School of Public Health

Self-efficacy Theory: Relevance of General and Specific Efficacy Beliefs for Psychosocial Adaptation to Chronic Illness Over Time.

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Abstract of Thesis

Over the last decade or more, chronic illness research has consistently found that the assumed linear relationship between knowledge and behaviour or between behaviour change and improved health outcomes does not exist. Furthermore, the link between behaviour and health status is not as strong as the link between illness-specific efficacy belief and health status. Strategies to increase confidence in illness-specific behaviours have gradually assumed more importance in improving health outcomes.

Strategies to improve behaviour-specific efficacy belief can assist individuals to change their behaviour by influencing behavioural choices, effort and persistence with task demands. Concomitantly, it has been suggested that there is a positive relationship between efficacy belief and psychosocial functioning. It is unclear as to whether this empirical evidence also applies to chronic illness conditions with a complex self-care regimen. The degree to which a more general level of confidence, or efficacy belief, can also contribute to psychosocial functioning is unknown. The focus of this study was to examine the relative impact of general and illness-specific efficacy expectations on psychosocial adaptation to illness over nine months. The study measured illness-specific efficacy beliefs when it was expected that they were still developing. The illness-specific beliefs were compared to the purportedly more stable general efficacy belief.

This longitudinal study employed an exploratory predictive design to measure efficacy beliefs in the natural setting. Data were collected at entry to the study, at three and nine months. Participants included adults from three chronic illness groups: Arthritis (n = 135), diabetes type 1 (n = 104) and type 2 (n = 122). The self-report questionnaires used to collect the data were three illness-specific efficacy belief measures, general self-efficacy and the Psychosocial Adjustment to Illness Scale. The dependent variable of interest was psychosocial adaptation to illness.

Multiple regression analysis provided evidence of between-group differences in the positive contribution of general and illness-specific efficacy beliefs to psychosocial adaptation for chronic illness groups with different regimen attributes. The variables best able to predict psychosocial adaptation to illness over time, after being adjusted for perceived level of stress and general self-efficacy (belief in abilities in general), were illness-specific efficacy beliefs. A general efficacy belief contributed to the illness adaptation process initially but its influence reduced as the influence of illness-specific beliefs increased. Repeated measures MANOVA confirmed the stability of general efficacy belief.

The contribution of this study to current knowledge of self-efficacy theory is its application to self-management programs for chronic illness groups. The findings suggest that the more stable general efficacy belief has a role in psychosocial adaptation to chronic illness during the period when illness-specific efficacy beliefs, targeted by self-management programs, are still developing.

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LIST OF NON-STATISTICAL ABBREVIATIONS USED IN THE TEXT.

ASES   Arthritis Self-Efficacy Scale

ASMC   Arthritis self-management course

ASSE   Arthritis symptoms self-efficacy (subscale of ASES)

BMI   Body Mass Index

DSES   Diabetes Self-Efficacy Scale

FMS   Fibromyalgia syndrome

GSE   General Self-Efficacy (17-item subscale used in this study to

measure general efficacy belief)

IU   Insulin using participants

N-IU   Non-insulin using participants

PAIS   Psychosocial Adjustment to Illness Scale

EXPLANATION OF TERMS

For the purposes of this study, the following terms are explained.

a) Efficacy beliefs

Judgements about ability or personal efficacy beliefs play an important role in effective therapeutic interventions (Maddux, 1995a). Efficacy beliefs, also referred to as efficacy expectations, were operationalised as a general construct (Sherer et al., 1982) and as multidimensional illness-specific measures relevant to individuals with diabetes (Hurley, 1990) or arthritis (Lorig, Chastain, Ung, Shoor, & Holman, 1989a). All efficacy expectation or belief measures were reported to be based on Bandura's work (1977).

General efficacy belief refers to "… a general set of expectations that the individual carries into new situations. These generalized expectancies should influence the individual's expectations of mastery in the new situation" (Sherer et al., 1982, p. 664).

Illness-specific efficacy belief refers to people's "beliefs in their capabilities to mobilize the motivation, cognitive resources, and courses of action needed to exercise control over task demands" (Bandura, 1990, p. 316). In this study, the term illness-specific efficacy beliefs will be used to refer to the individual's belief in ability to carry out specific self-care behaviours.

b) Lifestyle

Lifestyle refers to "Patterns of behavioural choices made from alternatives that are available to people according to their socio-economic circumstances and to the ease with which they are able to choose certain ones over others" (Milio, 1981, p.176).

c) Mastery experiences

Performance mastery experience is a composite of prior experiences associated with carrying out the behaviour (McAuley, Lox & Duncan 1993). It is the cognitive process associated with preconceptions about ability, perceived difficulty of task, effort needed and circumstances that will influence a change in efficacy belief (Bandura, 1997). Enactive

experience that leads to success is the most powerful source of efficacy information (Maddux & Lewis, 1995).

d) Outcome expectations

While personal efficacy expectation is a judgement about ability in relation to a particular behaviour or task, outcome expectation is a judgement about the result of enacting the behaviour (task) in question - a judgement as to whether the recommended behaviour will have the desired effect. Outcome expectation has been classified as a positive or negative expectation of a physical, social or self-evaluative nature (Bandura, 1989).

e) Psychosocial adaptation to illness

Psychosocial refers to more than just intrapsychic processes. Psychosocial includes "… interactions between the individual and other individuals and the institutions representing his or her sociocultural environment" (Derogatis & Derogatis, 1990 p. 1). More specifically, how the illness affects the person's interpersonal relationships with principal cohabitants, interpersonal relationships with extended family and friends, social support expectations of others and the degree of perceived psychological distress. Taken together, they become judgements about the person's psychosocial adjustment.

In this study, the term adaptation will be used in general discussion to differentiate between the process and the study's end-point measure, Psychosocial Adjustment to Illness Scale - Self Report version (PAIS) (Derogatis & Derogatis, 1990). Psychosocial adjustment refers to the theoretical endpoint of the adaptation process (Livneh & Antonak, 1997). The PAIS has seven primary domains that collectively predict psychosocial adjustment. The domains are health care orientation, vocational environment, domestic environment, sexual relationships, extended family, social environment and psychological distress.

f) Self-care

Although not measured in this study, self-care behaviour or illness-specific behaviour refers to a regimen of multiple tasks that people carry out in the management of their condition. Self-care behaviours or self-management tasks are described as a set of skilled behaviours engaged in by individuals to manage their illness (Goodall & Halford, 1991). The regimen may involve learning new behaviours, avoiding risk behaviours or both. Specifically, the treatment of chronic illnesses like diabetes and rheumatoid arthritis relies on the individual being able to carry out complex self-care tasks designed to control symptoms and avoid acute as well as chronic complications. At best, the regimen becomes a guide to possible behavioural choices.

g) Self-management courses referred to in this study

Two of the three groups in this study attended a six-week self-management course designed to assist individuals to master the relevant self-care regimen requirements. Each course consisted of two-hour, weekly lectures relevant to arthritis (Arthritis Self-Management Course – ASMC) or diabetes type 2 (Diabetes Education).

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

It has been recognised for at least a decade that the treatment of disease and illness in industrialised countries has changed from reliance solely on medical interventions to also include the development of personal skills to adapt to the illness process (Connelly, 1987). Personal skills that enable individuals to exercise more control over lifestyle choices and environmental determinants of health (World Health Organization, 1986). It has been recommended that researchers look beyond behaviour change as the mediator of health status and accept that people's perceptions, not objective reality, largely determine behaviour (Anderson & Funnell, 2000; Bandura, 1991).

In particular, people's perceptions of their ability to undertake certain tasks will determine their choice of behaviour, the effort that is made and the degree of persistence with the behaviour when problems arise (Bandura, 1997). In relation to a chronic illness self-care regimen, the behavioural perceptions may relate to more than one behaviour type. For example, the need to adopt a new behaviour (exercise), the need to cease at-risk behaviour (smoking) or to modify an existing behaviour (food choice). Each of the behaviour types can be perceived as a challenge for the person, influencing the amount of effort undertaken and or persistence under duress.

The degree to which individuals meet the challenge and adjust to the demands of an illness experience while continuing prescribed and ascribed roles in their daily lives impacts on the course of the illness (Connell, Gallant, & Davis, 1995; Griffith, Field, & Lustman, 1990; Pollock, Christian, & Sands, 1990; White, Richter, & Fry, 1992). It is believed that successful management of challenging situations leads to adaptive or positive adjustment (Barry, 1996; Pollock, 1993; Pollock et al., 1990). Livneh and Antonak (1997) also suggest that one of the

characteristics of successful adaptation, along with positive self-esteem, personal mastery and adaptive coping, is self-efficacy.

Self-efficacy is a cognitive resource or capacity of the individual to adapt and cope with chronic illness as much as life events in general (Bandura, 1997). Efficacious individuals are able to cope under diverse conditions and are willing to meet new challenges (Bandura, 1997). For the newly diagnosed individual faced with a complex regimen of care, belief about their ability to change and to cease or initiate new behaviours is generally believed to be important in determining successful adaptation to chronic illness (Cox & Gonder-Frederick, 1992). What is not clear, however, is the degree to which a general efficacy belief can also contribute to psychosocial functioning. The focus of the current study was to examine the relative impact of general and illness-specific efficacy beliefs on psychosocial adaptation to illness over time.

In the current study, psychosocial adaptation to illness was chosen as the dependent variable because the perceived burden and intrusiveness of chronic illness has been acknowledged by a number of authors as having a direct impact on psychosocial adjustment (Connell et al., 1995; Landis, 1991; Pollock, 1993; White et al., 1992; Willoughby, Kee, Demi, & Parker, 2000). Two further points about psychosocial adjustment were of relevance. First, that several studies have determined that psychosocial adaptation is independent of a specific illness (Cassileth et al., 1984; Felton, Revenson, & Hinrichsen, 1984; Pollock, 1993; Pollock et al., 1990). Secondly, that a universal process of adaptation to chronic illness does not appear to exist. Variations in the adaptation process are linked to the nature of the illness as well as to the person's developmental phase or stage of life when the chronic illness occurs (Livneh & Antonak, 1997; Rolland, 1984).

The current study sought to target individuals in what Rolland (1984) refers to as the 'initial adjustment' period before the chronic 'long haul' phase of an illness that requires a rest-of-life commitment to self-care. The early period of adjustment,

which may take months to years, is defined by awareness that behaviour change is necessary, including the questioning of effective strategies and personal abilities (Maddux & Lewis, 1995). The 'long haul' or the maintenance phase of behaviour change, where the challenge is sustaining long-term behaviour change, occurs six months after behaviour change has been initiated (Ruggiero & Prochaska, 1993). The intention was to measure the individual's efficacy beliefs, both general and specific, at a time when, according to Maddux and Lewis, behaviour-specific efficacy beliefs were more likely to be still developing. Also, the relative impact of general and specific efficacy beliefs on the individual's psychosocial adaptation to illness was of interest. Self-efficacy theory proposes that any increase in the individual's sense of efficacy belief – in specific situations and across a range of situations – facilitates adaptation (Maddux & Lewis, 1995, p. 47). The degree to which this is true both in the early stages of a chronic illness and also true of psychosocial adaptation has not been tested. Variations in the adaptation process because of the nature of the illness (Livneh & Antonak, 1997; Roland, 1984) may well be influenced by condition-specific efficacy beliefs.

1.2 BACKGROUND TO THE PROBLEM

Although the relevant indicators suggest that Australia is one of the healthiest countries in the world, Australians persist with unhealthy risk behaviours such as smoking (25%) and are overweight (45.7% for females; 66.3% for men) (Australian Institute Health and Welfare, 1998). Many chronic illnesses are caused by, or exacerbated by, lifestyle behaviours such as smoking, lack of exercise and poor dietary choices (Zimmet, 1992). For example, Australia has an increasingly overweight population in which the percentage of people who reported participation in physical exercise declined with increasing age (Australian Institute Health and Welfare, 1998).

Evidence of the need to influence lifestyle choices to counter the increase in associated chronic illnesses was highlighted with the addition of diabetes mellitus to the National Health Priority Areas (NHPA) in 1996. McCarty, Zimmet, Dalton,

Segal and Welborn (1996) estimated that the minimum "… total cost of diabetes in Australia aggregates to around $1 billion annually or at least $2,774 per year for each Australian with diagnosed diabetes". McCarty et al. also indicated the cost estimate to be conservative because of the lack of data at the time and because they did not include the psychosocial costs of premature death or loss of quality of life.

