, Gask & Goldberg (1992) showed that recall of psychiatric symptoms was reliable over a three-month period. Based on this evidence, albeit limited, it was decided that group 2 would not be significantly different and could be included in the sample as a whole. However, possible differences between groups were investigated.

The general practices recruited 41 (77%) participants, while the chemist recruited 9 (17%) participants. Three (6%) people contacted the researcher directly to volunteer to be a participant and were recruited by the researcher, who decided that they

fulfilled the inclusion criteria. All participants in group 2 were recruited by the research nurse in Fort-William, who very helpfully offered to do so.

2.2.3 Sample characteristics

The total sample consisted of 53 participants (20 (38%) males, 31 (58%) females, 2 (4%) gender not recorded). Their mean age was 50.4 years (SD = 16.78) and their age ranged from 17 to 79 years. Thirty-four participants in the present study also took part in a study carried out by their general practice (see 2.3 below). As part of that research project, nose and throat swabs were taken, as well as blood samples, and these were tested for the presence of a virus. The presence of an influenza (A or B) virus was confirmed for 23 (67.6%) people, while 11 (32.3%) people did not have a 'flu' virus. Forty-two (79.2%) people gave permission for a telephone follow-up and were followed up accordingly. The mean follow-up was 21.9 days (SD = 1.5) for group 1, and 118.1 days (SD = 26.3) for group 2. Follow-up time for group 1 ranged from 17 to 24 days, and for group 2 from 57 to 171 days.

2.3 Procedure

Envelopes containing a questionnaire booklet (Appendix 1–4), a consent form (Appendix 9), information sheet A (Appendix 6) and a stamped addressed envelope, were distributed among the cooperating GPs and chemist. The envelopes were then handed out to participants by the practice nurse, the GP or the chemist. The surgeries

were contacted after a few weeks as a reminder, as well as to establish how many potential participants were expected to take part in the study.

Participants were asked to fill in the consent form and send back the completed questionnaire booklet and consent form in the stamped addressed envelope. They were also asked permission to be contacted by telephone for a follow-up. Participants in group 1 were asked to fill in the questionnaires as soon as possible, when they were still experiencing 'flu'-like symptoms. Participants in group 2 were given a slightly adapted version of the information sheet (Appendix 7) to account for the fact that they were not experiencing symptoms any more. Participants in group 1 were contacted after a minimum of three weeks after the date written by the participant on the consent form. A minimum of three weeks was thought to be a period of sufficient length for participants to normally not experience 'flu'-like symptoms any more. Participants in group 2 were contacted as soon as possible after receiving the completed questionnaire, as the follow-up period for group 2 would be at least three weeks anyway.

The participants who had been involved with the GP study had all been tested by a practice nurse for influenza viruses. As it had been agreed for the researcher to have access to the actual diagnoses, it was now possible to compare participants who were positive for an influenza virus with those who were negative.

2.4 Measures

The questionnaire booklet consisted of four questionnaires. They are the Symptom Interpretation Questionnaire (SIQ; Appendix 1), the Viral Infection Research into Attitudes Scale (VIRAS; Appendix 2), The List of Threatening Experiences (L.T.E; Appendix 3) and a visual analogue scale (VAS; Appendix 4) measuring the severity of physical and psychological 'flu'-like symptoms. As a follow-up measure of fatigue, the Fatigue Scale (FS; Appendix 5) was administered over the telephone.

The Symptom Interpretation Questionnaire (SIQ). The SIQ (Robbins & Kirmayer, 1991) is a self-report measure documenting the participant's attribution of aetiology for common somatic symptoms. The SIQ has been found to have satisfactory internal reliability for each scale (psychologising scale: $\alpha = .86$; somatising scale: $\alpha = .71$; normalising scale: $\alpha = .81$). Factor analysis further confirmed the existence of three attributional dimensions. Some modest intercorrelations between the attributional scales were found. Psychological attributions were related to somatic attributions ($r = .39$, $p < .001$) and normalising attributions ($r = .23$, $p < .001$). Somatic attributions were weakly related to normalising attributions ($r = .19$, $p < .005$).

There are two versions of the SIQ. The first version consists of 13 common somatic symptoms, each followed by three causal explanations of the symptom. These explanations represent physical, psychological or normalising reasons for the symptom. Participants are to circle the explanation for each symptom which fits

closest to their personal explanation, whether they have experienced this symptom or not. The second version of the SIQ has a 'forced-choice' format, where participants are to circle only one explanation of the symptom. Three separate scores, one for each attributional style, are obtained by summing the total number of explanations. In addition, participants report if they actually experienced the symptom during the past three months, but this information was not analysed as this study was aimed at current symptoms. To enhance the likelihood of people participating in this study and thus the sample size, brevity of questionnaires was seen to be important. Therefore, an alternative shortened version of the forced-choice SIQ, also used by Cope, David & Mann (1994) and Cope, David, Pelosi & Mann (1994), was chosen. This version uses seven items relating to the most common symptoms.

The Viral Infection Research into Attitudes Scale (VIRAS). The VIRAS (Cope, David & Mann, 1994) is a seven-item measure developed to assess beliefs about viruses. It reflects commonly held lay beliefs, and the reported power of viruses in relation to the individual. Each item is scored on a four point Likert scale (definitely no-0, probably no-1, probably yes-2, and definitely yes-3). Scoring on the last two items is reversed. High scores on the VIRAS should indicate greater report of power of viruses. All the items had been shown to have to have significantly different means ($F = 65.35$, $p = .001$). The authors also report that the items are additive (F (for non-additivity) $= 2.175$, $p = .14$).

The List of Threatening Experiences (LTE). The LTE (Brugha, Bebbington, Tennant & Hurry, 1985) is a 12-item inventory of life events. Participants are asked to tick

those events that happened to them during the previous six months. If an event has happened to them, then they also rate the degree of distress they experienced as a result of this event on a four point Likert scale (not at all distressing-0, somewhat distressing-1, moderately distressing-2, extremely distressing-3). Brugha *et al.* recommended this inventory in preference to longer lists where practical and economical constraints need to be taken into account. As the current project is time-limited, it was decided that it would be appropriate to choose this brief measure of life events.

The Visual Analogue Scale (VAS). This 29-item self-report scale was constructed to measure the perceived severity of 'flu'-like symptoms. McCormack, de L. Horne & Sheather (1988) reported that visual analogue scales have often and effectively been used psychology and medicine as clinical and research tools, mainly to measure subjective experiences. Mood in particular has been measured with the use of visual analogue scales (e.g. Aitken & Zeally, 1970; Herbert, Johns & Doré, 1976). The VAS was constructed in consultation with a chartered clinical psychologist and a general practitioner and was piloted by two volunteers from the Psychology department who had 'flu' at the time. The VAS appeared to have good face and content validity.

The VAS consists of a list of 29 symptoms, 19 physical symptoms (items 1, 2, 6, 7, 9-13, 15, 16, 20, 21, 23, 26-30) and 10 psychological symptoms (items 3, 4, 8, 14, 17-19, 22, 24, 25). The decision whether a symptom was physical or psychological was taken by the researcher. In order to generate physical and psychological 'flu'-

like symptoms, a medical textbook (Wyngaarden & Smith, 1988) was consulted, as well as previous research into the psychological and physical aspects of influenza or upper-respiratory tract infections (e.g. Hall & Smith, 1996; Smith *et al.*, 1992; see 1.3.4 for more details). Anecdotal reports of psychological symptoms such as mood changes or impaired alertness were also taken into account.

The VAS consists of physical and psychological symptoms for two reasons. First, as shown earlier, previous literature suggests that people suffering from infections can experience psychological as well as physical symptoms. Therefore, it was decided that a comprehensive list should include both types of symptoms. Secondly, one of the goals of this study is to compare the influence of attribution and beliefs about viruses on symptom experience. This influence may be different for psychological and physical symptoms. Therefore, a distinction was made between the two types of symptoms.

Participants are asked to put a cross on a 10-cm line at a place that best describes how much that symptom is experienced. Participants of group 2, who had been ill in the past, were asked how much they had experienced the symptoms. The distance in centimetres from the 0-cm point at the extreme right represents the perceived severity of the experienced symptom. This distance was measured to the closest 0.5 cm, dividing every item up into 20 steps. Adding up all the distances from the 0-cm point on all the items represents the total symptom severity score. The psychological and physical items are also added up separately to provide a psychological and physical symptom severity score.

The Fatigue Scale (FS). The FS (Chalder, Berelowitz, Pawlikowska *et al*, 1993) is an 11-item self-rating scale to measure the severity of fatigue. The 11 items are all related to fatigue and are answered by ticking the most appropriate answer for the participant on a four point Likert scale (less than usual-0, no more than usual-1, more than usual-2, and much more than usual-3). The FS had been found to be reliable and valid. The scale is usually completed by the participants. However, in this study the FS was administered as a follow-up by the researcher over the telephone. In order to establish if participants felt more tired since they experienced the 'flu'-like symptoms, the introduction of the FS was changed slightly. It asked participants to rate how they feel now compared to before they experienced the symptoms. Those who experienced significant fatigue, which was subjectively defined as scoring two or more on at least four items, were also asked what they thought was the main reason for their fatigue.

2.5 Ethics

The local ethics committee gave ethical approval for this project. Ethical approval was also obtained for combining recruitment procedures of both projects. The original design of this study had included all five questionnaires to be given to participants at time 1. The ethics committee, however, felt that this would be too much to ask participants who were suffering from flu. Therefore, the committee requested the VAS, which was originally made up of 36 symptoms, to be shortened,

and the FS to be excluded from the questionnaire booklet. This decision compromised the strength of the design.