There is a need for both cost-effective and health-effective strategies to reduce the incidence of potentially preventable diseases such as diabetes type 2. However, the increasing incidence of diabetes type 2, an age-related condition in which lifestyle has a role, is exacerbated in at least two ways. First, diabetes type 2 is largely undiagnosed until secondary diabetes complications are evident (McCarty et al., 1996). Secondly, there is ample research to demonstrate that non-compliance with health-related behaviour changes that effect lifestyle is the norm (Blackwell, 1992; Dunn, 1986; Leventhal & Cameron, 1987). Changes in one's lifestyle are difficult at any time and no less so for illness prevention in at-risk populations (Wing, Venditti, Jakicic, Polley, & Lang, 1998) as they are for health promotion in general (Antonovsky, 1996; Robertson & Minkler, 1994; Sluijs & Knibbe, 1991).

The Ottawa Charter (World Health Organization, 1986) suggested that strategies to enable people to make healthy lifestyle choices should be used. Self-efficacy theory provides the scientific rationale for strategies that have the potential to increase people's belief in their ability to undertake behaviour change. Healthy choices have the prospect of being able to reduce the incidence of lifestyle diseases and, therefore, health costs.

1.3 PURPOSE AND RATIONALE FOR THE STUDY

The purpose of the study was to measure the relative impact of general and illness-specific efficacy beliefs on psychosocial adaptation to illness over time for selected chronic illness groups. A secondary purpose was to measure changes in illness-specific beliefs over the nine months of the study and to make comparisons with the purportedly more stable general efficacy belief. Whilst there is support for the

notion that a more general efficacy belief is stable in adults, it has not been tested with individuals who are still in the early stages of adapting to the lifestyle changes required in the self-management of a chronic illness.

1.3.1 Hypotheses

Five hypotheses were tested.

1. General efficacy belief will be stable over time.

2. Illness-specific efficacy belief will increase over time.

3. The strength of the relationship between general and illness-specific efficacy beliefs will increase over time.

4. A general efficacy belief (trait) is a better predictor of future adaptation to illness than illness-specific efficacy belief.

5. The influences of illness-specific efficacy beliefs, relative to general efficacy belief, are better concurrent predictors of adaptation to illness.

1.3.2 Significance of the study

Therapeutic self-care is viewed as a primary health resource in a health care system in which individuals are responsible for their health and, as such, individuals are expected to avoid risk factors and adopt positive health behaviours (Kickbusch, 1989). For the health care professional and the notion of the individual being responsible for their own care, the challenge is to avoid the victim blaming rhetoric often associated with research that focuses on the behaviour of the individual as if behaviour alone determines health outcomes (Dean, 1996). To meet this challenge, the discourse in the health care literature is about the facilitation of empowerment for the individual to make informed choices and the development of cognitive resources to manage health status (Robertson & Minkler, 1994). Concomitantly, the health literature also recognises that an individual's objectives and values about health are not necessarily congruent with those of the health care professional's (Leeder, 1992).

For example, the recommendations for diabetes self-management courses are about client empowerment and focus on strategies to facilitate lifestyle changes to

achieve effective therapeutic self-care (Ahroni, 1996; Ruggiero & Prochaska, 1993) and less on adherence to a regimen (Anderson & Funnell, 2000; Dunning, 1999). The cognitive dissonance for health care professionals directly involved is that, while they are aware of the impending outcomes when the self-management program is not followed, they are also aware of the person's right to choose not to comply. The juxtaposition of these two ideas is at the heart of the issue. The health professional's need to act to encourage regimen compliance whilst concurrently acknowledging individual responsibility for actions. That is, situations in which there is evidence of infrequent and variable testing of blood-glucose that will ultimately lead to diabetic complications (Estacio et al., 1998; Faas, Schellevis, & van Eijk, 1997; Heinemann, Overmann, & Muhlhauser, 1998; Wysocki, 1989). It is, therefore, little wonder that the person living with the chronic illness encounters the conflicting message of "... take charge but comply" (Hernandez, 1995). The person is expected to be in charge of their own self-care, to make decisions based upon blood glucose results, but is also expected to comply with a regimen determined by others rather than follow a regimen the person sees as being based on individual needs.

Through facilitating personal efficacy belief in the client's ability to manage therapeutic self-care in relation to a chronic illness, rather than focusing on behaviour itself, health care professionals can at least avoid the paternalism of compliance. Thus it is argued that, in order for individuals to take an active role in their own health, they need more than knowledge about their condition and how the regimen will help. Intervention strategies must also include building personal beliefs in their ability to manage the self-care regimen and the development of positive expectations about the health outcomes (Bradley, 1989).

From the client's perspective, studies have demonstrated that chronic illness self-care behaviour is influenced more by competing lifestyle and family demands than recommendations from health care professions (Haug, 1988; Hunt, Arar, & Larme, 1998; Kickbusch, 1989). Health compromising behaviours found to compete more

with lifestyle preferences include changes to diet and the need to increase activity levels (Glasgow, Ruggiero, Eakin, Dryfoos, & Chobanian, 1997; Grembowski et al., 1993; Wing et al., 1998). Clients may attempt to make decisions based on their knowledge about the medical condition but this will be influenced by choices for their way of life (Keeling, Williams Utz, Shuster, & Boyle, 1993; Thorne, 1990). For example, in a recent Australian study, 76% of the 714 heart attack survivors who were surveyed indicated that it was more important to continue their chosen lifestyle, regardless of the effect on the length of life (Glasziou, Bronwid, & Simes, 1994).

1.4 EXPLANATORY HEALTH BEHAVIOUR THEORIES

The systematic study of health-related behaviour began in the early 1970s (Blackwell, 1989; Haynes, 1987). Since then models to explain and modify health-related behaviour in response to expert advice have largely centred on the cognitive and social learning theories. There were, however, at least two issues to be resolved. First, that the iterative nature of science in relation to concepts and measures in this area has not resulted in adequate psychometric development. Failure to identify consistent determinants of outcomes across studies was attributed partly to the complexity of behavioural measures but also to the earlier poorly designed and non-theoretical attempts to understand the link between behaviour and health outcomes (Blackwell, 1989).

Secondly, the extent of the research focus for therapeutic self-care was for a long time the individual (the patient) seeking assistance from the health care system. Researchers have not convincingly demonstrated that changes in health-related behaviours resulted in improvements in health status (Lorig & Laurin, 1985; Haug, 1988; Glasgow, McCaull & Schafer, 1987) or even an improved health-related quality of life (Freeman, Blalock, Holman, Liang, & Meenan, 1996; Thorne, 1990). The proposition that health status is influenced by health behaviour has an appealing logic, but considering the complexity of health behaviour determinants

in chronic illness, it has only modest support (Freeman et al., 1996; Shillitoe, 1995; Wallston, 1991).

Ideally, in the case of research involving chronic illnesses that have a complex regimen of self-care behaviours, the theory used to guide research needs to be comprehensive enough to explain the adoption of new behaviours and avoidance of risky behaviours. The chosen theory would also need to be able to explain habitual behaviour change and maintenance of desired behaviours, with or without periods of relapse. Kirscht (1988) considered that for stopping or starting a repetitive behaviour and where health considerations were clearly linked to action, cognitive models were more appropriate. More specifically, Fishbein (1993), commenting on his general theory of intention, felt that for a class of behaviours (*to exercise* as opposed to *exercise 20 minutes each day*) and behaviours not under volitional control (losing weight as intention to reach a goal), intention was a poor predictor. He suggested that "Bandura's (1989) construct of self-efficacy may be an important determinant of intention and/or behaviour" (p. xxii).

Theories that had been used to explain health behaviours in chronic illness studies and explored at the time of setting up the current study in 1994 included the health belief model (Rosenstock, 1990), self-efficacy theory (Bandura, 1977), learned helplessness (Seligman, 1975), and health locus of control (Wallston, 1991).

The health belief model (HBM) assumed people would make the right decision (Stone, 1979) and that once the facts were given, behaviour change would occur. The assumption that most people valued health highly or were motivated for health reasons to change is unfounded (Robertson & Minkler, 1994). Theoretically, the HBM is not able to explain intention to perform the behaviour in question (Schwarzer, 1992), nor how to change habitual behaviour patterns or spontaneous behaviours (Salazar, 1991). Conceptually, when confidence in ability is low, efficacy expectation (belief) has been equated with the HBM component 'perceived barriers to preventive action'. Both 'perceived barriers ' and low

efficacy beliefs have been associated with a decrease in the adoption of behaviour (Rosenstock, 1985; Rosenstock, Strecher, & Becker, 1988).

Alternatively, learned helplessness and outcome-based futility of self-efficacy theory are thought to have some similarity (Gonzalez, Goeppinger, & Lorig, 1990), except that learned helplessness does not consider the person's perception of their ability (Buckelew & Parker, 1989). This difference is important since efficacy belief about ability is more important than outcome expectations when health outcomes are not entirely controlled by behavioural input (Bandura, 1986; Schwarzer, 1992). Furthermore, in contrast to self-efficacy theory, there are no direct theory derived interventions from the learned helplessness model (Buckelew & Parker, 1989; Gonzalez et al., 1990).

In relation to health status and chronic illness, Health Locus of Control (HLC) scales were found to be either a weak predictor or non-predictive (Lorig, Lubeck, Kraines, Seleznick, & Holman, 1985; O'Connor, Crabtree, & Abourizk, 1992; Shillinger, 1983; Wallston, 1992) and independent of health behaviours (Sallis, Pinski, Grossman, Patterson, & Nader, 1988). In fact, Weitzel (1989) found that Sherer's general efficacy scale was a better predictor of health-promoting behaviours than health locus of control.

The first health locus of control (HLC) scale (Wallston, Wallston, Kaplan, & Maides, 1976) was developed to increase the predictability of Rotter's (1966) generalised expectancy locus of control (LOC) construct in health-related situations. Health Locus of Control belief was found to be specific to the health domain but not to any particular health behaviour, and may not be stable (Wallston, 1991). Locus of control has been conceptualised as an internal-external duality of personal orientation to life's challenges. Internal orientation referred to the individual's belief that health status was determined by one's own behaviour. Alternatively, an external locus of control referred to individuals who believed that

health status was determined by powerful-others, by fate or by chance (Wallston, 1989).

Whether HLC was used alone to predict behaviour or in combination with a health value measure, when health was not valued or status was not contingent upon behaviour, a weak correlation was likely (Wallston, 1992). Wallston (1991) reiterated an earlier call for inclusion of other constructs to explain health behaviour, as HLC was not the most important determinant. For example, efficacy beliefs about health-related diet and exercise behaviours were found to mediate health behaviours, while health locus of control did not (Sallis et al., 1988).

Self-efficacy theory was purported to be a better predictor of behaviour than locus of control because self-efficacy related to the behaviour and context in question (Bandura, 1997; Sallis et al., 1988; Wallston, 1991). The consequences of greater belief in one's ability were thought to be psychological and physiological well-being. Specifically, self-efficacy mediated the relationship between behavioural competence and psychological well-being (Bandura, 1977; Bandura, 1986; McAuley, Lox, & Duncan, 1993; Stuifbergen, Seraphine, & Roberts, 2000).

The preponderance of evidence to determine relative usefulness, logical adequacy and generalisability of theory to chronic illness supports the use of self-efficacy theory for the current study.

1.4.1 Introduction to self-efficacy theory

The following discussion is a prelude to the detail provided in Chapter 3 – Self-Efficacy Theory and Psychosocial Literature. The details of self-efficacy theory include an explanation of efficacy belief development, generality of efficacy belief and health outcomes associated with self-efficacy theory. Self-efficacy theory is viewed as an important behavioural hermeneutic in many domains, including health (Bandura, 1997; O'Leary, 1985; Schunk & Carbonari, 1984; Velicer, DiClemente, Rossi, & Prochaska, 1990). Self-efficacy theory has two cognitive components. The first is perceived efficacy belief (efficacy expectation) and refers

to a person's confidence in being able to maintain a particular behaviour when situational challenges exist (Bandura, 1982; O'Leary, 1985). Such beliefs vary for different behaviours according to the degree of successful experiences with enactment of the behaviour. The second cognitive component of self-efficacy theory is outcome expectancy. Outcome expectancy refers to a belief that a particular behaviour will produce a particular outcome (Bandura, 1977). Both efficacy belief and outcome expectancy are important determinants of behaviour and their differential influence is explained further in Chapter 3.

In relation to health behaviours, self-efficacy theory supported intervention strategies to effect current and prospective behaviour change related to new behaviour or stopping risk behaviour. For example, the positive influence of behaviour-specific efficacy beliefs on smoking cessation (Mothersill, McDowell, & Rosser, 1988; Schwarzer & Fuchs, 1995), exercise for illness prevention (Conn, 1998; McAuley et al., 1993; Schwarzer & Fuchs, 1995; Velicer, Rossi, Prochaska, & DiClemente, 1996), or weight management (Shannon, Bagby, Wang, & Trenker, 1990) has been demonstrated. The strengthening of efficacy belief, therefore, was seen as a way of increasing health-related behaviour and pursuant to that, improved health status (Glasgow & McCaul, 1982; Grembowski et al., 1993; Lorig & Holman, 1998; Taal, Rasker, Seydel, & Wiegman, 1993a).

Efficacy beliefs were also found to provide a linking mechanism between psychosocial factors and health-related outcomes in stressful life transitions (Jerusalem & Mittag, 1995), in acute (Holroyd et al., 1984) and chronic illnesses (Holman & Lorig, 1992). Self-efficacy theory has also been useful as an intervention strategy to explain multiple, concurrent, self-care behaviour changes in diabetes (Glasgow et al., 1992; Hurley & Shea, 1992) and arthritis research (Lorig et al., 1989a; Rejeski, Ettinger, Martin, & Morgan, 1998; Taal et al., 1993b). The reality of clinical practice for diabetes and arthritis management requires interventions that improve people's belief in their ability to initiate healthy behaviours, cease risk behaviours and facilitate persistence in the face of adversity.

The cognitive appraisal mechanisms of self-efficacy increase the predictive power of behaviour through behavioural choices, effort and persistence (Bandura, Adams, Hardy, & Howells, 1980). According to Bandura (1997), behaviour itself can only be a predictor of future health status if the behaviour remains stable and other factors that impact on the health outcome also remain the same. When health status is not routinely contingent upon behaviour, efficacy beliefs account for more of the variation in behaviour than outcome expectancies (Bandura, 1997); an important consideration in the initial period after diagnosis when behaviour would be most variable. This is particularly relevant for metabolic control and arthritis pain – both health outcomes are influenced by more than illness-specific behaviour (Glasgow et al., 1989; Lorig et al., 1989b; O'Leary, Shoor, Lorig, & Holman, 1988; Rubin, Peyrot, & Saudek, 1989).

Much of the health-related research on self-efficacy involving chronic illness groups has either not targeted recently diagnosed individuals or excluded them. Since self-efficacy belief specific to a particular task or behaviour develops over time (Bandura, 1989; Stretcher, De Villis, Becker, & Rosenstock, 1986), its initial usefulness as an explanatory variable for the person who has recently been diagnosed with a chronic illness needs to be tested over time.

The influences of self-efficacy judgements, both general and specific, are especially relevant when substantial changes are occurring in the early stages of chronic illness management (Ruggiero & Prochaska, 1993). The purported stability of general efficacy belief in adults is suggested as the focus for clinical investigation during the early post-diagnosis period when the strength of the illness-specific efficacy beliefs are still developing. A positive belief in abilities in general would not only increase the likelihood that the individual would make the lifestyle changes but the changes would also persist under duress. The development of confidence related to the illness-specific behaviour can only occur if the behaviour change persists. Alternatively, when perceived barriers exist the person

with lower efficacy belief about ability in general may initially need more help than the person with higher efficacy belief. This nexus between behaviour and the development of efficacy beliefs is important when a rest-of-life behaviour change is required.

The popular mantra behind the need for this research can be expressed in the following way. If you think you can - you might. If you think you can't – you're right (Lawrance & McLeroy, 1986).

1.5 SUMMARY

This study holds that psychological resources shape individual behaviour. To adapt to the life-style changes generated by the demands of chronic illness and a complex self-care regimen, the person needs to develop the capacity to sustain the desired behaviour. The influence of self-referent thought is an essential part of behaviour change and ensuing adaptive functioning (Bandura, 1997). For the person attempting the many illness-related behaviour changes associated with a complex self-care regimen, neither the relationship between efficacy beliefs (general and specific), nor their individual contribution to psychosocial adaptation to chronic illness is clear.

The current study will compare general and illness-specific efficacy beliefs and their relative impact on psychosocial adaptation in selected chronic illness samples. Correlational data and applied statistical techniques will be used to determine if the theoretical predictions fit the data. Multiple regression analyses will determine the percentage of variance in psychosocial adaptation to illness (PAIS) accounted for by general and specific efficacy beliefs.

1.6 OVERVIEW OF THESIS

This thesis is presented in six chapters. The first chapter has introduced the purpose and rationale for the study, hypotheses, background to the problem and its significance for health outcomes. Chapter two discusses the rationale for the choice

of chronic illnesses used to test the study's hypotheses, the prevalence of each illness, and its impact on lifestyle. Self-efficacy theory and psychosocial adaptation to chronic illness are discussed in Chapter three, along with the literature review of studies that have applied the variables of interest to the selected chronic illnesses. Chapter four describes the study design, data collection and method of analysis. Chapter five presents the findings of the study. In addition to discussing the findings in the context of the extant literature, Chapter six discusses the implications of the findings, the limitations of the study and makes some recommendations for clinical practice and research.

CHAPTER 2: MEDICAL CONDITIONS

Chapter 2 reviews the criteria used to select the three chronic illnesses studied, the prevalence of each illness, the self-care regimen and the literature related to the impact of these illnesses on lifestyle. The review moves from a general discussion of the rationale for the selected chronic illness conditions to the more specific aspects of each illness.

2.1 RATIONALE FOR THE SELECTED ILLNESS CONDITIONS

The selection of three chronic illness groups was determined initially by the potential to access participants, sufficient incidence of new cases within the local population and differences in typology of illnesses. After selecting conditions that met the first two criteria, the typology put forward by Rolland (1984) was used. In this typology, chronic illnesses differ in their *onset, course, outcome* and *degree of incapacitation of illness*. *Onset* can be acute or chronic, *course* can be progressive, constant or relapsing, *outcome* can be fatal, shortened life span or non-fatal and *incapacitation* can be determined by the presence or absence of any significant impairment to one of the five faculties or to movement. Using this typology, three illnesses were identified as progressive with a gradual onset that suited the study design. Furthermore, diabetes types 1 and 2 were classified as 'not incapacitating' but may have a shortened life span due to diabetic complications. Type 1 diabetes was categorised as possibly fatal and type 2 diabetes as non-fatal (Rolland, 1984).

A further consideration in the selection of illness conditions was the degree of complexity of the therapeutic self-care regimen. The selected illness conditions needed to involve life-style behaviour changes rather than simply remembering to take medication. It is reasonable to assume that the more complex the regimen the more likely it will be that efficacy beliefs about ability will change. According to self-efficacy theory successful enactment of the required behaviour change reinforces and increases the behaviour-specific efficacy belief (Bandura, 1997).

The arthritic diseases and diabetes mellitus were considered to require significant lifestyle behaviour changes as part of a complex self-care regimen. The inclusion of rheumatoid arthritis (RA), osteo-arthritis (OA) and fibromyalgia syndrome (FMS) in one group was based on reported similarity in the focus of self-management requirements (Lorig & Fries, 1990). For example, the non-medicinal component useful for this group includes regulated exercise, joint protection, weight control and relaxation techniques.

By way of confirming the complexity of the self-care regimen and its impact on quality of life, results from the Short Form 36 questions (SF-36, a global measure of the impact of disease on health-related quality of life) were considered. The SF-36 health survey included in the 1995 National Health Survey (Australian Institute Health & Welfare, 1998) confirmed that the life-style changes associated with conditions such as diabetes and arthritis had a considerable effect on people's perception of health and well-being. The SF-36 has eight dimensions of health: physical functioning, role limitations due to physical problems, role limitations due to emotional problems, bodily pain, general health perceptions, vitality, social functioning and mental health (Ware & Sherbourne, 1992). An earlier study (Stewart et al., 1989) found that, compared to patients without a chronic illness, individuals with diabetes scored far worse than did arthritis patients on perceptions of health. Stewart et al. also found that arthritis patients reported lower quality-of-life scores (physical, role, and mental health domains) than did diabetes patients.

Another measure of illness impact, the Diabetes Care Profile (Anderson, Fitzgerald, Wisdom, Davis, & Hiss, 1997; Fitzgerald, Connell, Hess, Funnell, & Hiss, 1996) indicated a greater negative impact on quality of life for people with diabetes who were using insulin compared with those who were not using insulin to manage their diabetes. Similarly, others have also reported that the need to use insulin had a greater impact on quality of life for individuals with type 2 diabetes compared with those on oral medication or diet alone (Glasgow et al., 1997; Jacobson & de Groot, 1994).

It is argued that the cognitive self-regulatory factors that influence motivation and efficacy belief (Bandura, 1989; Zimmerman, 1989) are particularly relevant to the therapeutic self-care regimens of diabetes mellitus and the arthritic diseases. Given the impact of the self-care regimens of diabetes mellitus and the arthritic diseases this view is consistent with findings from a review of health promotion research. That personal attributes such as a general confidence in abilities and a belief in ability to undertake new challenges, become the resources that influence lifestyle changes (Dean, 1996). Newly diagnosed individuals with a chronic illness have the burden not only of the illness and the impact of its intrusiveness to deal with, but also the everyday normative stressors and lifestyle hassles shared by those without a chronic illness. In the early period after diagnosis, the illness is perceived as overwhelming and beyond one's control (Eberhardt, Larrson, & Nived, 1993; Emery, 1997; Samuelsson, Ahlmen, & Sullivan, 1993; White et al., 1992). Self-efficacy theory suggests a measure of perceived control.

2.2 DIABETES MELLITUS

"Diabetes mellitus is a chronic condition resulting from either a deficiency in the production and release of insulin into the blood stream, or an inability to use the insulin produced" (Australian Bureau of Statistics, 1997 p. 5). The pathophysiological reasons for the inability to maintain blood glucose levels within the normal range vary, and form the basis for the two main diagnostic types: insulin dependent diabetes mellitus, or type 1; and non-insulin-dependent diabetes mellitus or type 2 (American Diabetes Association, 1998d).

The Expert Committee on the Diagnosis & Classification of Diabetes Mellitus (American Diabetes Association, 1998e) recommended the use of the terms type 1 and type 2 instead of the previous nomenclature of IDDM, NIDDM respectively.

- Type 1 diabetes – autoimmune and idiopathic disease leading to beta cell destruction resulting in absolute insulin deficiency. Exogenous insulin is

needed for survival and the person is at risk of keto-acidosis. The onset is often acute and severe (McCarty et al., 1996).

- Type 2 diabetes – insulin resistance as a result of relative or absolute insulin deficiency (DeFronzo, Bonadonna, & Ferrannini, 1992). It can be asymptomatic for years. People with type 2 diabetes are not dependent on insulin, are not ketosis prone and are often obese with the obesity itself contributing to insulin resistance. Weight reduction may reduce the insulin resistance but will not result in a cure (McCarty et al., 1996).

- Insulin requiring diabetes refers to the person who meets the type 2 diagnostic criteria but for whom the underlying pathology has changed to the extent that insulin is required at least once a day to maintain normal blood glucose levels (DeFronzo et al., 1992; Kuzuya & Matsuda, 1997). Diagnostically, these individuals remain type 2 as the metabolic defect has not changed.

In the study, the two diabetic groups either need insulin to manage the diabetes (IU) or do not (N-IU). Diabetes type 2 individuals who are insulin-requiring have been included in the IU group as their need to use insulin impacts on lifestyle (Kuzuya & Matsuda, 1997).

2.2.1 Prevalence

The 1995 National Health Survey (NHS) found that 2.4% of Australians reported that they had been diagnosed with some form of diabetes mellitus, however, the AIHW (1998) indicated that there was no reliable estimate of the prevalence and no national information on its incidence. It has been suggested by McCarty et al. (1996) and Welborn, Knuiman, Bartholomew and Whittall (1995), that the true prevalence of diabetes in Australia is much higher than self-reports revealed and could be as high as 3.8%. This was also reflected in statistics for other industrialised countries (American Diabetes Association, 1998c) including England and New Zealand (McCarty et al., 1996). The reported prevalence of type 2 diabetes among Aboriginal populations in Australia ranged from 5% to 19% (Dobson, Penman, & eighty two others, 1994) and other ethnic groups in Australia

are also at greater risk of type 2 diabetes than Australian Caucasians (McCarty et al., 1996).

The prevalence for diabetes rises with age and was 8.9% for people over 75 years of age (Australian Bureau of Statistics, 1997). Most of this increase is due to type 2 diabetes which occurs more commonly after 40 years of age (Australian Institute Health and Welfare, 1998) and represents approximately 42% of those who reported that they had diabetes (Australian Bureau of Statistics, 1997). Furthermore, the research literature indicated that the prevalence of undiagnosed, type 2 diabetes was approximately the same as diagnosed diabetics in populations of both the United States of America (Harris, 1993) and Australia (Australian Bureau of Statistics, 1997). Of concern is the finding that type 2 diabetes develops slowly over 6 to12 years before the clinical diagnosis occurs (Carter, Dunn, & Turtle, 1993). In fact, Welborn (1995) described diabetes as an epidemic of worse proportions than HIV infection. He calls for this "… silent and continuing epidemic …" (p. 445) to be notifiable.