2.6 Statistical analyses

Statistical procedures were performed with the use of the statistical software package Minitab 10.51 Xtra for MacIntosh and InStat 2.03 for MacIntosh. Associations between variables were tested using Pearson's correlation coefficient. Comparisons of group means were carried out using independent *t*-tests. Multiple regression analyses were carried out in order to find possible predictors of the dependent variables.

In the following sections, the results will be presented, starting with a summary of relevant descriptive data, and followed by the findings relevant to each hypothesis. In addition, other relevant findings will be presented at the end of this chapter, as well as differences between group 1 and group 2. Although some of the non-hypothesised findings in this study are interesting, due to the number of analyses that were carried out, some of these findings may have resulted from a type-I error.

As mentioned in the method section (p.48), the results were analysed using the software package Minitab 10.51 Xtra for MacIntosh. As Minitab does not assume equal variances, it selects a procedure whereby the standard deviations are estimated, which makes the degrees of freedom vary from test to test. All *p*-values are two-tailed.

3.1 Descriptive data

Table 1 shows a summary for the total sample of the means, standard deviations, sample sizes and range of values for the following variables: normalising attributional style (Norm), psychologising attributional style (Psych), somatising attributional style (Soma), total score on the VIRAS, number of life events (LTE-N), perceived degree of distress of experienced life events (LTE-D), total symptom score on the VAS (VAStot), symptom score for psychological symptoms on the VAS (VASps), and physical symptom score on the VAS (VASph). These values were

used in the calculations throughout the results, wherever hypotheses were tested for the whole sample.

Table 1. Descriptive data of the variables used in the present study

Variables	*N*	Mean	SD	Range
Norm	50	3.89	1.71	1.0–7.0
Psych	50	1.64	1.18	0.0–4.0
Soma	50	1.34	1.21	0.0–4.0
VIRAS	52	10.25	2.52	5.0–18.0
LTE-N	52	1.02	0.83	0.0–4.0
LTE-D	53	1.53	2.32	0.0–10.0
VAStot	51	127.66	55.84	21.0–243.50
VASps	51	36.23	22.99	4.50–90.50
VASph	51	95.17	38.27	35.0–159.0

Some of the hypotheses are related to levels of post-infectious fatigue. As mentioned in the introduction (p.33 above), fatigue a few weeks after infection may well be different from fatigue several months after infection. In this study, fatigue for group 1, measured at an average of 21.9 days follow-up, was significantly and substantially different from fatigue for group 2, measured at an average of 118.1 days follow-up. Thus, it was decided to only test the hypotheses relating to levels of post-infectious fatigue for group 1. This meant using values for variables of group 1 and not the whole sample, which is why the fatigue score is not included in table 1. In the

following sections, the results relating to the hypotheses generated in the introduction (p.46) will be presented.

3.2 The relationship between attributional style and symptom severity

It was hypothesised that a psychological symptom attributional style would be positively associated with the reported severity of flu-like symptoms, as measured by the VAS. In addition, a normalising attributional style was expected to correlate negatively to symptom severity. Table 2 shows the correlations between symptom attributional styles, VAStot, VASph and VASps.

Table 2. Associations between symptom attributional styles and symptom severity

Variables	Normalising	Psychologising	Somatising	d.f.
VAStot	-.09 (n.s.)	.23 (n.s.)	-.14 (n.s.)	48
VASps	.07 (n.s.)	.19 (n.s.)	-.31 ($p = .027$)	48
VASph	-.10 (n.s.)	.26 (n.s.)	-.13 (n.s.)	48

No significant association was found between psychologising and symptom severity. Furthermore, no significant association was found between normalising and symptom severity, contrary to expectation. However, a somatic attributional style was negatively associated with psychological symptom severity ($r = -.31$, $p = .027$).

Those who tend to attribute physical symptoms to a somatic cause report a lower severity of psychological viral symptoms.

3.3 The relationship between VIRAS score, psychologising, and symptom severity

It was hypothesised that total score on the VIRAS, and in particular on subscale 1 (relating to believed personal vulnerability to viruses), would be positively associated with a psychological attributional style, as well as with reported severity of psychological symptoms. Table 3 summarises the associations between those variables.

Table 3. Associations between VIRAS score, psychologising, and psychological symptom severity

Variables	VIRAS	Subscale 1	d.f.
Psychologising	.35 ($p = .012$)	.48 ($p = .0004$)	48
VASps	.30 ($p = .0324$)	.17 (n.s.)	48

As expected, the degree of belief in the power of viruses was positively associated with the tendency to attribute physical symptoms to a psychological cause. The personal vulnerability subscale of the VIRAS was even more strongly associated with psychologising. Furthermore, VIRAS scores were positively associated with the severity of psychological viral symptoms. However, the belief of personal vulnerability to viruses was not significantly correlated with perceived severity of

psychological symptoms, which again was not hypothesised. An additional finding was that VIRAS scores were negatively correlated with normalising (r = -.29, p = .04).

3.4 The relationship between number of life events and their perceived distress levels with VIRAS score and psychologising

3.4.1 Number of life events in relation to VIRAS and psychologising

It was hypothesised that the number of life events would positively relate to VIRAS and psychologising score. Twenty-seven (51%) of the participants had experienced at least one life event in the previous six months. As the majority of this group (60%) had only experienced one event, and only three people more than two, it was not seen as useful to investigate the influence of number of life events on dependent variables. Instead, it was decided to divide the sample into those who had experienced life events in the previous six months as measured by the List of Threatening Experiences (LTE-yes; N = 27), and those who had not (LTE-no; N = 25). Independent t-tests were carried out to compare the two groups on VIRAS score, score on item B, and psychological attributional style. Table 4 summarises the results.

The results showed an unexpected significantly different score on item B between people with and people without previous life events. People who had experienced life events were less likely to believe that they would get viruses when feeling 'run

down' or under stress. Comparing the LTE-yes and LTE-no groups on perceived vulnerability score (subscale 1 of the VIRAS) revealed a similar significant difference (t (46) = 2.05, p = .05). However, mean scores on the VIRAS and on psychologising were not different. In addition, no significant differences were found between LTE-yes and LTE-no groups on normalising or somatising scores, or on severity of viral symptoms.

Table 4. Comparison of people with versus people without previous life events on VIRAS score, item B score, and psychological attributional style

Variables	LTE-yes	LTE-no	95% C.I. for the difference between means	Significance (t-value)	d.f.
VIRAS Mean (SD)	9.81 (2.72)	10.72 (2.25)	-0.48 to 2.29	p = .1963 (1.31)	49
Item B Mean (SD)	1.54 (0.76)	2.04 (0.54)	0.13 to 0.87	p = .0090 (2.73)	45
Psychologising Mean (SD)	1.69 (1.12)	1.61 (1.08)	-0.72 to 0.55	p = .7884 (-.27)	46

3.4.2 Perceived distress levels of life events in relation to VIRAS and psychologising

It was also hypothesised that the level of experienced distress from life events would be positively associated with VIRAS, item B and psychologising. The results of the analysis are summarised in table 5.

As expected, distress from life events was related to belief in the power of viruses, as well as to psychological attributional style. Furthermore, an interesting finding was that LTE-D also correlated positively with overall viral symptom severity (VAStot; $r = .59$, $p = .0001$), with psychological symptom severity (VASps; $r = .69$, $p = .0001$) and with physical symptom severity (VASph; $r = .46$, $p = .0007$). This suggests that those who experienced a higher degree of distress from life events also experienced their viral symptoms more severely.

Table 5. Associations between degree of distress of life events (LTE-D) and VIRAS score, item B, and psychologising

Variables	LTE-D	d.f.
VIRAS	.47 ($p = .0154$)	23
Item B	.56 ($p = .0029$)	23
Psychologising	.42 ($p = .0327$)	23

In order to explore further the relationship between perceived severity of viral symptoms (VAStot) as the dependent variable, and psychologising, VIRAS score, number of life events and experienced distress from life events, these variables were entered into a multiple regression model. However, as there was such a small sample, one must be cautious in interpreting the results. This analysis was only done as an exploratory exercise.

A stepwise regression showed that the variables mentioned above accounted for 35.8% of the variance. Only experienced severity of life events (LTE-D) was a

significant predictor of overall VAStot score, explaining 14.7% of the variance. With psychological viral symptom severity (VASps) as the dependent variable, the four proposed predictors explained 48.0% of the variance. Again, LTE-D was the only significant predictor, explaining 7.4% of the variance. Furthermore, with physical symptom severity (VASph) as the dependent variable, the proposed predictors explained 21.2% of the variance, with LTE-D being the only significant predictor, explaining 7.3% of the variance.

3.5 The relationship between symptom attributional style, VIRAS, and post-infectious fatigue

The mean score on the fatigue scale for group 1 was 17.71 (SD = 4.57). It was hypothesised that a psychological attributional style would be positively associated, and a normalising attributional style negatively associated to the level of post-infectious fatigue, at a minimum of three weeks after participants filled in the questionnaires. In addition, it was hypothesised VIRAS score, as well as item B on the VIRAS would also be positively associated to the level post-infectious fatigue. Only the sample of group 1 was analysed for reasons explained earlier.

Contrary to expectation, no significant positive correlation was found between post-infectious fatigue and psychologising. Normalising was not negatively related to fatigue. In addition, no significant relationship was found between fatigue and VIRAS score, as well as item B of the VIRAS either. When the above variables were entered into a multiple regression model, no significant predictors we found.