The early symptoms of type 2 diabetes are easily confused with the signs of aging and considered by the individual as not worth bothering about. A national campaign, *Defuse Diabetes,* hopes to raise community awareness of this increasingly prevalent condition to enable diagnosis before diabetic complications occur (P. Williams, Campaign Coordinator, *Defuse Diabetes*, Diabetes Australia (WA), personal communication August 24th, 2000). The risk factors for type 2 diabetes include being over 50 years, overweight and with high blood pressure regardless of a family history of diabetes. Although screening for type 2 diabetes in general is important, more specific strategies are needed to prevent its occurrence in susceptible individuals (Harris, 1993) and high risk groups (Zimmet, 1992). For example, it has been found that fat consumption predicted type 2 risk in individuals with impaired glucose tolerance after controlling for obesity and markers of glucose metabolism (Marshall, Hoag, Shetterly, & Hamman, 1994). The AIHW

(1998) indicated that the proportion of overweight or obese individuals has increased from 26.7% in 1980 to 45.7% in 1995.

2.2.2 Impact on way of life

The dysfunctional nature of the homeostatic mechanisms controlling carbohydrate, protein and fat metabolism in people with diabetes necessitates major adjustment to their way of life aimed at normalising blood glucose levels. This means active involvement by the individual, several times a day, every day, in an effort to regulate the blood glucose within a narrow range. Active involvement means making choices in relation to diet, exercise and or insulin as to how much or when, while considering the 'what if' situation. Choices that may, depending on the person's attitude to their condition and competence, increase daily stress levels.

The effect of life stress in the course and management of diabetes has been recognised for nearly 50 years (Hinkle & Wolf, 1952; Hunt et al., 1998). Furthermore, stress has been found to have a bi-directional impact in that psychological stress affects blood glucose levels and the diabetes can affect stress levels (Aikens & Mayes, 1997; Cox & Gonder-Frederick, 1992). In the case of the non-diabetic, normal homeostatic mechanisms ensure a normal blood glucose level despite infection, headache, family argument or overtime at work. The impact of these same events for the person with diabetes requires recognition of the potential impact on blood glucose levels, action to ascertain the extent of change in blood glucose, followed by a decision as to if and what remedial action to take. Even when there are no unforeseen events and the prescribed regimen is followed, metabolic responses may result in recurrent episodes of hyperglycaemia or hypoglycaemia (Armstrong, 1987). This in itself can cause stress and a sense of helplessness for the person unable to understand the effects of stress on diabetes management (Aikens & Mayes, 1997; Gonder-Frederick, Cox, Bobbitt, & Pennebaker, 1989; Griffith et al., 1990).

Problem-solving associated with the various regimen self-care requirements was found to be an important factor in achieving metabolic control (Peyrot & Rubin,

1988) and there was an interdependent relationship between problem solving, behaviour and blood glucose (Glasgow et al., 1992; Toobert & Glasgow, 1991). For example, research has demonstrated that learning and memory improved with glycaemic control for older type 2 subjects (Gradman, Laws, Thompson, & Reaven, 1993). Hypoglycaemia reduces the amount of blood glucose available to the brain and results in temporary cognitive-motor impairment (Gonder-Frederick, Cox, Kovatchev, Schlundt, & Clarke, 1997; Holmes, Koepke, & Thompson, 1986) and more permanent damage in the case of frequent hypoglycaemic episodes (Wredling, Levander, Adamson, & Lins, 1990). An earlier study, however, found that type 1 and type 2 adults ($\underline{N}$ = 98) who adjusted their own insulin dosage or dietary intake, rather than follow a pre-set regimen, had better metabolic control (Peyrot & Rubin, 1988).

Diabetes is one of the most physiologically and behaviourally demanding chronic illnesses (Hunt et al., 1998; Padgett, Nord, Heins, & Arfken, 1996), and psychosocial factors are relevant to nearly every aspect of diabetes and its treatment (Fisher, Delamater, Bertelson, & Kirkley, 1982). The onset and chronicity of diabetes have been associated with, among other things, insecurity and fear of an uncertain future (Carey et al., 1991; White et al., 1992). The 1995 National Health Survey (Australian Bureau of Statistics, 1997) found that 49% of diabetics rated their health as fair or poor compared to 16% of the non-diabetics. The standardised mean scores for the eight dimensions of the SF-36 questionnaire indicated that the diabetic group scores were significantly lower (negative) on all dimensions than the non-diabetic group. The dimensions with the largest differences were *general health* and *role limitations due to physical health problems*.

2.2.3 Diabetes self-care regimen

The goal in management of diabetes is to normalise the blood glucose (BG) level as there is a direct relationship between long-term hyperglycaemia and the risk of future diabetic complications (American Diabetes Association, 1998d). People with diabetes and health care workers commonly acknowledge that diabetes mellitus

will inevitably result in one or more complications because of the difficulty individuals have in maintaining euglycaemia all day every day.

The need to change diet behaviours was found to be common after diagnosis (Snetselaar, 1995), however, diet change was also economically difficult (Hunt et al., 1998). Furthermore, people with diabetes are expected to have more than a tacit understanding of the carbohydrate content of foods. This level of knowledge and interest for a non-diabetic individual could be taken to indicate an eating pathology (Shillitoe, 1995).

Persons with type 2 diabetes (not requiring insulin) maintain normal blood glucose levels with dietary restrictions alone, dietary restrictions and oral medication and or exercise. Exercise is important as it lowers blood glucose levels and can also improve cardiovascular fitness, as well as assist with weight reduction. Cox and Gonder-Frederick found a direct relationship between weight loss and improved metabolic control for individuals with type 2 diabetes. Hence, for the person with type 2 diabetes without complications, exercise in conjunction with diet, is often recommended to improve blood glucose levels (American Diabetes Association, 1998a; Bloomgarden, 1997; Horton, 1988).

The life-style changes associated with diet and exercise to reduce weight were found to be the most difficult aspect of a diabetic regimen (Armstrong, 1987; Rubin, Peyrot, & Saudek, 1991). Likewise, the Nurses Health Study (Shimakawa et al., 1993) found that nurses with type 2 diabetes were not able to sustain the early post-diagnosis weight loss. Furthermore, that compared to their age-matched controls, there were no consistent differences for complex carbohydrate intake. Adults with diabetes are least likely to follow lifestyle recommendations involving changes to diet and or increasing physical activity (Ary, Toobert, Wilson, & Glasgow, 1986; Glasgow, McCaul, & Schafer, 1987; Wing et al., 1998). Recommendations associated with the taking of medications were more likely to be followed as they have a lesser impact on lifestyle (Ruggiero et al., 1997).

If the blood glucose levels cannot be reduced to within a near normal range, eventually insulin injections will be required. Although the decision to include insulin is just another tool in the medical regimen, its inclusion can also be perceived negatively by the person (Hunt, Valenuela, & Pugh, 1997).

Persons with type 1 diabetes and insulin-requiring type 2 diabetes need to give themselves insulin injections each day, but for most people, the regimen involves multiple injections per day, including blood glucose testing. Fear of injecting and or self-testing is not uncommon (Hunt et al., 1997; Snoek, Mollema, Heine, Bouter, & van der Ploeg, 1997).

Maintenance of blood glucose at recommended levels requires knowledge of the disease process, a systematic problem-solving process to use this knowledge and psychomotor competency to implement the regimen behaviours. To manage diabetes on a daily basis the person needs knowledge as to why blood glucose self-management (BGSM) should be done routinely, and circumstances that would necessitate greater frequency of BGSM (Wysocki, 1989). The Diabetes Control and Complications Trial (DCCT) found that the better the blood glucose control is maintained, the more likely the onset of microvascular complications will be delayed and their progression slowed. This ten year study included 1440 type 1 subjects who were followed for an average of seven years (American Diabetes Association, 1998d). Since the results of the DCCT study were made public, there has been a more aggressive approach to developing strategies to help the person manage and maintain BG levels within the accepted normal range (Cox & Gonder-Frederick, 1992; Hunt et al., 1998). In particular, the DCCT study demonstrated a need to change the thinking in diabetic clinics. Rather than accept a higher, more liberal blood glucose target range, health care professions working with diabetics were advised to encourage clients to achieve a lower, narrower non-diabetic blood glucose range (Michael & Sabo, 1996). What has been demonstrated as a significant clinical goal, however, may not translate with equal force to the

individual's view of reality. To some individuals, BGSM is an essential self-care strategy – to others it is a continual reminder of their disease (Fox et al., 1984; Hunt et al., 1998). Without knowledge and a belief in ability, behaviour change is less likely to occur.

Processes that are physiologically automatic and invisible for the non-diabetic become, for the diabetic, purposive behaviours controlled by constant cognitive mechanisms: a process of behavioural self-regulation (Gonder-Frederick & Cox, 1991; Wing et al., 1998). The effort required by the person with type 1 diabetes to maintain BG within the narrow recommended range may involve three or more daily injections, with BG testing on each occasion and perhaps more often. This in itself is a considerable commitment, particularly when success also means an increased risk of hypoglycaemic episodes (Marsh & Stanton, 1996). To avoid hypoglycaemia, even more frequent BG testing is necessary. Other measures to control BG include adjusting meal frequency and/or content, changing activity patterns and/or adjusting insulin dosage. While these examples illustrate to some extent the self-regulation required, they also explain why the vast majority of individuals are not able or willing to try and achieve the 'tight' non-diabetic blood glucose range (Cox, Miller, & Mull, 1987a; Cox, Irvine, Gonder-Frederick, Nowacek, & Butterfield, 1987b; Gonder-Frederick et al., 1997; Marsh & Stanton, 1996).

2.2.4 Lifestyle risk factors for diabetes

The 1995 National Health Survey (Australian Bureau of Statistics, 1997) revealed that, compared to the non-diabetic person, people with diabetes were more likely to have major health problems including hypertension, high cholesterol, heart disease, kidney disease, cataracts, blindness, glaucoma, limb amputations or stroke. For individuals with diabetes who provided height and weight data for Body Mass Index calculations (BMI), 37% were overweight and a further 21% were obese. This compared negatively with the non-diabetic group in which 25% were found to be overweight and a further 8% were obese. Comparing the two main diabetic

groups, 67% of the type 2 group were overweight or obese compared to 49% of the type 1 group.

Body Mass Index (BMI) is calculated from the equation Weight (kg) / Height (m^2) and is suitable for use with men and women from the age of 18 years (National Health and Medical Research Council, 1985). The four BMI categories include underweight, less than 20kg/m^2; acceptable weight, 20-25kg/m^2; overweight, 25-30kg/m^2; obese, more than 30kg/m^2.

Weight reduction to meet the normal BMI score of 20 to 25kg/m^2 is an essential part of ongoing diabetes control and prevention of further deterioration in health for the person with type 2 diabetes. Being overweight is a risk factor not only for diabetes, but when associated with other risk factors such as smoking or hypertension, the likelihood of further diabetic complications is compounded (American Diabetes Association, 1998b). For example, whether diagnosed or not, the person with type 2 diabetes is at increased risk for macro-vascular damage and diseases such as coronary heart disease, stroke and peripheral vascular disease, visual disorders, increased risk of infections, nephropathy and neuropathies (McCarty et al., 1996). A United Kingdom survey of 5102 newly diagnosed type 2 individuals found a significant change in prevalence over six years (from age at diagnosis) of macro and micro-vascular diabetic complications (Davis, Stratton, Fox, Holman, & Turner, 1997). It was also found that retinopathy begins to develop four to seven years before clinical diagnosis of type 2 diabetes (Carter et al., 1993; Harris, 1993).

The behavioural and cognitive demands generated by diabetes mellitus are considerable (Cox & Gonder-Frederick, 1992; Hamberg & Inoff, 1983; Hunt et al., 1998). Hamberg and Inoff referred to 'the predictable crises of diabetes' that cause distress after diagnosis. These include uncertainty of future health, feelings of incompetence in relation to self-care responsibilities, helplessness, loss of valued life goals together with lifestyle changes due to diabetes. Other potential causes of

distress include the adverse effects of a hypoglycaemic episode (possibly in public), the potential to perceive blood glucose results which are too high or low as a failure, and the unwanted weight gain associated with insulin use (Hunt et al., 1997; Shillitoe, 1995). A strong sense of personal confidence in the ability to cope with any one or all of these contingencies is necessary.

For example, the person with diabetes may have had little understanding of how insulin works, never had to give an injection, never had to worry about diet or exercise – let alone the inter-relationships of each. In such situations, an initial generalised efficacy expectation could be more important to the person's illness response (psychosocial adaptation) than the level and strength of the still developing task-specific efficacy beliefs associated with the different aspects of the regimen (Tipton & Worthington, 1984).

Collectively, effective problem-solving skills are required to incorporate the therapeutic self-care regimen into a daily routine that still leaves room for a lifestyle not too different from that of family and friends. Diabetes is a problem-based condition (Armstrong, 1987 p. 567) which necessitates that people become experts in their own care and know how to learn from past experiences with hypo- and hyperglycaemic episodes. Hernandez, (1995) refers to this as " the science of one, a personalised science of living with diabetes." (p. 35).

2.3 RHEUMATIC DISEASE

The term rheumatic disease includes more than 100 chronic conditions involving the joints and or connective tissue. Among the most prevalent of the rheumatic diseases are rheumatoid arthritis, osteo-arthritis, and fibromyalgia (Taal, Seydel, Rasker, & Weigman, 1993c). Rheumatoid arthritis (RA) is a chronic systemic disease that starts between 20 and 40 years of age and affects more women than men. However, it does have a juvenile form which can start as young as six months of age. Onset is gradual and for some people, the episodes of acute symptoms may be separated by lengthy remissions. Inflammation of the synovial lining of the

affected joint ultimately results in cartilage and bone destruction that leads to joint deformity and reduced joint function (Rasker & Cosh, 1987).

Osteo-arthritis (OA) involves degeneration of the articular cartilage with hypertrophy (regeneration) of bone at the margins of the joint (spurs) (Taal et al., 1993c). It affects males and females equally, and occurs as part of the normal aging process affecting joints that are used more often or is related to poor management of joint injury at any age. The amount of damage to one or more joints determines the degree of pain and stiffness, but it is generally less crippling than RA (Lorig & Fries, 1990).

Fibromyalgia syndrome (FMS) is a non-articular disease characterised by a syndrome of sleep disturbance, diffuse musculo-skeletal pain, tiredness and morning stiffness (Block, 1999). It is a chronic pain syndrome of unknown aetiology and unpredictable course (Buckelew, Murray, Hewett, Johnson, & Huyser, 1995; Hallberg & Carlsson, 2000; Taal et al., 1993c) that appears to be made worse by cold, noise, stress, changing weather and tiredness (Hanrahan, 1997). Fibromyalgia syndrome occurs more often in women (80 – 90%) (Hanrahan, 1997; Taal et al., 1993c; Wolfe, 1997).

2.3.1 Prevalence

The 1995 National Health Survey conducted by the Australian Bureau of Statistics (ABS), found the self-reported prevalence estimate of arthritis (rheumatoid and osteo) to be 15%. Prevalence differences for age groups exist. In general, the prevalence increases with age for both genders with a higher percentage for females in any age group and highest in the 65 to 74 year group (56%). The profile for Western Australians aged 50 years and over indicates arthritis to be the second most prevalent condition, with 13% more females than males reporting it (Milligan & Daly, 1996). More recently, in America, arthritis has been described as a 'looming epidemic' (Meenan, Callahan, & Helmick, 1999 p. 79).

Since the status of FMS as a discrete disorder is still being debated (Wolfe, 1997) the prevalence statistics are not readily available, although Hanrahan (1997) cites a USA study which found about 2% of the population reported fibromyalgia; 80% of whom were women. Fibromyalgia in the Australian population has not been reported in published literature.

2.3.2 Impact on way of life

Life-style sources of stress associated with the rheumatic diseases, including FMS, comprise loss of vocational or social roles as a consequence of decreased mobility or other physical disabilities, decreased functional capacity (strength), fatigue and chronic pain (Devins, Edworthy, Guthrie, & Martin, 1992; Katz, 1995; Taal et al., 1993c). In addition, living with uncertainty and the feelings of guilt associated with enforced change in roles can reduce the person's quality of life (Devins et al., 1992; Freeman et al., 1996; Samuelsson et al., 1993). Arthritis affects not only physical functioning but also psychological and social aspects (Anderson, Bradley, Young, Lisa, & Wise, 1985; DeVellis McEvoy, 1995; Eberhardt et al., 1993; Taal et al., 1993a). Considerable personal effort is required to follow the typical regimen recommendations even on a good day when pain and or fatigue are marginally less than at other times (Hallberg & Carlsson, 2000; Shaul, 1995).

Katz (1995) found that the ratings of the impact of seven stressors was significantly negatively correlated with perceived coping efficacy for adult males and females (N = 446; mean age 60.6 yrs). The correlations ranged from r = -.62 (p < .01) for *medication side effects* to r = -.15 (p < .01) for *burden of taking care of rheumatoid arthritis*. The other stressors included *pain* (r = -.48), *unpredictability of symptoms* (r = -.48), *functional impairment* (r = -.47), *change in joint appearances* (r = -.47) and *fatigue* (r = -.44).

Pain was often the main reason for seeking medical help (Buckelew & Parker, 1989). Pain caused by the disease process, further limited not only activity, but also contributed to loss of quality of life and psychological distress, problems of depression and anxiety (Jacobs, van der Heide, Rasker, & Bijlsma, 1993; Taal et

al., 1993c). In this way, arthritis pain perception is a complex phenomenon that is greater than the tissue damage alone (Buckelew & Parker, 1989). Dissatisfaction with illness-related abilities exacerbated psychological distress both concurrently and long term (18 months) in a recently diagnosed group of rheumatoid arthritis participants (Blalock, Orlando, Mutran, DeVellis, & DeVellis, 1998). Furthermore, women with rheumatoid arthritis were found to experience greater distress and perceived more role limitations than men (Reisine & Fifield, 1995).

In a review of the literature dealing with arthritis pain, its impact and treatment, Buckelew and Parker (1989) found support for the notion that cognitive-behavioural interventions reduced pain behaviours and self-reported pain levels. The strongest support came from studies using self-efficacy to modulate the effects of cognitive-behavioural interventions. In particular, cognitive restructuring or reinterpretation of arthritis symptoms was important (Gonzalez et al., 1990). Learned helplessness was also recognised as a critical factor in pain management that could be addressed through cognitive-behavioural interventions (Smarr et al., 1997; Smith & Wallston, 1992; Smith, Peck, & Ward, 1990). In particular, Buckelew and Parker suggested that the complexity of the pain phenomenon be recognised and more attention given to the client's psychological state. Pain interventions need to focus as much on the affective and cognitive components as on the sensory component of pain (Blalock et al., 1998).

Reported symptoms of anxiety and depression were not uncommon among patients with rheumatoid diseases (Devins et al., 1992). Evidence from a variety of sources, including longitudinal studies, however, indicated that the prevalence of depressive symptoms "… is probably no greater than that found in other serious chronic diseases" (DeVellis McEvoy, 1995 p. 284). And yet, FMS patients reported higher pain and psychological stress levels than a group of RA patients (Hawley & Wolfe, 1991). Hawley and Wolfe assessed 1522 patients with various rheumatic disorders using a pain visual analogue scale (VAS), the Stamford Health Assessment

questionnaire and obtained a score for anxiety and depression from the Arthritis Impact Measurement Scale.

Much of the literature indicates that symptoms of psychological distress (anxiety or depression) are not related to disease severity (Eberhardt et al., 1993; Lambert, Lambert, Klipple, & Mewshaw, 1989) or a particular chronic illness diagnosis (Cassileth et al., 1984; Devins et al., 1992). Development of depressive symptoms was related to the degree to which the illness interfered with previously established life-style patterns including recreational activities (Buckelew et al., 1995; Devins et al., 1992). This pattern was also observed by Katz and Yelin (1995) in that loss of 10% or more of the women's valued activities was a significant predictor of the later onset of depressive symptoms (Odds ratio = 6.77, 95%CI 2.35-19.55, p < .01).

Whether rheumatic diseases develop insidiously or as an acute episode of pain and stiffness, the unpredictability and functional impairment meant changed work and family routines (Devins et al., 1992). This in turn diminished the person's sense of identity, independence, self-confidence and ability to plan for the future with any degree of confidence (Anderson et al., 1985; Parker et al., 1988).

2.3.3 Arthritis self-care regimen

The goals of treatment and management of RA, OA and FMS are palliative not curative. The focus is on relief of pain, prevention of fatigue, and prevention of further joint destruction / stiffness. Even though treatment is a combination of rest, controlled exercise and medication with constant adjustment according to disease activity (Lorig & Fries, 1990), the symptoms are unpredictable and variable (Hirano, Laurent, & Lorig, 1994; McEvoy, Blalock, Hahn, DeVillis, & Hochbaum, 1988). More recently, early treatment clinics (two weeks from initial GP visit) have been increasingly adopted as a model in the United Kingdom (Emery, 1997). The clinic aims to make an early diagnosis, treat the inflammatory arthritis and reduce pain that together reduces functional disability. The longer the inflammatory stage, the greater the damage by way of bony erosion or secondary osteoporosis.

Although arthritic conditions do not respond to a particular diet, weight loss may be necessary to reduce the weight-bearing load on lower joints. Weight loss can help reduce pain, leading to an improvement in mobility and quality of life. Inactivity is not an option. Inactivity will not only increase the likelihood of weight gain, but also joint flexibility is lost. The person with arthritis needs to balance rest requirements with appropriate exercises, within pain limits, to maintain joint flexibility and muscle strength. Joint protection principally relies on the strength of the joint muscles. (Lorig & Fries, 1990)

Fear that exercise might exacerbate the disease is common, not only to people with an arthritis condition, but also to health professionals who are reluctant to recommend vigorous exercise (Gecht, Connell, Sinacore, & Prohaska, 1996). Further compounding the issue of recommendations and perceptions of harm, the literature on exercise participation in adult surveys indicates exercise activity to be least likely for women and older persons (Australian Institute Health & Welfare, 1998; (Bauman, Owen, & Rushworth, 1990). Since arthritis is largely a chronic illness associated with women and older persons, strategies used in an arthritis self-management program need to consider this finding.

Arthritis self-management requires the development of personal resources such as coping, self-efficacy and problem-solving skills to make the daily adjustments to the recommended regimen (Lorig et al., 1989b; O'Leary et al., 1988). The change in focus for intervention studies also reflects this notion (Freeman et al., 1996). Similarly, a review of studies between 1987 and 1991 found a continuing reduction in the use of 'knowledge' as the only dependent variable (Hirano et al., 1994). For example, Hirano et al. found that the more recent arthritis education studies that included an intervention also measured psychosocial and health status outcome variables.

2.4 CHAPTER SUMMARY

The rationale for the selected chronic illnesses chosen as the substantive platform to test the study's hypotheses was based on several criteria. The criteria included access to participants, sufficient incidence of new cases for a longitudinal study within the time constraints of a higher degree award, a self-care regimen that involved more than one behaviour change and the typology put forward by Rolland (1984). Rolland's typology was used to guide the selection of three chronic illnesses that differ as to *onset, course, outcome* and *degree of incapacitation of illness* (See section 2.1), yet had a common requirement for significant long-term behaviour changes. This chapter has discussed the prevalence of each illness, the impact of each on lifestyle and the therapeutic regimen for each. In addition, the lifestyle risk factors for diabetes mellitus were discussed. This discussion builds on the background information found in Chapter 1 and provides a link to the review in Chapter 3 of the self-efficacy and psychosocial literature relevant to the selected illness groups.

CHAPTER 3: SELF-EFFICACY THEORY AND PSYCHOSOCIAL ADAPTATION LITERATURE

This chapter presents an overview of self-efficacy theory, psychosocial adaptation to illness and the related health-outcome research findings from the diabetic and arthritis literature. Self-efficacy theory, as described by Bandura (1977-1997) will be discussed first. The discussion includes the influence of two expectancies, efficacy beliefs or expectations and outcome expectations. Strategies to enhance self-efficacy and the effect of these strategies on behaviour change are also discussed.

The chapter also addresses the methodological issues involved in self-efficacy research findings related to the selected chronic illnesses. This chapter is not intended to be a comprehensive review of studies that have considered self-efficacy in its various guises. But rather, it is to illustrate the requirements and difficulties in respect of four areas that need to be addressed in undertaking the current study. First, there are only a few studies that have explored the changes in illness-specific efficacy beliefs. Second, the clinical applicability to chronic illness of studies that only measure a single behaviour belief versus multiple behaviour beliefs will be discussed. Third, scales that use a composite self-efficacy score to analyse a multi-dimensional construct add to the variability of results. Lastly, differences in the level of the self-efficacy measures in relation to the chronic illness findings will be discussed. That is, the self-efficacy measure can be behaviour and context specific, only context specific (domain measure) or not specific to behaviour or context.

The chapter concludes with studies that have applied self-efficacy theory to the selected chronic illnesses and a discussion of psychosocial adaptation to illness. Psychosocial adaptation to illness will be discussed in general and in relation to research findings from the diabetic and generic arthritis literature. Although studies could not be found that used the instrument Psychosocial Adjustment to Illness (Derogatis & Derogatis, 1990) with an illness-specific efficacy scale, the link between self-efficacy and psychosocial adaptation to illness will be presented.