Information concerning participants' ideas about the causation of their fatigue was gathered qualitatively. Those participants who experienced significant post-infectious fatigue were asked what they thought was the main cause of their current fatigue. Twenty-one people (91%) experienced significant fatigue, of whom 5 (24%) were men and 16 (76%) were women. Fourteen (66%) people thought that their fatigue was related to flu or was an after-effect of it, while 3 (14%) people stated stress as the main cause. Other reasons were 'age', 'losing weight because I'm not eating well', 'doing too much', and 'a lack of sleep'.

3.6 Additional findings

In addition to the results related to the hypotheses, several other potentially important factors were investigated. They were the influence of sex and age, the potential differences between those who had an influenza virus and those who did not, the relationship between physical and psychological symptoms, and the possible associations between viral symptom severity and post-infectious fatigue. The results are summarised in the following sections.

3.6.1 The effect of sex and age

No significant differences were found between males and females on normalising or somatising score. However, females were significantly more likely to attribute physical symptoms to a psychological cause than men [Mean (SD) = 2.0 (0.98)] vs

1.25 (1.07); (t (38) = 2.48, p = .02). There were no significant associations between sex and life events or other variables.

Age was significantly positively related to somatising attributional style, but negatively to perceived psychological and total viral symptom severity. The older people were, the more they would tend to attribute physical symptoms to a somatic cause and the less severely they experienced viral symptoms, especially psychological ones. Table 6 summarises the significant results.

Table 6. Significant associations between age, somatising, and VAS scores

Variables	Age	d.f.
Somatising	.44 (p = .0012)	48
VAStot	-.33 (p = .018)	48
VASps	-.42 (p = .0022)	48

3.6.2 The influence of having influenza

People with a positively verified influenza (A or B) virus (N = 23) were compared with those with a negative verification (N = 11) on symptom attributional style, VIRAS score, life events and perceived severity of viral symptoms. No significant differences were found, except for VIRAS score. People who had influenza had significantly higher scores on the VIRAS (t (18) = -2.25, p = .04). This suggests that those who have an actual influenza virus are likely to attribute significantly more

power to viruses. It was interesting to find no significant difference in the perceived severity of viral symptoms between people with and without the influenza virus. This appears to suggest that having an influenza virus does not significantly influence the experienced severity of the symptoms, compared to not having this virus.

3.6.3 Physical versus psychological viral symptoms

Several significant correlations between physical or psychological viral symptom severity and other variables were presented earlier. The actual relationship between those two categories of symptom severity was not studied in detail. However, a significant positive association between VASps and VASph was found ($r = .58$, $p = .0001$). This suggests that suffering from physical symptoms is positively related to suffering from psychological symptoms.

3.6.4 The association between viral symptomatology and post-infectious fatigue (group 1)

As mentioned earlier (see section 3.5), proposed predictors for post-infectious fatigue were not found to be significant. It was thought plausible, however, that severity of viral symptoms may influence further development of post-infectious fatigue as measured at a few weeks follow-up. A significant positive association was found between the severity of psychological viral symptoms and post-infectious fatigue at follow-up ($r = .39$, $p = .0046$). No other significant correlations were found.

3.7 Differences between group 1 and group 2

The sample for this study was made up of two groups (see method section (p. 50) for details). The evidence, albeit limited, for a reliable memory of symptoms at three months follow-up (Kisely *et al.*, 1992) provided some confidence in the usefulness of recruiting participants who had previously been ill (group 2). However, the significant results found for the total sample may not be the same for each individual group, due to possible group differences. Table 7 shows a summary of the significant group differences.

The results showed that group 2 had a significantly higher mean age than group 1, while group 1 reported a significantly higher symptom severity score, as well as, maybe not surprisingly, a higher fatigue score.

Table 7. Significant differences between group 1 and group 2

Variables	Group 1	Group 2	95% C.I. for the difference between means	Significance (*t*-value)	d.f.
Age Mean (SD)	45.8 (17.6)	56.3 (13.9)	-19.5 to -1.5	$p = .0230$ (-2.35)	47
VAStot Mean (SD)	142.1 (56.7)	107.0 (48.7)	5 to 65	$p = .0226$ (2.36)	46
VASph Mean (SD)	104.3 (38.4)	82.1 (34.9)	1.3 to 43	$p = .0378$ (2.14)	45
VASps Mean (SD)	44.2 (23.8)	24.9 (16.5)	7.9 to 30.6	$p = .0013$ (3.41)	48
FS Mean (SD)	17.7 (4.6)	13.5 (3.0)	1.85 to 6.57	$p = .0009$ (3.60)	39

Although level of fatigue was significantly different for the two groups (see table 7), it was discussed earlier that fatigue was likely to be of a different kind for the two groups. Therefore, variables relating to post-fatigue were only investigated for group 1 (see 3.5, p.66). Nevertheless, it was argued that if the groups differed on the above variables, then they might also differ on some of the results found for the whole sample. If this were true, then it may not have been appropriate to investigate the recruited sample as a whole. To help clarify this issue, some of the analyses were carried out again for each group and compared with the results found for the whole sample. Several differences between correlations found for the whole sample, and those for group 1 or group 2 were found. They are summarised in table 8.

Table 8. Comparison of correlations for group 1 and 2 which differed from the whole sample (group 1+2)

Correlated Variables	Group 1 ($N = 30$)	Group 2 ($N = 23$)	Group 1+2 ($N = 53$)
Age/VAStot	-.17[a] (n.s.)	-.43 ($p = .0410$)	-.33 ($p = .016$)
Age/VASps	-.29[a] (n.s.)	-.51 ($p = .0131$)	-.42 ($p = .0017$)
Age/VASph	-.06 (n.s.)	-.48[a] ($p = .0204$)	-.27 (n.s.)
Age/Soma	.61 ($p = .0003$)	.09[a] (n.s.)	.44 ($p = .0010$)
VASps/Soma	-.25[a] (n.s.)	-.51 ($p = .0131$)	-.31 ($p = .0239$)

[a] Correlation which differs from the correlation of the other group and the whole sample

Age seemed to be involved in the majority of the different correlations between the whole sample and group 1 or group 2. Although a significant negative correlation for the whole sample was found between age and overall perceived severity of viral symptoms, as well as between age and psychological viral symptoms, this was only found for group 2 and not for group 1. In contrast, group 2 showed a significant negative correlation between age and perceived severity of physical symptoms, while group 1 and the whole sample did not show significant correlations. In addition, group 2 did not show a significant positive correlation between age and somatising attributional style, in contrast to the whole sample and group 1. Furthermore, a significant negative correlation was found between a somatising attributional style and perceived severity of psychological viral symptoms for the whole sample and group 2, but not for group 1. The differences between group 1 and group 2 suggest that caution needs to be taken when interpreting the results for the whole sample.

CHAPTER 4 DISCUSSION

4.1 Summary of this study

This study aimed to investigate whether symptom attributional styles and beliefs about the power of viruses influenced the presentation of viral symptoms in terms of perceived severity. The study looked at people who were experiencing, or had experienced recently a set of viral symptoms. In addition, (Cope, David & Mann, 1994) had found that people suffering from an infection were more likely to believe that they would 'catch a virus' when 'run down' or under stress (item B on the VIRAS). This suggested a possible link between previous stress and current beliefs about viruses. As it had previously been shown (e.g. Cohen and Williamson, 1991) that life events increased susceptibility to infections, the occurrence of previous life events in this sample was also assessed. Furthermore, the influence of beliefs, symptom attributions, and life events on post-infectious fatigue was assessed in order to increase our understanding of which factors have an influence on the development of fatigue, and possibly, chronic fatigue syndrome. The results of this study will be discussed in the following sections, limitations will be discussed, and suggestions will be made for future research.

4.2 Symptom attributional style and symptom severity

Contrary to the hypotheses, which were based on the findings of Robbins & Kirmayer (1991), psychological attributional style was not significantly associated

with viral symptom severity. In addition, no negative association was found for normalising and symptom severity, and no correlation was found between somatising and physical symptom severity. The only significant result was a negative correlation between somatic attributional style and psychological symptom severity.

Differences in the samples may explain why this study failed to find similar results as those found by Robbins & Kirmayer (1991). Their sample consisted of a healthy population, unlike this study's sample, which consisted of people who were currently suffering from an infection. The experiencing of the symptoms, or the cause of those symptoms, may have influenced the relationship between their severity and attributional styles. Robbins & Kirmayer (1991) investigated the influence of recent experience of a symptom on attributional styles and found that it did not change attributional style. However, the recent experience of symptoms in their study was defined as having experienced a symptom during the last three months, instead of currently experiencing symptoms. Therefore, their finding of attributional styles being independent from symptom experience may not generalise to a population suffering from an infection.

The other factor that could explain the failure to find significant hypothesised associations was a potential difference between the symptoms found in this study and those reported in the study by Robbins & Kirmayer (1991). The symptoms in this study were likely to be part of a viral illness, unlike the common symptoms in the sample used by Robbins & Kirmayer (1991). They found that common symptoms that are unrelated to a disease could be influenced by a person's attributional style.

For example, 'somatic attributions may focus attention on bodily manifestations of distress and lead to the perception of physical symptoms' (Robbins & Kirmayer, 1991, p.1041), or a normalising style may lead to paying little attention to symptoms in general, and will lead to a lesser presentation of symptoms to the individual. It may be that symptom attributional styles are only associated with symptom reporting when the symptoms are below a certain level of severity. In this study, for example, a normalising style would maybe not 'prevent' a person from noticing the symptoms, as they may have been more severe as part of a 'real' viral illness, and were therefore very likely to be noticed.