3.1 SELF-EFFICACY THEORY

Self-efficacy theory has demonstrated the potential to explain the adoption of new health-related behaviours (McAuley et al., 1993; Schwarzer & Fuchs, 1995; Stretcher et al., 1986; Taylor, Bandura, Ewart, Miller, & DeBusk, 1985) and the avoidance of risky lifestyle behaviours, including habitual behaviours (DiClemente et al., 1991; Lawrance & McLeroy, 1986; Shannon et al., 1990). Furthermore, self-efficacy theory has proven its place in maintenance of behaviours associated with chronic illness in general (Lorig, 1996; Ruggiero & Prochaska, 1993).

Self-efficacy theory is one of the social cognitive theories, and differs by virtue of its specificity and its recognition of the dual cognitive mechanisms that influence behaviour - outcome expectations and personal efficacy belief in ability to carry out the task (Bandura, 1986). Although outcome expectations and efficacy belief are viewed as different mechanisms, their influence on behaviour change is synergistic. Bandura (1977; Bandura, 1982; Bandura, 1986) saw a distinction between the person's perception of the expected outcome of behaviour (outcome expectation) and the person's perception of their ability (efficacy belief) to complete the behaviour successfully. Both outcome expectations (belief that the behaviour will have the desired effect) and efficacy belief (confidence in ability) are required for any given outcome. The latter belief controls the thought processes and emotional reactions, thereby affecting the person's choice of behaviour, degree of effort and persistence (Bandura, 1989). The greater the efficacy belief the more likely the person will choose to make an effort to change behaviour and or persist with the behaviour when problems are encountered.

Enhancement of situational confidence in starting and maintaining behaviour change is included as one of the intervention strategies for three of the five reported stages of behaviour change (Prochaska, DiClemente, & Norcross, 1993; Ruggiero & Prochaska, 1993). Self-efficacy strategies are suggested for the first two stages of behaviour change: precontemplation (not thinking about behaviour change in the foreseeable future) and contemplation (considering change in the foreseeable future). The

characteristics of the precontemplation stage that indicate the person is not thinking about behaviour change include an under estimation of the benefits and an over estimation of the constraints. The person is considered to be contemplating behaviour change when the benefits and barriers are viewed more equally but doubt may still exists. Enhancement of self-efficacy was also seen as an important strategy in the last of these iterative stages - relapse prevention or maintenance of behaviour change (Prochaska et al., 1993; Ruggiero & Prochaska, 1993).

3.1.1 Efficacy belief / expectation

Judgement about the particular task is built on past experiences and will vary according to the level (or magnitude) of efficacy belief, strength of the belief and generality of the belief (Bandura, 1977; Bandura, 1986). There is empirical evidence to support the assertion that efficacy beliefs about ability are independent of actual ability (Liebert & Spiegler, 1994).

Initial performance of a new skill is affected by immediately preceding relevant experiences (sources of information) that contribute to efficacy beliefs about ability to carry out a specific behaviour. As one of the more important sources of information, past accomplishments may be the main influence on strength and level of efficacy beliefs for a new task. When a new task has not yet been mastered, perceptions of performance may be a personally biased interpretation based upon the person's physical, social, or self-evaluative outcome expectations for similar events. Specifically, the efficacy belief derived from a similar prior challenge and experience influences the individual's level of efficacy expectation. Similar prior challenge and experience also influence the generalisation of the earlier belief to the new but similar task. In this way, the person determines if the task is to be attempted (worth the effort) and the extent of persistence in the face of difficulties or an unresponsive environment (Bandura, 1982; Shannon et al., 1990).

Belief in one's ability to undertake behaviour is an important link between knowing what to do and actually doing it (Bandura, 1982; Grembowski et al., 1993). It reflects the confidence and motivation that help in making decisions about a course of action.

In particular, lifestyle behavioural changes are likely to be reliant on efficacy belief to overcome perceived barriers to adopting the new behaviour (Rosenstock et al., 1988; Schultz & Shultz, 1998; Shannon et al., 1990). Efficacy expectation influences the three categories of action or personal change: the adoption of new behaviours, generalised use under different conditions, and maintenance of the behaviour over time (Bandura, 1986; Schwarzer & Fuchs, 1995).

High efficacy belief does not imply that the behaviour will be performed without anxiety (Feist, 1994). Bandura (1991) referred to several studies that confirmed efficacy belief was able to mediate the relationship between stress or anxiety and a sense of the controllability of an adverse situation. Life in general is replete with adversities, setbacks and failures both large and small. When perceived coping ability does not match an unresponsive environment, a perception of threat exists. To counteract the threat, an optimistic sense of personal efficacy was needed (Bandura, 1986). Setbacks and difficulties served to strengthen efficacy belief if the person persevered and succeeded. In the face of difficulty, individuals with strong efficacy belief have fewer self-doubts and will recover quickly. Individuals with stronger efficacy belief may feel anxious but are more likely to attend to what was familiar in a new task or situation, than focus on the unknown (Bandura, 1997; Jerusalem & Mittag, 1995). In relation to health, individuals with a stronger efficacy belief were not as likely to perceive themselves as sick and less likely to be depressed compared to people with a low efficacy belief (Bandura, 1997; Gecas, 1989).

Additionally, individuals with a low efficacy belief are more likely to worry about negative events in the past and be unable to cope with uncertainty. In this situation, individuals may believe that a potential threat is beyond their control, may visualise failure and become distressed with the resultant impaired level of performance. The interactions of poor performance, low efficacy belief and stress symptoms become iterative. The less resilient person will stop trying to reach the goal (Bandura, 1986; Jerusalem & Mittag, 1995).

3.1.2 Outcome expectations

While personal efficacy expectation is a judgement about ability in relation to a particular behaviour or task, outcome expectation is a judgement about the result of enacting the behaviour (task) in question - a judgement as to whether the recommended behaviour will have the desired effect. Outcome expectation has been classified as a positive or negative expectation of a physical, social or self-evaluative nature (Bandura, 1989).

Outcome expectation was found to be important at the intention stage of behaviour change and less so for the maintenance of the behaviour change (Schwarzer & Fuchs, 1995). In particular, without prior experience of a behaviour, "outcome expectations may have a stronger direct influence" (Schwarzer, 1992 p. 234). For example, Maddux, Sherer and Rogers (1982) used 95 introductory psychology students to test the theory that efficacy and outcome expectancies were independent. The study had three levels (high, low, and no information) for both cognitive expectancies. Information in brochures about a simple interpersonal skill of minimal risk was varied to reflect three levels of both difficulty in using the technique (efficacy expectancy) and effectiveness of the technique (outcome expectancy). Maddux et al. found outcome expectancy to be independent of efficacy belief in relation to intention to perform the behaviour change. Specifically, intention to perform a behaviour was significantly associated with higher levels of outcome expectancy ($\underline{F}\{2, 87\} = 12.32$, $\underline{p}$ <.01), whereas intention was not significantly associated with efficacy belief.

Outcome expectations were not measured in many studies, and mixed results were found for those that did (Shannon et al., 1990). Outcome expectation and efficacy belief were found to be good predictors of intention to undertake breast self-examination behaviour (Seydel, Taal, & Weigman, 1990). Conversely, in relation to a less serious health outcome, outcome expectation was not predictive of intention to floss teeth (Beck & Lund, 1981), lose weight (Shannon et al., 1990) or use pain coping strategies (Jensen, Turner, & Romano, 1991) when efficacy beliefs were controlled in respective regression analyses. It may be that, "the greater the risk of aversive

consequences, the greater the salience of self-efficacy expectation" (Maddux et al., 1982 p. 211). Alternatively, Maddux et al. suggested that, when the health threat was perceived to be more serious, the inconsistencies related to both outcome expectations and efficacy beliefs might be accounted for by the moderating influence of an additional but untested variable.

3.1.3 Behaviour

Behaviour is as important to the aetiology of many chronic conditions as it is to the self-care regimen. Although the interaction of efficacy belief and action-outcome expectation generally determine behaviour, optimal performance usually requires both efficacy and outcome expectation to be high (Gecas, 1989; Lent, Lopez, & Bieschke, 1991; Stretcher et al., 1986). The likelihood that recommended behaviour will be adopted depends on three aspects of people's understanding. Their perception of the degree of risk followed by an expectation that the behaviour will reduce the risk and their expectation that they are capable of making the behaviour change. Together, the three perceptions influence behaviour intention (Bandura, 1997). Good intentions alone are not sufficient for people to adopt health practices, cease risky behaviours or change the habits of a lifetime (Grembowski et al., 1993).

In low risk situations, outcome expectation was found to be more important to the formation of intention to change or adopt behaviour (Maddux et al., 1982). Efficacy expectation about ability, however, influenced behaviour from initiation through to long-term maintenance (Bandura, 1986; Schwarzer & Fuchs, 1995).

Optimal performance requires a reasonable degree of association between action and outcome. Without it, individuals develop a sense of hopelessness or learned helplessness (Buckelew & Parker, 1989; Sullivan, 1993). In particular, when the match between efficacy belief and the particular behaviour cannot predict outcome in a reliable way, the efficacy belief becomes more important in explaining behaviour change (Bandura, 1982). Bandura suggested that people give up trying because they either doubted their level of performance (efficacy-based futility) or they believed that they could not influence the outcome regardless of their ability (outcome-based

futility). This lack of coherence between action and outcome is particularly relevant to some health-related behaviours (Blackwell, 1992; Lorig et al., 1989b; Wallston, 1991). The unpredictable course and the varying disease activity of rheumatoid arthritis (RA) caused patients to view their disease as uncontrollable (Long & Sangster, 1993), leading to lower efficacy beliefs in relation to self-care behaviours (Bradley et al., 1984; Taal et al., 1993a). Similarly, the uncertainty and ambiguity associated with future diabetic complications (Carey et al., 1991), regardless of how well 'controlled' the diabetes may have been in the past, increase fear and guilt (Armstrong, 1987; Hunt et al., 1998).

3.1.4 Development of self-efficacy

Antecedents in the development of efficacy belief (level / magnitude, strength, and generality of the belief) for a particular task are the four sources of information provided by direct and indirect experiences. The four sources include performance mastery experiences, vicarious experience, verbal persuasion and cues associated with physiological status (Bandura, 1982). The individual uses this information to make judgements about personal efficacy. Hence, each source has the potential to enhance or decrease efficacy belief. Bandura recommended that strategies to build self-efficacy use all four sources of information. Strategies or treatment to increase efficacy belief operate differently not only for each of the sources (Bandura, 1977), but the sources of efficacy information impact differently for each type of behaviour (Ewart, Taylor, Reese, & DeBusk, 1983; Taylor et al., 1985).

Regardless of the source of the mastery information, attribution of successful and unsuccessful performances to personal ability and effort is an important determinant of the magnitude of an individual's efficacy expectation.

> The cognitive processing of efficacy information concerns the types of cues people have learned to use as indicators of personal efficacy and the inference rules they apply for integrating efficacy information from different sources (Bandura, 1982, p. 127).

3.1.4.1 Performance mastery experience

Performance mastery experience is a composite of prior experiences associated with carrying out the behaviour (McAuley et al., 1993). It is the cognitive process associated with preconceptions about ability, perceived difficulty of task, effort needed and circumstances that will influence a change in efficacy belief (Bandura, 1997).

Successful achievements over time will strengthen efficacy expectation about ability to perform specific tasks and generalise to similar tasks, but will also increase the person's ability to withstand the occasional failure. Overcoming the occasional failure through determined effort and persistence can help to strengthen efficacy belief further. The effect of failure, however, depends on the stage at which it occurred. A failure in the early stages of performance mastery will be harder to recover from than failure at a later stage (Bandura, 1997).

Enactment of the behaviour has consistently explained a greater percentage of efficacy belief than other sources (Bandura, 1986; Gecas, 1989; Rosenstock et al., 1988). The greater the perceived difficulty of the task, the greater its contribution to efficacy expectation when the behaviour is successful. Successfully enacting the behaviour results in higher, more generalised, and stronger efficacy belief than vicarious experience or other behaviour feedback sources (Bandura, 1982). The term 'more generalised' refers to the transfer of efficacy beliefs to similar situations and tasks in which the person has self-doubts (Ewart, Stewart, Gillilan, & Kelemen, 1986; Kaplan, Atkins, & Reinsch, 1984). Efficacy cognition is dynamic and changes as new experiences influence one's perception about abilities. Personal mastery experiences contribute to efficacy belief that generalise to actions other than the original target behaviour (Sherer et al., 1982).

3.1.4.2 Vicarious experiences

Rosenstock et al. (1988) found vicarious experience to be only second in importance to the experience of enacting the behaviour. Vicarious experiences enable judgement based on the observation of another's performance. The greater the perceived similarity to oneself, the greater the impact of the modeled success or failure (Bandura,

1997). Vicarious experience, however, cannot be relied upon as the sole source of efficacy information, as the effect can be negated by perceived personal failure (Bandura, 1997; Schunk & Carbonari, 1984).

The model in vicarious learning for young people with type 1 diabetes learning how to manage their blood glucose level needs to illustrate the competing commitments of the relevant age-group (Schunk & Carbonari, 1984). Good days and bad days are part of life, but overall, by relating one's own experiences, the model should be able to convince the person that the challenge can be met. It is also important that clear outcomes are evident. Individuals are then able to persuade themselves that if others can do it, they can also (Liebert & Spiegler, 1994).

3.1.4.3 Verbal persuasion

Verbal persuasion has been found to increase efficacy belief and outcome expectation, and leads to change in behavioural intentions (Maddux et al., 1982). Verbal persuasion by others, even when realistic, is a weaker source of mastery expectation than the previous two (3.1.4.1 Performance mastery and 3.1.4.2 Vicarious experiences). While verbal persuasion is easy to provide and readily available, mastery expectation developed by this means is also easily lost by a subsequent less than ideal performance and may even discredit the persuader. Used in conjunction with other sources, rather than having an independent role, exhortation and suggestion by credible others can be effective (Bandura, 1977). Returning to the example of the young diabetic, verbal persuasion could include discussions about how to overcome perceived barriers to blood glucose management, how to safely enjoy 'the party' or prevent problems during holidays. Self-instruction packages are classified as verbal persuasion.

3.1.4.4 Emotional arousal

Emotional arousal, derived from physiologic cues such as heart beat and breathing pattern, is used by individuals to judge their degree of anxiety and readiness to act. Higher levels of anxiety serve as negative feedback that can erode self-confidence and performance, especially for complex tasks (Bandura, 1986). That is, in threatening situations, personal efficacy belief affect emotional reactions as well as behaviour. Perceived inefficacy in coping with unfavourable events has been shown to have a

negatively effect on heart rate, on blood pressure, and on serum levels of catecholamines (Bandura, 1982; O'Leary, 1985).

Physiological cues are considered critical for the diabetic who needs to learn to recognise the differing symptoms associated with hypo- and hyperglycaemia in order to take remedial action. While symptoms are a useful indicator of blood glucose levels, they can also be interpreted by the person as a sign that they have failed to 'control' the condition or have done something 'wrong'. For example, remedial action that had to be covert to avoid criticism from a judgmental family member (Daniels & Rapley, 1997). Such distress scenarios arising from unsupportive family or social situations add to the stress felt by the person (Gonder-Frederick et al., 1989; Hamberg & Inoff, 1983; MacLean & Lo, 1998), which further impedes cognitive abilities and increases the potential for inappropriate choices (Manne & Zautra, 1989). Indeed, regardless of health status, competent people can still be troubled by a sense of inefficacy and make inappropriate choices (O'Leary, 1985).

Similarly, arthritis sufferers need to recognise that the presence of pain need not indicate further joint damage; that pain and fatigue may be the normal effect of exercise undertaken as part of the self-care routine (Holman & Lorig, 1992; Taal, Rasker, & Weigman, 1996). Individuals are more likely to be optimistic about their situation when they are not anxious or feeling tense, although, moderate levels of anxiety have been shown to improve efficacy belief and quality of behavioural effort (Feist, 1994). That is, moderate levels of anxiety assisted with the successful completion of simple tasks but interfered with complex tasks.

Nevertheless, fear of failure can become a self-fulfilling prophecy. Modes of treatment that have been used to reduce the negative emotional arousal associated with pain and anxiety include relaxation techniques, biofeedback and symbolic exposure (Feist, 1994).

3.1.5 The generality of self-efficacy

The five processes through which mastery experiences produce generality of personal efficacy belief include co-development of competencies, similarity of task sub-skills, perception of commonality of behavioural demands, diverse coping skills and development of self-regulatory ability (Bandura, 1997; Ewart et al., 1986). First, the co-development of competencies refers to skills that are acquired by the person concurrently. For example, the aim of self-management classes associated with diabetes or arthritis is to improve the individual's competency level for all regimen behaviours needed for managing the illness. This is not to say that the rate of competency development will be the same – only concurrent development in, for example, dietary choices, adoption of an exercise routine and or the testing of blood glucose at appropriate times each day. Secondly, efficacy belief is likely to generalise when the activities have a similarity in terms of required sub-skills. Thirdly, similar behavioural demands produce a generalised personal efficacy belief, in that, for example, the cognitive skills used to establish a blood-glucose testing routine also have application for an exercise routine. All require organisational skills, commitment to a daily routine and an understanding of the disease process. The fourth process relates to successful coping strategies for one type of threatening environment (the diabetic eating away from home for the first time) that can have a positive effect on efficacy expectation for other potential threats. The fifth process through which mastery experiences foster generality in efficacy belief is self-regulation. Self-regulatory skills include: being able to determine the demands of the new task, setting goals to guide effort, having alternative courses of action ready, using personal rewards to reach proximal goals and continuing under duress while controlling intrusive doubts (Zimmerman, 1989).

In summary, the degree to which the five processes assist with the generalisability of efficacy belief to learn or unlearn behaviour depends on its similarity to the attributes of previous successful attempts. Dissimilar task demands are less likely to facilitate transfer of efficacy belief.

3.1.6 Self-efficacy theory and health outcomes

When Self-efficacy theory is applied to health it has been argued that:

> 1) Perceived self-efficacy for behaviors that affect health status will predict future health status, given that subjects believe that the outcome of the behaviour will be improved health status and that they value improved health status, 2) Self-efficacy is not a static trait; it can be altered, and 3) Enhanced self-efficacy will be associated with improved health status in the areas affected by those specific behaviours (Lorig et al., 1989a, p. 38).

The evidence for self-efficacy theory as an explanatory framework for health behaviours and outcomes is extensive. It includes application in anxiety disorders, depression, smoking avoidance, weight loss, pain management, cardiac rehabilitation and adherence to both simple and complex self-care regimens (Bandura, 1991; Schwarzer & Fuchs, 1995). Increased efficacy beliefs can predict future positive health-related behaviour change (Glasgow et al., 1989; Kavanagh, Gooley, & Wilson, 1993; Stretcher et al., 1986), although, not consistently for all self-care behaviours (Kingery & Glasgow, 1989; Skelly, Marshall, Haughey, Davis, & Dunford, 1995).

Self-efficacy theory has been used extensively in educational programs because of its role as a mediator between knowledge and health-related behaviour (Lawrance & McLeroy, 1986; Schwarzer, 1994), and between behaviour and health outcomes. For example, perceived efficacy to control pain may contribute as much as the person's pain management skills to pain perception (Holroyd et al., 1984; Litt, 1988). Findings from the arthritis or diabetes related research that have not involved self-efficacy theory, however, indicate that the association between behaviour and a health status outcome variable is more variable (Lenker, Lorig, & Gallagher, 1984; Lorig et al., 1989b; Padgett, 1991; Skelly et al., 1995).

A 1981 evaluation of the Arthritis Self-Management Course (ASMC) revealed that it was able to improve health behaviours and improve health status (Lorig, Kraines, & Holman, 1981). However, subsequent analysis revealed a lack of association between the two variables (Lorig, Lubeck, & Holman, 1982). After an extensive review of the literature, Lorig and Laurin (1985) suggested that methodological factors such as a

response bias could have contributed to the finding indicating a lack of an association between behaviour and health outcome. Alternatively, another variable could have provided the explanation. Their conclusion referred to four possible variables including self-efficacy. Subsequent research by Lorig and colleagues identified the significant effect of self-efficacy on behavioural intention (Lorig et al., 1989a; Lorig & Gonzalez, 1992; Lorig et al., 1989b).

Most of the chronic illness research that used self-efficacy theory to explain behaviour and health status outcomes was correlational (Ewart et al., 1983; Glasgow et al., 1992; O'Leary, 1985). There was, however, evidence for a causal link between self-efficacy and pain tolerance (Litt, 1988). Similarly, Lorig and associates established that the association between efficacy beliefs and arthritis health outcomes existed, that increases in the former resulted in improvements in health outcomes, both concurrent and over time (Lorig & Gonzalez, 1992). Of particular relevance to the issue of causality was their finding that the effect of the ASMC on health outcomes improved even more after strategies to enhance self-efficacy were added to the course.

Strengthening of efficacy beliefs was also suggested as a treatment strategy to prevent depressive states associated with learned helplessness or a sense of inadequacy (Cunningham, Lockwood, & Cunningham, 1991; Padgett, 1991). Depressive symptoms were found to be associated with several chronic illnesses (DeVellis McEvoy, 1995; Feldman, 1974) including diabetes (Lustman, Griffith, & Clouse, 1988; Padgett, 1991; Peyrot & Rubin, 1997) and rheumatoid arthritis (Buckelew & Parker, 1989; Katz, 1995; Revenson & Felton, 1989; Schiaffino, Revenson, & Gibofsky, 1991). This association is of clinical significance because its presence interferes with people's functional abilities (Parker & Wright, 1995; Smith & Wallston, 1992).

3.2 SELF-EFFICACY MEASUREMENT ISSUES

There are four self-efficacy measurement issues relevant to the literature to be discussed. First, the difficulty associated with the relevance of findings from single-

behaviour belief (self-care behaviour) research to the situation of multiple behaviour beliefs associated with a complex regimen. Secondly, the use of a composite score to represent diverse behaviours or beliefs, and thirdly, duration of illness has not been measured in relation to the change in efficacy belief. Hence, findings that are based on participants diagnosed for more than five years may not be relevant for newly diagnosed people. Lastly, the level of measurement to be used (general, domain or specific) has varied between studies.

3.2.1 Single versus multiple behaviour change

It can be argued that research based on a single health-related behaviour such as smoking or exercise can be generalised to other similar smoking or exercise populations but not across behaviour domains. For example, efficacy belief specific to a change in eating behaviours was found to be weakly related ($\underline{r} = .21$) to efficacy belief for smoking cessation (DiClemente, 1986). Furthermore, efficacy belief related to dietary choices to control diabetes was rated lower than efficacy belief related to the taking of diabetic medication (Glasgow et al., 1989).

From the chronic illness research, therapeutic regimen behaviours vary within the same chronic illness and the regimen of self-care involves at least two, but mostly more than two tasks. The extant literature suggests that rarely are the findings for all behaviours / tasks or health outcomes similar within any one study, with one or more achieving statistical significance and others not reaching significance (Anderson et al., 1995; Glasgow et al., 1989; Lorig et al., 1989a; McCaul, Glasgow, & Schafer, 1987; O'Leary et al., 1988).

The findings in the above studies should not be surprising because behaviours associated with a complex regimen may involve the concurrent challenges of initiating a new behaviour while trying to break habitual behaviours judged by others to be detrimental to health status. For example, the recently diagnosed diabetic may need to quit smoking while also learning how to manage blood glucose through diet and exercise. The difficulties associated with lifestyle change that were identified in single behaviour research related to diet, exercise or smoking, are then compounded when the

person has to follow a self-care regimen involving two or more lifestyle behaviours. The implications for the current study will be the within group comparisons of multiple illness-specific efficacy beliefs and the concurrent between group comparison of a more general efficacy belief.

3.2.2 Use of a composite measure for data reduction.

Many of the reviewed studies describe the use of a composite measure. The specificity of illness-specific efficacy scales suggests that scores for two or more scales cannot be treated as sub-scales and aggregated to one efficacy belief score for analysis as it does not represent a uni-dimensional construct. Hair, Anderson, Tatham and Black (1998) suggested that the creation of a composite or summated measure should be based on four criteria. The criteria were listed as follows: the scale conforms to its conceptual definition, items are uni-dimensional, it meets appropriate reliability levels, and the scale conforms to various forms of validity, including convergent and discriminant validity.

Nevertheless, studies have used a total, un-weighted self-efficacy score, referred to as a composite score (Buckelew et al., 1996; Hurley & Shea, 1992; McCaul et al., 1987; Padgett, 1991; Simeoni, Bauman, Stenmark, & O'Brien, 1995), to substitute for two or more uni-dimensional scales in an effort to improve the predictor-to-subject ratio.

The composite variable in some studies (Hurley & Shea, 1992; McCaul et al., 1987; Padgett, 1991; Skelly et al., 1995) appeared to represent diverse efficacy beliefs related to different regimen tasks. Using composite scales ignores the evidence that there are variations in strength of efficacy beliefs for different behaviours and contexts (DiClemente, 1986; Kingery & Glasgow, 1989). Smarr et al. (1997) recognised the problem in their paper but rationalised their summated score on the basis that "… the total self-efficacy measure is closely aligned with the general constructs of mastery, personal control, and non-helplessness" (p. 24).