Thus, this study's finding of a negative correlation between somatising and psychological viral symptoms could be explained by the 'lack of attention' by participants to psychological aspects of influenza. Bishop (1987) reported that people were less inclined to visit a doctor for symptoms they would attribute to psychological causes than for those attributed to physical causes. This could mean that psychological symptoms are generally not mentioned to health professionals as much as physical symptoms, or that 'biologically minded' people are less likely to do so, or alternatively, that psychological symptoms are not perceived as equally severe. In this study people perceived psychological viral symptoms as generally less severe than physical symptoms. This could of course be because influenza is in fact a mainly physical illness, with primarily somatic symptoms. However, as Bishop (1987) explained, it could also be that people do not mention their psychological symptoms. This would result in an under-estimation of psychological symptom severity, which may have caused an artificial or unreliable negative correlation with

somatic attributional style. In addition, it needs to be considered that certain types of psychological symptoms, for example low mood or irritability, are less noticed or reported than other types, such as decreased concentration or alertness. A generalising statement about psychological symptoms would then have to be adjusted. The idea of an 'under-representation' of psychological symptoms, or of only certain kinds of them, would have to be tested more thoroughly in future research studies.

The results of this study should be interpreted cautiously as the total sample used in this study really consisted of two samples that scored differently on important variables. Group 2 had lower symptom severity scores than group 1, as well as a higher mean age (56.3 years versus 45.8 years in group 1). It could be that the memory for symptoms of participants in group 2 might not have been as accurate as that of a younger population, which makes generalisation inappropriate. One could argue that measuring viral symptoms at an average of 118 days after infection is unreliable, even though Kisely *et al.* (1992) showed that this could be done for other types of symptoms. It could also be that people currently suffering from symptoms might be more acutely aware of them, which may increase their perceived severity of symptoms. Furthermore, older people may have had more previous illnesses, a factor found to be predictive of attributional style (Robbins & Kirmayer, 1991), as well as seen to be important in the development of lay beliefs about illness (Leventhal *et al.*, 1984). Assessing people's history of previous illness was not part of this study, and could be included in future investigations.

4.3 Belief in the power of viruses, psychologising, and symptom severity

In line with the hypothesis, this study showed that the total score on the VIRAS, which represents the overall belief in the power of viruses, was positively associated with a psychological attributional style. In addition, it showed that subscale 1 of the VIRAS, which represents the level of believed personal vulnerability to a virus, was associated even more strongly with psychologising. Furthermore, overall VIRAS score was positively correlated to psychological symptom severity. This was unexpectedly not found for subscale 1, which consists of items related to a belief in personal vulnerability to viruses. The failure to find a significant relationship between subscale 1 and psychological symptoms may show that beliefs of vulnerability alone are not enough to increase the perceived severity of psychological symptoms, but may contribute to it. VIRAS scores were also negatively related to normalising, which was not hypothesised, but was also found by Cope, David & Mann (1994).

The results replicate to a large extent the findings of Cope, David & Mann (1994), albeit with a population suffering from an infection. They provide more evidence for a relationship between psychological attributional style and psychological symptoms, and the feeling of powerlessness over viruses, although a direction of this relationship cannot be given. Given the results, one might also expect a positive relationship between psychologising and psychological symptoms. As discussed earlier, this was not found in this study, and possible explanations relating to the nature of the sample have been given.

In order to explain the relationship between psychologising, psychological symptoms and feelings of powerlessness to viruses, Cope, David & Mann (1994) suggested a mechanism whereby depressed mood and anxiety could lead to a general feeling of powerlessness over adverse events, such as viruses. The authors appear to suggest that the psychological attributional style and symptoms were present before the viral illness. It would be interesting to know what leads to those feelings of depression or anxiety, as well as to a psychologising attributional style. One possibility, which was investigated in this study, is the experience of previous life events. Results relating to that hypothesis will be discussed in the next section. It would also be interesting to know if the feelings of powerlessness resulting from depression and anxiety actually make a person more susceptible to a viral illness. Potential evidence supporting this idea was found in this study. People who had a verified influenza virus scored significantly higher on the VIRAS than people whose virus verification was negative. In addition, no difference in perceived symptom severity was found between people with and people without an official flu-diagnosis. Therefore, it could be argued that the feeling of powerlessness increases the risk of being infected by a virus. A study measuring VIRAS scores prospectively, for example before an expected flu-epidemic, would need to be carried out to investigate this hypothesis in more detail.

An alternative explanation of the relationships found by Cope, David & Mann (1994), as well as in this study, is that people's current experience of viral symptoms make them realise how powerless they are. If this experience of powerlessness is experienced as a sense of helplessness, and at least partly contributing to the viral

symptoms, and if it is also seen as global and stable (see p.14), then the learned helplessness theory (Abramson, Seligman & Teasdale, 1978) predicts an increased risk of depressive symptoms. However, this is in contrast to the idea that attributing symptoms to a virus (an external cause), which all participants did, makes people blameless (Helman, 1978).

A third possibility is that people who are more aware of their feelings of powerlessness may generally be more 'psychologically aware', which could mean that they are more likely to think of psychological causes for common symptoms, or are more likely to be aware of psychological symptoms.

4.4 Life events, belief in the power of viruses, and psychologising

This study investigated the influence of the presence and of the perceived distress levels of previous life events on VIRAS score and psychological attributional style. The results showed no difference between people with and without the experience of life events in the previous six months on VIRAS score or on psychologising, which was not in line with the hypothesis. There was, however, an expected positive association between item B of the VIRAS ('I get viruses if I am 'run down' or under stress') and the experience of previous life events, which was expected. More hypothesised results were found for perceived distress levels of life events and dependent variables. The level of experienced distress was positively associated with VIRAS score and psychological attributional style. An unexpected, but very interesting result was the positive relationship between level of experienced distress

and perceived severity of overall viral symptoms, as well as of psychological and physical symptom severity separately. This result may be due to a positive response set, or possibly to a tendency to catastrophise symptoms, after having had a 'catastrophic' experience in the form of a life event.

It came as no surprise that life events were somehow related to viral symptoms, as earlier research (e.g. Cohen & Williamson, 1991) had provided evidence for a relationship between previous stress and increased susceptibility of infections. This study seems to suggest that it is the level of experienced distress, rather than the fact of having experienced them, which could have an influence on future viral symptomatology. The other results require an explanation.

Earlier it was proposed that life events may initiate a feeling of psychological distress, which in turn may be associated with the experience of powerlessness. The experience of a stressful life event may make people feel generally more vulnerable, also to viruses. When this vulnerability is interpreted by the person as making it more likely for him or her to 'catch a virus', or to be causal of other symptoms, then a psychological attributional style may start to develop. Thus, an association between VIRAS, as well as psychological attributional style, and level of distress of life events seems an expected outcome. However, other variables, such as psychological coping style, may moderate the effect of life events on a person. Unfortunately, measuring potential moderating variables was beyond the boundaries of this study. Nevertheless, previous levels of distress caused by life events, as well as previous illness (Robbins & Kirmayer, 1991), can be seen as influential in forming certain

health beliefs and attributions, and as such life events may have an indirect facilitating role on viral symptom experience. Some previous illnesses could also be interpreted as a life event. They have in common that they are stressful, and the level of this stress may be the essential ingredient for the development of continuing feelings of powerlessness and vulnerability.

When looking at actual predictors of perceived viral symptom severity, only the level of experienced distress of previous life events came out as a significant predictor of viral symptom severity. Although more variance was explained by a combination of life event distress, VIRAS score, and psychologising, life event distress had the biggest influence on viral symptom severity. However, it may underlie psychological stress and feelings of vulnerability that are associated with VIRAS score and a psychological attributional style.

The results have to interpreted cautiously for several reasons. Participants were asked their experience of life events during the previous six months. However, this would have been approximately six months before viral symptoms for group 1, but not for group 2 as they were asked to fill the life event scale at about 118 days after infection. Therefore, their life event scale would only have showed the life events at about two months before viral illness, instead of six months, which could have made the results unreliable. In addition, the scale used in this study to measure life events (List of Threatening Experiences, Brugha *et al.*, 1985) was chosen for its brevity, and not for its comprehensiveness. Other scales may be more appropriate to use when investigating the influence of life events in more detail. In addition, rather than the

presence, or level of severity of life events, research may need to focused on chronicity of life events, as Cohen *et al.* (1998) found that this was predictive of an increased risk of disease. Furthermore, in order to investigate the effects of life events on viral symptoms, attributional style, or VIRAS score, life events should ideally be measured prospectively. This could be done in a future study.

4.5 Symptom attributional style, belief in the power of viruses and post-infectious fatigue

This study was also interested in factors that may underlie post-infectious fatigue development. It was hypothesised that the individual differences in levels of post-infectious fatigue would be positively associated with a psychological attributional style, while a normalising style would negatively correlate with fatigue. The results neither showed significant associations between normalising and psychologising, and level of post-infectious fatigue, nor did they show a significant association with VIRAS and item B of the VIRAS. Furthermore, multiple regression analysis showed that none of the dependent variables predicted post-infectious fatigue significantly

The results may show that post-infectious fatigue measured about two weeks after infection is part of the recovery process from an infection, and is unlikely to be influenced by attributions or health beliefs. Cathébras *et al.* (1995) showed, in a 'non-infected' population, that fatigue at 42-day follow-up was not influenced by somatic attributional style, and this study appears to confirm that idea for a population that recently suffered from an infection. Cope, David, Pelosi & Mann

(1994) found that fatigue at six months follow-up was related to VIRAS score and psychological morbidity, as well as psychologising. It seems possible that attributions or health beliefs may only start to play a role in the development or maintenance of fatigue at a later stage, for example after six months (e.g. Cope, David, Pelosi & Mann, 1994).

This study showed one interesting additional result, which was not hypothesised. The perceived severity of psychological viral symptoms was significantly associated with post-infectious fatigue. Some studies showed an association between psychological morbidity and fatigue. Cope, David, Pelosi & Mann (1994) had found that psychological morbidity, as measured by the GHQ-3, was a predictor of fatigue at six months follow-up. Pawlikowska *et al.* (1994) did a community survey and found that fatigue was closely related to GHQ-12 scores. Thus, there appears to be evidence for an association between psychological symptom and fatigue, which is confirmed by this study. It is no surprise, however, that the two variables are related, as there is considerable overlap between the psychological items of the VAS and items on the Fatigue Scale.

The failure to find significant results may also be due to the limited sample size ($N = 23$), which decreased the statistical power. To test this out, the study should be repeated with a larger sample size. There are also other limitations of the study. Some participants felt that they were still suffering from the virus. Although this could not be verified, it may have been that the follow-up period was too short to measure fatigue which was not still a direct symptom of the infection. Furthermore,

the researcher administered the Fatigue Scale over the telephone, as opposed to participants filling it in themselves and sending it back. Lyons, Wareham, Lucas *et al.* (1999) presented evidence that the mode of presentation of health ratings influenced the outcome on the questionnaire significantly. Postal administration of health measures resulted in significantly lower response ratings than interview-administered ratings. Therefore, the difference in mode of administration for the Fatigue Scale, which was administrated by an interviewer, may have resulted in higher reported fatigue levels, than if the scale would have been administered by post. In addition, it was not established how far fatigue levels were limiting a person's activities. The clinical relevance of the results may therefore be limited. Another limitation may be that the role of certain attributions or beliefs on fatigue development in a population suffering from an infection is better investigated, when the Fatigue Scale is administered at the same time as the viral symptom measures, or before the infective illness. Therefore, the hypotheses relating to levels of fatigue should be tested again, using a prospective design.

4.6 Other results

Other factors that were studied were the effect of sex, the relationship between psychological and viral symptoms, the influence of having influenza, and the influence of viral symptom severity on fatigue. The latter has already been discussed earlier.

4.6.1 The effect of sex and age

This study found that females were significantly more likely to attribute physical symptoms to a psychological cause. This was also found by Cope, David & Mann (1994). In this study, the proportion of women in the sample was 58%. This was not seen to be such an over-representation, that generalisation to the normal population would be impossible.

Age was related to a somatic attributional style, but this association was only significant for group 1 and not for group 2. This could suggest that the older people get, the more current experience of viral symptoms (as in group 1) highlights their increasing physical vulnerability, which may lead to somatising. People in group 2 did not experience symptoms at the time of filling in the questionnaire, so their somatic vulnerability is not triggered by symptoms. Age was negatively related to viral symptom severity, but only for group 2. This finding was discussed earlier.

4.6.2 Psychological versus physical symptoms

A significant positive relationship was found between psychological and physical viral symptom severity. This was not surprising, as previous literature (e.g. Hall & Smith, 1996; Smith *et al.*, 1992) had showed evidence that psychological symptoms were part of viral symptomatology. This study's finding seems to support this evidence. Imboden *et al.* (1961) found that impaired psychological functioning measured before a viral illness delayed recovery after the illness. It would be

interesting to study if the increased severity of psychological viral symptoms during a virus also relate to delayed recovery. As discussed earlier, this study showed evidence that this is the case for fatigue.

4.6.3 The influence of having influenza

People with a positively verified influenza virus scored significantly higher on the VIRAS than those with a negative verification. A psychological mechanism that may explain this finding was discussed in section 4.2. Another finding was that perceived viral symptom severity was not significantly different for people with a positive or negative verification of an influenza virus. This could suggest that variables other than the virus itself, are responsible for perceiving a symptom as severe, which highlights why this study was interested in attributions and beliefs as influential variables.

In relation to the additional, non-hypothesised findings in this study, caution should be exercised when interpreting those results, as there was always a danger of type-I errors, where a significant result is found the null hypothesis is in fact true. Therefore these additional findings, even though they may be interesting, should be replicated in future studies to verify that they are genuine and not simply due to multiple testing.

4.7 Limitations and suggested improvements

The sample used in this study consisted of two groups, which were significantly different on age and perceived viral symptom severity. In addition, the relationship between somatising and age was significant in group 1, but not in group 2. The decision to recruit group 2 in order to increase the sample size was based on evidence, albeit limited, from previous literature, suggesting that people could remember symptoms reliably over a three-month period. There was no reason to suggest that the mean age of group 2 would turn out to be significantly higher. Greater care could have been taken to prevent this from happening, for example by noticing earlier from the incoming responses that age appeared to be higher compared to group 2. Maybe there would have still be time to then recruit more people from a younger age group. Thus, as the different groups, which formed the total sample, were dissimilar on several important variables, the interpretation of the results relating to the sample as a whole should be done with great caution.

Ideally, this study should have started earlier, so that only one group would be recruited. In addition, starting earlier would have made it possible to increase the follow-up time, so that it would have been less likely that fatigue was still a result of the infection, rather than an after-effect. However, the researcher was somewhat restricted by having to wait for the next two-monthly ethics committee meeting before further changes to the study could be implemented and the study could commence.

As mentioned in Chapter 2, the design of this study was compromised as the ethics committee asked for a shorter version of the VAS, and more importantly, for the Fatigue Scale to be removed from the questionnaire booklet. Given the comments of the ethics committee, it may have been better to have limited the number of questionnaires to the VIRAS, the VAS and the FS, in order to be allowed to administer them all at time 1 and time 2. This would have increased the prospective element of the study, which may have led to a stronger design.

Overall, the study should ideally be replicated in a prospective design. Measuring life events, beliefs about viruses and attributional style before an actual 'flu-outbreak' may result in results with more predictive power. In any case, the sample size should be increased in a future study to increase power, especially with regard to multiple regression analyses.

An issue mentioned earlier in relation to the fatigue scale, but which is also relevant to the whole study, is the fact that the mode of administration (interviewer or postal) may yield significantly different results on health rating scales (Lyons *et al.*, 1999). Postal administration of questionnaires appears to lead to an underestimate of the results. Therefore, the mode of administration should either be consistent, which was not the case in this study, or the result should be corrected for this underestimation.

Although some significant results were found, it is still unknown how high or low an individual would need to score on for example the VIRAS or the SIQ to be 'at risk' of being associated with for example increased perceived severity of psychological

symptoms. This study might, therefore, have benefited from a separation between high scorers and low scorers on the measures used in this study. This could also potentially make the SIQ, VIRAS and VAS more of a clinical tool.

The study used a visual analogue scale to measure the severity of viral symptoms. Proponents have claimed that visual analogue scales are simple, quick to construct and easy to score (McCormack *et al*, 1988). However, there are disadvantages in using a visual analogue scale. Goldney (1979) reported that scores were clustered at three points, the midpoint and two extremes of the scale. This suggests that people do not really treat the scale as a continuum. The VAS was not analysed to check if participants scored it as a continuum or as a three-point scale. This should perhaps have been done to prevent the danger of interpreting subtle differences as 'more or less severe' when they are not there. In relation to this point, it has been argued that the precision that visual analogue scales seem to provide, an accuracy of 1 per cent when using 100mm lines, is an illusion (Streiner & Norman, 1989), as participants may not be able to distinguish between units that small. Therefore, the VAS was measured as a 20-point scale.

This study measured people's level of severity of viral symptoms. However, we do not know how clinically relevant the symptoms really are, or for whom this is so. In order to establish if the results have some practical use, it would need to be investigated if an attempted change in attributions or beliefs would lead to a change of severity of the symptom. Alternatively, it would need to be investigated if people differ in their own decision to do something about a symptom. Bishop (1987)

explained that a person's belief of what a symptom means influences the decision to do something about it or not. This illness behaviour appears to be an important variable, which impacts on a person's subsequent adjustment to illness. If the impact of beliefs and attributions is to be investigated, than future research should also include the relationship between those beliefs and attributions and illness behaviour.

4.8 Contribution of this study

An important motivation for this study was to find evidence for mechanisms that would help explain which psychological variables might be responsible for the individual differences in the reporting of symptoms as well as for the development of post-infectious fatigue. One such possible mechanism could have been that previous life event stress would underlie symptom attributional style as well as belief in the power of viruses, and those variables together would be related to symptom severity and fatigue. Due to several limitations in this study, not enough evidence was found to suggest the existence of such a mechanism, although some of the results could be seen as supporting some of it. They are the relationship between a psychological attributional style and a belief in the power of viruses, as well as the relationship between the belief of feeling more vulnerable to viruses when 'run down' or under stress and higher distress levels of previous life events. However, more research needs to be carried out before firmer conclusions can be drawn.

4.9 Summary of directions for future research

As mentioned several times throughout the discussion, future research needs to be carried out to help clarify some of the still unclear issues, and it should try to take into account the limitations of this study, whenever practical. If ample time is available, several of the investigated hypotheses could be tested in a prospective design with a bigger sample size. Participants would ideally need to be recruited before an outbreak of influenza. Life events, symptom attributional style, virus beliefs and fatigue could be measured before, during, and after the infection episode to enable the researchers to draw conclusions on predictors of symptom severity and fatigue development. This design would also make it possible to investigate the differences between people who develop an infective illness and those who do not. Furthermore, a new study could look at those who seek help for their symptoms (e.g. by going to a doctor or chemist) versus those who do not seek help. This would include the variable 'illness behaviour' into the study, which was seen as an important variable for adjustment to illness. Alternatively, future research could select participants based on predetermined 'high' or 'low' scores on certain attributional styles or the on VIRAS. This would make it possible to investigate differences in perceived symptom severity, such as the earlier mentioned under-representation of psychological symptoms, and fatigue between people with various levels of held attributional styles and beliefs. The inclusion of a measure of previous illness history would be useful, as this was found predictive of symptom attributional styles (Robbins & Kirmayer, 1991).

With regard to the development of fatigue, future studies should include a longer follow-up period to eliminate the chance of measuring fatigue directly related to a virus. To investigate the role of beliefs and attributions on viruses, one could also try to include participants suffering from more than one virus, as Smith *et al.* (1992) had found some evidence that the psychological symptoms may differ, depending on the type of virus.

Finally, the mode of administration of questionnaires would need to be taken into account when planning a future project.

4.10 Implications for health professionals

Although the results of this study do not have direct implications for general practitioners of clinical psychologists, this study contributes to the body of evidence that people's personal beliefs about symptoms may be a variable to keep in mind when helping people as health professionals. As mentioned by Ogden (1996), health professionals may have different beliefs about symptoms, viruses, or illnesses than their clients. This could lead to miscommunication between clients and health professionals, which may have implications for clients' adjustment to illness. For example, a client may not accept a doctor's point of view and fails to follow advice, or a health professional may interpret symptoms mainly as physical and fails to notice the psychological aspects of them. These issues could play a role in syndromes like chronic fatigue syndrome, where somatic attributions were found to relate to worse outcome (e.g. Sharpe *et al.*, 1992). In illnesses such as chronic fatigue

syndrome, clinical psychologists may have an important role to play, as finding out people's attributions for their ill-being, and trying to adjust those when necessary, is a core part of their clinical job.

REFERENCES

Abramson, L. Y., Seligman, M. E. P. & Teasdale, J. D. (1978). Learned helplessness in humans: critique and reformulation. *Journal of Abnormal Psychology*, **87**, 49-74.

Aitken, R. C. B. & Zealley, A. K. (1970). Measurement of moods. *British Journal of Hospital Medicine*, **4**, 215-224.

Bishop, G. D. (1984). Gender, role and illness behavior in a military population. *Health Psychology*, **3**, 519-534.

Bishop, G. D. (1987). Lay conceptions of physical symptoms. *Journal of Applied Social Psychology*, **17**, 127-146.

Booth Davies, J. B. (1992). *The Myth of Addiction: An Application of the Psychological Theory of Attribution to Illicit Drug Use*. Chur: Harwood Academic Publishers.

Brown, G. W. & Harris, T. O. (1989). *Life Events and Illness*. New York: Guilford Press.

Bruce-Jones, W. D. A., White, P. D., Thomas, J. M. & Clare, A. W. (1994). The effect of social adversity on the fatigue syndrome, psychiatric disorders and physical recovery, following glandular fever. *Psychological Medicine*, **24**, 651-659.

Brugha, T., Bebbington, P., Tennant, C. & Hurry, J. (1985). The List of Threatening Experiences: a subset of 12 life event categories with considerable long-tem threat. *Psychological Medicine*, **15**, 189-194.

Butler, S., Chalder, T., Ron, M. & Wessely, S. (1991). Cognitive behavioural therapy in chronic fatigue syndrome. *Journal of Neurology, Neurosurgery and Psychiatry*, **54**, 153-158.

Cathébras, P., Jacquin, L., Le Gal, M., Fayol, C., Bouchou, K. & Rousset, H. (1995). Correlates of somatic causal attributions in primary care patients with fatigue. *Psychotherapy & Psychosomatics*, **63**, 174-180.

Chalder, T., Berelowitz, G., Pawlikowska, T., Watts, L., Wessely, S., Wright, D. & Wallace, E.P. (1993). The development of a fatigue scale. *Journal of Psychosomatic Research*, **37**, 147-153.

Chalder, T., Power, M. & Wessely, S. (1996). Chronic fatigue in the community: 'A question of attribution'. *Psychological Medicine*, **26**, 791-800.

Cohen, S., Frank, E., Doyle, W. J., Skoner, D. P., Rabin, B. S. & Gwaltney, J. M., Jr. (1998). Types of stressors that increase susceptibility to the common cold in healthy adults. *Health Psychology*, **17**, 214-223.

Cohen, S. & Williamson, G. M. (1991). Stress and infectious disease in humans. *Psychological Bulletin*, **109**, 5-24.

Cope, H., David, A. & Mann, A. (1994). 'Maybe it's a virus?': beliefs about viruses, symptom attributional style and psychological health. *Journal of Psychosomatic Research*, **38**, 89-99.

Cope, H., David, A., Pelosi, A. & Mann, A. (1994). Predictors of chronic "postviral" fatigue. *The Lancet*, **344**, 864-868.

David, A., Pelosi, A., McDonald, E., Stephens, D., Ledger, D., Rathbone, R. and Mann, A. (1990). Tired, weak, or in need of rest: fatigue among general practice attenders. *British Medical Journal*, **301**, 1199-1202.

Dohrenwend, B. S., Krasnoff, L., Askenasy, A. R. & Dohrenwend, B. P. (1978). Exemplification of a method for scaling life events: the PERI Life Events Scale. *Journal of Health and Social Behavior*, **19**, 205-229.

Endicott, J. & Spitzer, R. L. (1978). A diagnostic interview: the Schedule for Affective Disorders and Schizophrenia. *Archives of General Psychiatry*, **35**, 773-782.

Evans, P. D., Doyle, A., Hucklebridge, F. & Clow, A. (1996). Positive but not negative life-events predict vulnerability to upper respiratory illness. *British Journal of Health Psychology*, **1**, 339-348.

Evans, P. D., Pitts, M. K. & Smith, K. (1988). Minor infection, minor life events and the four day desirability dip. *Journal of Psychosomatic Research*, **32**, 533-539.

Fukuda, K., Straus, S. E., Hickie, I. Sharpe, M., Dobbins, J. & Komaroff, A. (1994). The chronic fatigue syndrome: a comprehensive approach to its definition and study. *Annals of Internal Medicine*, **121**, 953-959.

Glaser, R., Rice, J., Sheridan, J., Fertel, R., Stout, J., Speicher, C. E., Pinsky, D., Kotur, M., Post, A., Beck, M. & Kiecolt-Glaser, J. K. (1987). Stress-related immune suppression: Health implications. *Brain, Behavior, and Immunity*, **1**, 7-20.

Goldberg, D. P. (1972). *The Detection of Psychiatric Illness by Questionnaire.* London: Oxford University Press.

Goldberg, D. P. & Bridges, K. W. (1988). Somatic presentations of psychiatric illness in primary care settings. *Journal of Psychosomatic Research*, **32**, 137-144.

Goldberg, D., Gask, L. & O'Dowd, T. (1989). The treatment of somatization: teaching techniques of reattribution. *Journal of Psychosomatic Research*, **33**, 689-695.

Goldney, R. D. (1979). Assessment of suicidal intent by a visual analogue scale. *Australian and New Zealand Journal of Psychiatry*, **13**, 153-155.

Graham, N. M. H., Douglas, R. B. & Ryan, P. (1986). Stress and acute respiratory infection. *American Journal of Epidemiology*, **124**, 389-401.

Hall, S. & Smith, A. (1996). Investigation of the effects and aftereffects of naturally occuring upper respiratory tract illnesses on mood and performance. *Physiology & Behavior*, **59**, 569-577.

Heider, F. (1944). Social perception and phenomenal causality. *Psychological Review*, **51**, 358-374.

Heider, F. (1958). *The Psychology of Interpersonal Relations.* New York: Wiley.

Helman, C. G. (1978). "Feed a Cold, Starve a Fever": Folk models of infection in an English suburban community, and their relation to medical treatment. *Culture, Medicine and Psychiatry*, **2**, 107-137.

Herbert, M., Johns, M. W. & Doré, C. (1976). Factor analysis of analogue scales measuring subjective feelings before and after sleep. *British Journal of Medical Psychology*, **49**, 373-379.

Hunter, M., Phillips, C. & Rachman, S. (1979). Memory for pain. *Pain*, **6**, 35-46.

Imboden, J. B., Canter, A. & Cluff, L. E. (1961). Convalescence from influenza: a study of the psychological and clinical determinants. *Archives of Internal Medicine*, **108**, 115-121.

Kelley, H. H. (1967). Attribution theory in social psychology. In D. Levine (Ed), *Nebraska Symposium on Motivation*, pp. 192-238. Lincoln: University of Nebraska Press.

Kelley, H. H. (1972). Attribution in social interaction. In E. E. Jones, D. E. Kanouse, H. H. Kelley, R. E. Nisbett, S. Valins & B. Weiner (Eds), *Attribution: Perceiving the Causes of Behavior*, pp. 1-26. Morristown, NJ: General Learning Press.

Kisely, S. R., Faragher, B., Gask, L. & Goldberg, D. P. (1992). Measuring psychiatric disorder in the recent past: the use of the Psychiatric Assessment Schedule retrospectively. *Psychological Medicine*, **22**, 457-463.

Lepore, S. J., Miles, H. J. & Levy, J. S. (1997). Relation of chronic and episodic stressors to psychological distress, reactivity, and health problems. *International Journal of Behavioral Medicine*, **4**, 39-59.

Leventhal, H., Nerenz, D. R. & Steele, D. J. (1984). Illness representations and coping with health threats. In A. Baum, S. E. Taylor & J. E. Singer (Eds), *Handbook of Psychology and Health Volume IV: Social Psychological Aspects of Health*, pp. 219-252. New York: Erlbaum.

Linville, P. W. (1987). Self-complexity as a cognitive buffer against stress-related illnesses and depression. *Journal of Personality and Social Psychology*, **52**, 663-676.

Lloyd, A. R., Hickie, I., Boughton, C. R., Spencer, O. & Wakefield, D. (1990). Prevalence of chronic fatigue syndrome in an Australian population. *Medical Journal of Australia*, **153**, 522-528.

Lyons, R. A., Wareham, K., Lucas, M., Price, D., Williams, J. & Hutchings, H. A. (1999). SF-36 scores vary by method of administration: implications for study design. *Journal of Public Health Medicine*, **21**, 41-45.

Macintyre, S. (1993). Gender differences in the perceptions of common cold symptoms. *Social Science & Medicine*, **36**, 15-20.

McCormack, H. M., de L. Horne, D. J. & Sheather, S. (1988). Clinical applications of visual analogue scales: a critical review. *Psychological Medicine*, **18**, 1007-1019.

Mechanic, D. (1986). Illness Behavior: An Overview. In S. McHugh & T. M. Vallis (Eds), *Illness Behavior: a Multidisciplinary Model*. pp. 101-109. New York: Plenum.

Meyer, R. J. & Haggerty, R. J. (1962). Streptococcal infections in families. *Pediatrics*, **29**, 539-549.

Ogden, J. (1996). *Health Psychology: a Textbook*. Buckingham: Open University Press.

Pawlikowska, T., Chalder, T., Hirsch, S. R., Wallace, P., Wright, D. J. M. & Wessely, S. C. (1994). Population based study of fatigue and psychological distress. *British Medical Journal*, **308**, 763-766.

Powell, R., Dolan, R. & Wessely, S. (1990). Attributions and self-esteem in depression and chronic fatigue syndromes. *Journal of Psychosomatic Research*, **34**, 665-673.

Ray, C., Jefferies, S. & Weir, R. C. (1995). Life-events and the course of chronic fatigue syndrome. *British Journal of Medical Psychology*, **68**, 323-331.

Robbins, J. M. & Kirmayer, L. J. (1991). Attributions of common somatic symptoms. *Psychological Medicine*, **21**, 1029-1045.

Sharpe, M. C., Archard, L. C., Banatvala, J. E., Borysiewicz, L. K., Clare, A. W., David, A., Edwards, R. H. T., Hawton, K. E. H., Lambert, H. P., Lane, R. J. M., McDonald, E. M., Mowbray, J. F., Pearson, D. J., Peto, T. E. A., Preedy, V. R., Smith, A. P., Smith, D. G., Taylor, D. J., Tyrrel, D. A. J., Wessely, S. & White, P. D.

(1991). Chronic fatigue syndrome: guidelines for research. *Journal of the Royal Society of Medicine*, **84**, 118-121.

Sharpe, M. C., Hawton, K., Seagroatt, V. & Pasvol, G. (1992). Follow up of patients presenting with fatigue to an infectious diseases clinic. *British Medical Journal*, **305**, 147-152.

Smith, A. P., Tyrrell, D. A. J., Barrow, G. I., Higgins, P. G., Willman, J. S., Bull, S., Coyle, K. B. & Trickett, S. (1992). Mood and experimentally-induced respiratory virus infections and illnesses. *Psychology and Health*, **6**, 205-212.

Stone, A. A., Reed, B. R. & Neale, J. M. (1987). Changes in daily event frequency precede episodes of physical symptoms. *Journal of Human Stress*, **13**, 70-74.

Stone, A. A., Bovbjerg, D. H., Neale, J. M., Napoli, A., Valdimarsdottir, H., Cox, D., Hayden, F. G. & Gwaltney, J. M., Jr. (1992). Development of common cold symptoms following experimental rhinovirus infection is related to prior stressful life events. *Behavioral Medicine*, **8**, 115-120.

Streiner, D. L. & Norman, G. R. (1989). *Health Measurement Scales: a Practical Guide to their Development and Use*. New York: Oxford University Press.

Totman, R., Kiff, J., Reed, S. E. & Craig, J. W. (1980). Predicting experimental colds in volunteers from different measures of recent life stress. *Journal of Psychosomatic Research*, **24**, 155-163.

Turner Cobb, J. M. & Steptoe, A. (1996). Psychosocial stress and susceptibility to upper respiratory tract illness in an adult population sample. *Psychosomatic Medicine*, **58**, 404-412.

Weiner, B. (1974). *Achievement Motivation and Attribution Theory*. New Jersey: General Learning Press.

Wessely, S., Chalder, T., Hirsch, S., Pawlikowska, T., Wallace, P. & Wright, D. J. M. (1995). Postinfectious fatigue: prospective cohort study in primary care. *The Lancet*, **345**, 1333-1338.

Wessely, S. & Powell, R. (1989). Fatigue syndromes: a comparison of chronic 'postviral' fatigue with neuromuscular and affective disorders. *Journal of Neurology, Neurosurgery and Psychiatry*, **52**, 940-948.

White, P. D., Thomas, J. M., Amess, J., Grover, S. A., Kangro, H. O. & Clare, A. W. (1995). The existence of a fatigue syndrome after glandular fever. *Psychological Medicine*, **25**, 907-916.

Wilson, A., Hickie, I., Lloyd, A. Hadzi-Pavlovic, D., Boughton, C., Dwyer, J. & Wakefield, D. (1994). Longitudinal study of outcome of chronic fatigue syndrome. *British Medical Journal*, **308**, 756-759.

Wyngaarden, J. B. & Smith, L. H., Jr. (Eds) (1988). *Textbook of Medicine*. Philadelphia: W. B. Saunders Company.

APPENDIX 1

SYMPTOM INTERPRETATION QUESTIONNAIRE

1

Listed below are conditions you may or may not have ever experienced. For each condition, please ***circle the letter*** next to the reason or group of reasons that ***corresponds best to how much that might explain your condition***. Only circle **one** answer. Also, answer whether you have had the condition in the last 3 months by circling **A** (yes) or **B** (no). Please answer all the questions.

1. If I had a *prolonged headache*, I would probably think that it is because:

I am emotionally upset	**A**
There is something wrong with my muscles, nerves or brain	**B**
A loud noise, bright light or something else has irritated me	**C**
Have you had a prolonged headache in the last 3 months?	**A-yes B-no**

2. If I felt *fatigued*, I would probably think that it is because:

I'm emotionally exhausted or discouraged	**A**
I've been over-exerting myself or not exercising enough	**B**
I'm anaemic or my blood is weak	**C**
Have you felt fatigued in the last 3 months?	**A-yes B-no**

3. If I was *constipated or irregular*, I would probably think that it is because:

There is not enough fruit or fibre in my diet	**A**
Nervous tension is keeping me from being regular	**B**
There is something wrong with my bowels or intestines	**C**
Have you been constipated or irregular in the last 3 months?	**A-yes B-no**

4. If I noticed *numbness or tingling in my hands or feet*, I would probably think it is because:

I'm under emotional stress	**A**
There is something wrong with my nerves or blood circulation	**B**
I am cold or my hand or foot went to sleep	**C**
Have you had numbness or tingling in your hands or feet in the last 3 months?	**A-yes B-no**

5. If I had *trouble sleeping*, I would probably think that it is because:

Some kind of pain or physical discomfort is keeping me awake	**A**
I'm not tired or I had too much coffee	**B**
I'm worrying too much or I must be nervous about something	**C**
Have you had trouble sleeping in the last 3 months?	**A-yes B-no**

6. **If I felt my heart *pounding in my chest*, I would probably think that it is because:**

I've exerted myself or drunk a lot of coffee	**A**
I must be really excited or afraid	**B**
There must be something wrong with my salivary glands	**C**
Have you noticed your heart pounding in the last 3 months?	**A-yes B-no**

7. **If my *stomach was upset*, I would probably think that it is because:**

I've worried myself sick	**A**
I have the flu or stomach irritation	**B**
I've had something to eat that did not agree with me	**C**
Have you had an upset stomach in the last 3 months?	**A-yes B-no**

Thank you very much.

APPENDIX 2

VIRAL INFECTION RESEARCH INTO ATTITUDES SCALE

2

This is a questionnaire about viruses. Please answer the following questions by circling, underlining or ticking the answer which describes best what you think. Please answer all the questions.

Questions	Answers			
A. If a virus is going around, I am more likely to catch it than others.	Definitely no	Probably no	Probably yes	Definitely yes
B. I get viruses if I am 'run down' or under stress.	Definitely no	Probably no	Probably yes	Definitely yes
C. Doctors diagnose a virus when they don't know what's wrong.	Definitely no	Probably no	Probably yes	Definitely yes
D. If I feel 'under the weather' or 'run down' I think it is a virus.	Definitely no	Probably no	Probably yes	Definitely yes
E. If I catch a virus it will remain in my body.	Definitely no	Probably no	Probably yes	Definitely yes
F. I can prevent catching a virus.	Definitely no	Probably no	Probably yes	Definitely yes
G. Doctors can treat viruses.	Definitely no	Probably no	Probably yes	Definitely yes

APPENDIX 3

LIST OF THREATENING EXPERIENCES

3

1	2	3	4	5	6	7	8	9	10
					0	3			

L.E.S.

Please read each of the twelve statements below and indicate that they apply to you by putting an X in t
marked 'yes', or that they do not apply to you by putting an X in the box marked 'no'. You may find tha
of these statements apply to you, or you may find that only some of them apply. However, if you answer
to any questions please indicate the degree of distress you experienced as a result of that particular s

	YES	NO	Not at all distressing	Somewhat distressing	Moderately distressing	Extremely distressing
For example: Have you had this questionnaire sent to you in the past six months?	X		X			
11 (1) Have you had a serious illness or injury within the past six months?						
12 (2) Has a close relative had a serious illness or injury within the past six months?						
13 (3) Has there been a death in your close family within the past six months (mother, father, brother, sister, wife, husband, son or daughter).						
14 (4) Has there been a death of a close friend, uncle, aunt or cousin within the past six months?						
15 (5) Have you had a separation due to marital difficulties within the past six months?						
16 (6) Have you broken off a steady relationship within the past six months?						
17 (7) Have you had a serious problem with a close friend, neighbour or relative within the past six months?						
18 (8) Within the past six months, has there been any period during which you were unemployed and seeking work for more than one month?						
19 (9) Within the past six months have you been sacked from your job?						
20 (10) Have you had any major financial crisis within the past six months?						
21 (11) Have you had any problems with the police or have you had a court appearance within the past six months?						
22 (12) Have you had any valuables lost or stolen within the past six months?						

APPENDIX 4

VISUAL ANALOGUE SCALE

4

We would like you to answer some questions about how you feel. To answer the questions on the next pages, we would like you to put a cross on each of the lines at a place that best describes how much you experience the named problem. You can put a cross anywhere on the line. Below are a few examples.

In this example, a man tells us he feels very miserable:

Miserable

Very much X Not at all

In this example, a woman tells us she feels a bit miserable:

Miserable

Very much X Not at all

In this example, a man does not feel miserable at all:

Miserable

Very much X Not at all

Now please turn over and put a cross on each of the lines to tell us how you feel. Do not think too long about where exactly you want to put a cross. It should only take a few minutes.

THANK YOU VERY MUCH FOR YOUR HELP!

Sex: 1.male 2. female (please circle the correct answer)

Age:

Have you had any psychological or psychiatric problems during the previous six months for which you received professional help? No / Yes.

If you answered 'Yes', please write down what kind of problems (your answer will be kept confidential):.....

.....

Please put a cross on the lines at a place that best describes what you experience or feel

Runny or blocked nose

1 Very much_____ Not at all

Headache

2 Very much_____ Not at all

Forgetful

3 Very much_____ Not at all

Depressed

4 Very much_____ Not at all

Feverish

6 Very much_____ Not at all

Tired

7 Very much_____ Not at all

Stressed

8 Very much_____ Not at all

Sore muscles

9 Very much_____ Not at all

Burning or runny eyes

10 Very much_____ Not at all

Sneezing

11 Very much_____ Not at all

Difficulty breathing

12 Very much_____ Not at all

Tense

13 Very much_____ Not at all

Poor concentration

14 Very much_____ Not at all

Shivery

15 Very much_____ Not at all

Sore throat

16 Very much_____ Not at all

Anxious

17 Very much_____ Not at all

Poor sleep

18 Very much_____ Not at all

Irritable

19 Very much_____ Not at all

Hot sweats

20 Very much_____ Not at all

Blocked ears

21 Very much_____ Not at all

Angry

22 Very much_____ Not at all

Coughing

23 Very much_____ Not at all

Poor appetite

24 Very much_____ Not at all

Less alert

25 Very much_____ Not at all

Sore joints

26 Very much_____ Not at all

Sluggish

27 Very much_____ Not at all

Sleepy

28 Very much_____ Not at all

Cannot see as well as usual

29 Very much_____ Not at all

Upset stomach

30 Very much_____ Not at all

THANK YOU VERY MUCH!

APPENDIX 5

FATIGUE SCALE

Appendix 5

HEALTH AND FATIGUE QUESTIONNAIRE

I would like to know whether or not you have any problems with feeling tired, weak or lacking energy at this moment. When answering the questions, I would like you to compare how you feel now with how you felt before you became ill.

Do you have problems with tiredness?	Less than usual	No more than usual	More than usual	Much more than usual
Do you need to rest more?	Less than usual	No more than usual	More than usual	Much more than usual
Do you feel sleepy or drowsy?	Less than usual	No more than usual	More than usual	Much more than usual
Do you have problems starting things?	Less than usual	No more than usual	More than usual	Much more than usual
Do you lack energy?	Better than usual	No more than usual	More than usual	Much more than usual
Do you have less strength in your muscles?	Better than usual	No less than usual	More than usual	Much more than usual
Do you feel weak?	Less than usual	Same as usual	More than usual	Much more than usual
Do you have difficulty concentrating?	Less than usual	Same as usual	Worse than usual	Much worse than usual
Do you make slips of the tongue when speaking?	Less than usual	No more than usual	Worse than usual	Much worse than usual
Do you find it more difficult to find the correct word?	Less than usual	No more than usual	Worse than usual	Much worse than usual
How is your memory?	Better than usual	No worse than usual	Worse than usual	Much worse than usual

APPENDIX 6

INFORMATION SHEET A

HIGHLAND COMMUNITIES NHS TRUST

cúram is seirbhís

INFORMATION SHEET

INFECTIONS PROJECT

People suffering from an infection, possibly like yourself, can have a variety of symptoms or feelings. Some of them may be physical, like headaches or feeling feverish, and some may be more psychological, like feeling a bit down or finding it difficult to concentrate. These feelings can be quite disabling for a lot of people.

The aim of this project is to find out from which symptoms people with probable infections, like yourself, suffer. It has also been shown that one's idea about what caused illness can actually make one experience certain symptoms more than other symptoms. Therefore we would also like to find out what you think about what causes symptoms of illness. This will help us understand better what people feel and think about being ill and may help doctors to give better advice. This is why I would very much like to ask you to participate in this project.

Taking part in this study will involve filling out a few questionnaires. This should take no longer than about 15 minutes. The practice nurse or myself will give you the questionnaires to fill in at home or in the surgery and all your responses will be confidential.

I can imagine you are probably feeling ill at the moment, but I would be very grateful if you could still cooperate with this study. If you do, then it is important that you fill in the questionnaires when you are still experiencing illness symptoms, so ideally the same day as when you have received them.

It may be that you will be asked in a few weeks time to answer some of the questions again over the phone. This would give me important information about how you are feeling after you have been ill. It would only take a 2-3 minutes and would be greatly appreciated.

If you do not want to get involved in this project, then your future treatment or support will not be affected in any way.

If you would like more information, then please do not hesitate to contact me.

Mr Jan Banis
Clinical Psychology Department
Staff Residence
By Craig Dunain Hospital
Inverness IV3 8JU
tel: 01463 - 242860 extension 3697 (secretary) or 2339 (direct line)

Thank you very much!

APPENDIX 7

INFORMATION SHEET B

INFORMATION SHEET

INFECTIONS PROJECT

People suffering from an infection can have a variety of symptoms or feelings. Some of them may be physical, like headaches or feeling feverish, and some of them may be psychological, like feeling a bit down or finding it difficult to concentrate. These feelings can be quite disabling for a lot of people and may have been when you were ill.

The aim of this study, which is really a follow-up of the previous flu-study you cooperated with, is to find out from which symptoms people with probable infections, like you may have had, suffer. It has also been shown that one's ideas abou what caused illness may actually make one experience certain symptoms more than others. Therefore we I would also like to find out what you think about what causes symptoms of illness. This will help us understand better what people feel and think about being ill and may help doctors to give better advice. This is why I would very much appreciate you participation.

Taking part in this study involves filling out a questionnaire booklet. This should take no longer than about 15 minutes. Your responses will be confidential. I may be that some of the participants will be phoned up after I received the questionniare. This is to ask you a few more questions about tiredness and should take about 5-7 minutes. I would also very much appreciate your help with that.

If you do not want to get involved in this project, then your future treatment of support will not be affected in any way.

Thank you very much for your help and please feel free to contact me should you wish more information.

Mr Jan Banis
Clinical Psychology Department
Staff Residence
By Craig Dunain Hospital
Inverness IV3 8JU
tel: 01463-242860 extension 3697 (secretary) or 2339 (direct line)

APPENDIX 8

INFORMATION SHEET C

Appendix 8

INFORMATION ABOUT WHAT TO DO NEXT.

First of all, could you please fill in the included consent form. You obviously do not have to fill in the signature of the investigator and the date at the bottom of the page.

Now you can start filling in the questionnaires, which are all stapled together. As you may have noticed, the questionnaires have a number printed on the top left corner. The numbers represent the order in which the questionnaires should be filled in. It means that you must simply start at the beginning with questionnaire **1** and finish at the end with questionnaire **4**. Try not to think about the questions too long.

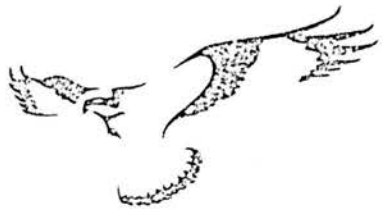
When you have finished, please use the stamped envelope to send the completed questionnaire booklet ***and*** consent form to:

Mr Jan Banis
Clinical Psychology Department
Staff residence
By Craig Dunain Hospital
Inverness IV3 8JU

Thank you very much for your help!

APPENDIX 9

CONSENT FORM



HIGHLAND COMMUNITIES NHS TRUST

curam is seirbhis

CONSENT FORM

INFECTIONS PROJECT

Name:

I have read the information on this study and have had the opportunity to talk it over with Jan Banis or the practice nurse and to ask any questions. I have been told what the project is for, and understand what will happen. I know that I do not have to take part and that I can withdraw from the project at any time. If I do not want to get involved or if I decide to withdraw I have been assured that my treatment and support will not be affected. I also understand that my name will not be known to anyone apart from either the practice nurse or the person who interviews me and that all information will be treated very confidentially.

I hereby agree to participate in this study which has been satisfactorily explained to me.

Signature: .....

Date: .....

I give/do not give permission (please circle your response) to Mr Jan Banis to phone me for a follow-up after I have filled in the questionnaires.

Please write down day-time telephone number:.....

I confirm that I have explained to the subject the nature and purpose of this study and have answered all queries posed by the subject as honestly, fully and truthfully as I can.

Signature of Investigator: .....

Date: .....