Composite variables also result in another problem for interpretation of data when used in this way. The composite variable is not able to show the differential

contribution of behaviour-specific efficacy and outcome expectations of different health outcomes or behaviours. Still, the prevalence of using a composite score suggests the strategy has been accepted as reasonable - despite its limitations.

3.2.3 Target population: Newly diagnosed versus longer term

The third self-efficacy measurement issue has implications for the clinical application of self-efficacy theory. Most of the self-efficacy theory research with respect to chronic illness involved using long-term illness groups. In fact, several studies excluded diabetic subjects diagnosed for less than one year (Glasgow et al., 1989; Kingery & Glasgow, 1989; McCaul et al., 1987; Padgett, 1991; Skelly et al., 1995). Inclusion criteria have not focused on the newly diagnosed.

Furthermore, several of the diabetic studies had neither newly diagnosed participants nor an intervention (Kavanagh et al., 1993; Kingery & Glasgow, 1989; Skelly et al., 1995). Behaviour-specific efficacy belief can be enhanced through intervention studies or through feedback from mastery experiences in non-intervention studies. The non-intervention studies rely upon the person's own resources, internal and external, and the passage of time - all of which may have had its maximum effect if the person had been diagnosed for several years.

3.2.4 Instruments: Specific, domain and general.

The most specific of the three levels of efficacy expectation refers to a designated task and the context for performance of the task. Alternatively, the intermediate or domain level refers to behaviours that share common properties. The most general level, however, sometimes referred to as being trait-like (Earley & Lituchy, 1991) or a collective entity (Bandura, 1986), does not specify behaviour or context.

3.2.4.1 Specific level measure

Since most of the self-efficacy research has involved the prediction of one or two behaviours, the testing of self-efficacy belief as highly task-specific has been appropriate (Wallston, 1991). For example, Kaplan et al. (1984), using a generalised health locus of control expectancy measure and a task-specific measure, was able to confirm the superiority of specific expectancy belief as a mediator of behaviour change (exercise compliance). The study sample was a group of older adults with

chronic obstructive pulmonary disease ($\underline{N}$ = 60). Similarly, Barrios (1985) was able to confirm the superiority of specific self-efficacy expectation as a mediator of pain tolerance in a group of college students ($\underline{N}$ = 80).

In relation to multiple health-related behaviours, a descriptive, correlation study examined lifestyle behaviours of individuals on a disability mailing list ($\underline{N}$ = 117 adults) covering 22 conditions of varying disability and duration of disability (Stuifbergen & Becker, 1994). Stuifbergen and Becker found that people who were more likely to engage in health promoting lifestyle behaviours were female with higher levels of specific self-efficacy, higher general efficacy and a wellness orientation to health.

Although Stuifbergen and Becker (1994) found specific and general efficacy beliefs (total score for each scale) to be significantly correlated ($\underline{r}$ = .37, $\underline{p}$ < .01), the specific efficacy measure explained more (38% compared to 6%) of the health-promoting lifestyle behaviour scores than Sherer et al.'s (1982) general efficacy subscale. Stuifbergen and Becker's results, however, cannot be generalised to a chronic illness group in which illness-specific beliefs are still developing. Certainly, people with acquired disabilities or chronic illness need to make lifestyle changes, but Stuifbergen and Becker's study was not designed to take account of efficacy beliefs specific to target behaviours and illness context. Hence, there remains insufficient evidence about the relationship of general and illness-specific efficacy beliefs in recently diagnosed chronic illness groups who have a complex regimen of care involving lifestyle changes.

3.2.4.2 Domain level measure.

The *Perceived Health Competence Scale* (PHCS, 8 items) was developed as a domain specific measure (Smith, Wallston, & Smith, 1995). The PHCS purports to measure perceived competence (self-efficacy) at an intermediate level of specificity. All items refer to health in general – not specific to any condition and are worded to reflect ability or health outcome expectations. Psychometric testing of the PHCS was completed over five studies using undergraduate students ($\underline{n}$ = 186 and $\underline{n}$ = 54), long

term rheumatoid arthritis (RA) subjects (n = 238), West Point cadets (n = 528) and middle management adults starting a health promotion program (n = 100). Confirming an earlier finding by Wallston (1992), Smith et al. (1995) concluded that personal competence, which they had likened to generalised self-efficacy but at a domain level, and health locus of control were distinct constructs.

3.2.4.3 Trait-like measure

There has also been some agreement that a more generalised efficacy belief is a function of early life experiences and remains relatively stable, changing infrequently during adult life (Jerusalem & Mittag, 1995; Shelton, 1990; Sherer et al., 1982). Earley and Lituchy (1991) and Jerusalem and Mittag (1995) viewed self-efficacy as a trait-like general sense of confidence that reflected a person's perceived ability in different situational demands. Similarly, Shelton viewed general self-efficacy belief as a composite of past successes and failures that influenced a person's attitude to new challenges.

According to Schwarzer (1993), the 10-item General Self-Efficacy Scale (GSES) developed by them, when compared to other dispositional measures such as self-esteem or trait anxiety, was able to confirm the principles of self-efficacy theory. In addition, it provided normative data derived from five community group studies conducted between 1985 and 1991 (N = 1660) in Germany. The GSES was further tested with three arthritis groups (N = 80, 79 & 66) in England (Barlow, Williams, & Wright, 1996) and found to be inversely correlated with depression across the three groups (rs = -.50 to -.29, $p \leq$ .018). People with arthritis who had higher generalised self-efficacy belief had more positive psychological well-being (rs = .52 to .34, $p \leq$ .006). However, there was no significant association between the GSES scores and health outcome measures of pain, functional impairment and fatigue. General efficacy belief was independent of specific health outcomes.

A similar general efficacy scale developed by Sherer and associates (1982) purported to measure a " general set of expectations that the individual carries into new situations" (p. 664). The level of generalised expectancies was influenced by prior

varied experiences. Sherer (1990) indicated that Bandura's idea of personal efficacy beliefs reflected a continuum of 'very specific' to 'quite general' and that while Bandura and associates concentrated on the situation-specific end of the continuum, he had researched the other end.

Sherer et al.'s (1983) 23-item Self-Efficacy Scale (SE) was designed to measure efficacy beliefs unrelated to specific situations or behaviours and it has rarely been applied to a chronic illness group. One study did find a significant negative correlation (r = -.31, p = .014) between the 17-item general subscale of SE and metabolic control for individuals with type 1 diabetes (n = 49) but no association for the type 2 group (n = 48). The better the metabolic control for the type 1 group (low GHb), the higher the self-efficacy score (Rapley, 1991). Other support for the 17-item subscale as a predictor of general health-related behaviour has been reported in health promotion among adults with disabilities (Becker, Stuifbergen, Ingalabe, & Sands, 1989), blue collar workers (Weitzel, 1989) and health-fair attendees (Waller, Crow, Sands, & Becker, 1988).

Sherer et al.'s 17-item general self-efficacy subscale (GSE) has been used to establish the construct validity of a domain level health self-efficacy measure (Becker, Stuifbergen, Oh, & Hall, 1993). A moderate correlation (rs = .26 to .43) was found between the GSE and a total score for the Self-Rated Abilities for Health Practices Scale and its four subscales. This finding was confirmed in a further cross sectional study (Stuifbergen & Becker, 1994).

In summary, it can be argued that there is limited support for a less specific measure of self-efficacy and these few studies cited demonstrate the potential usefulness of predicting chronic illness health-related outcomes from less specific measures. Not withstanding the tension between a standardised measure for use across domains and the need for specificity of behaviour and context (Abraham, 1994), it would be useful for clinicians to know the extent to which efficacy beliefs can be generalised from one chronic illness to another (Lawrance & McLeroy, 1986; Schwarzer, 1994). Initial

support provided to the newly diagnosed can be guided by the person's general set of expectations of mastery. To this end, the current study attempted to ascertain the degree of association between general efficacy belief and illness-specific efficacy belief for selected illness groups.

When considering the lifestyle changes generated by a complex, chronic illness self-care regimen, the conceptual difference between the broader and more stable general efficacy belief and behaviour-specific efficacy belief may have important implications, particularly for the person when they are first diagnosed. Whether studies have used longitudinal, cross-sectional or point-in-time designs, the task-specific results obtained from long-term chronic illness groups cannot presume to be transferable to recently diagnosed populations.

3.3 SELF-EFFICACY THEORY AND SELECTED CHRONIC ILLNESSES

The study presented in this thesis adopts the view that research that has confirmed the relationship between a specific efficacy belief and a single behaviour intention cannot be generalised to situations in which individuals need to adopt a complex regimen of self-care. In order to manage the different aspects of the disease process, mitigate complications and generally adjust to the consequences of chronic illness, the development of multiple efficacy beliefs needs to be considered. The next part of the literature review will focus on diabetic and arthritis studies. Unless otherwise stated, the studies used task-specific measures of efficacy belief.

As stated at the beginning of the chapter, the reporting of illness-specific efficacy mainly focused on its association with, or predictive ability for self-care behaviours over time. This was true in the diabetes (Glasgow et al., 1992; Hurley & Shea, 1992; Kingery & Glasgow, 1989; McCaul et al., 1987) and the arthritis literature (Parker et al., 1993; Schiaffino et al., 1991; Shoor & Holman, 1984; Smarr et al., 1997; Taal et al., 1993a). For example, the focus for the patient education review article by Taal et al. (1996) was on the predictive influence of self-efficacy theory on behaviour and health status.

Studies have also sought to test the stability of the self-efficacy instrument itself over time (Hurley, 1990; Kavanagh et al., 1993; Kingery & Glasgow, 1989; McCaul et al., 1987; Sallis et al., 1988) rather than test for changes in efficacy belief over time. Other studies measured illness-specific efficacy beliefs at one point in time only (Glasgow et al., 1989; Hurley & Shea, 1992; Padgett, 1991). The problem that then emerges is the lack of evidence in the chronic illness literature as to the rate of increase within and between illness groups.

Nevertheless, the testing of self-efficacy theory's role in behaviour change and health outcomes relevant to chronic illness management has been considerable. Where studies did not have an intervention, they relied upon changes in behaviour and other sources of efficacy information to elicit future reciprocal increase in efficacy belief (Bandura, 1991; O'Leary, 1985). For example, if the behavioural task, once enacted, is perceived by the individual as a positive experience an increase in confidence will ensue and the greater the likelihood that the behavioural task will be repeated. In theory, the reciprocal effect between a positive behavioural experience and the building of efficacy belief continues to accrue as the behaviour persists. Each of the four sources of efficacy information, not just enactment of the behaviour, has the potential to increase the person's sense of confidence in ability. The current study did not have an intervention and hence, changes in efficacy belief relied upon the four sources of efficacy information (See section 3.1.4) in the every-day lives of participants.

3.3.1. Rheumatic diseases

As early as 1984, Shoor and Holman (1984) reported on the possible contribution of psychological factors, rather than behaviour, to functional outcomes in chronic arthritis. The bases for their finding at that time were diagnostic criteria and clinical studies. Two of the diagnostic criteria for rheumatoid arthritis relied on people's perception of their pain and health status. In relation to clinical studies, a "… weak correlation between function and biological markers of disease activity …" (p. 325) was found. Shoor and Holman (1984) cited findings from various clinical studies that

indicated a high incidence of psychological abnormalities such as depression, that when treated, were able to improve prognosis.

Furthermore, a randomised-controlled study (Lorig et al., 1982) found that self-care behaviours and improvement in pain and disability were not correlated. Although significant improvement in self-care behaviours and health status had occurred as a result of the Arthritis Self-Management Course (ASMC), there was no correlation between the two variables. A subsequent modified grounded theory study ($\underline{N}$ = 54) to explore this apparent anomaly, concluded that "… control and affect may be important mediating factors for health-status outcomes of arthritis education" (Lenker et al., 1984 p. 71).

The earlier assertions of Shoor and Holman (1984) in relation to the lack of association between health behaviours and health status were also confirmed in other clinical studies (Johnson, 1992; Lorig & Laurin, 1985; O'Leary et al., 1988). Concomitantly, other studies were able to provide support for the effect of self-efficacy in arthritis-related health outcomes (Buckelew & Parker, 1989; Lorig & Gonzalez, 1992; Stretcher et al., 1986; Taal et al., 1993a).

Lorig et al. (1989a) found that efficacy beliefs correlated with present and future health status for a mixed arthritis group who took an ASMC ($\underline{N}$ = 95). From baseline to four months, the efficacy enhancing strategies (skill mastery, modeling, reinterpreting symptoms and persuasion) significantly improved health status (perceptions related to pain and depression) independent of the behaviours taught ($\underline{p}$ < .05). Research based on the ASMC and other similar programs was able to show that patients who had a greater sense of efficacy had less pain and functional impairment, less depression, less stress and better sleep (Holman & Lorig, 1992). A 12 year review of the ASMC by Lorig and Holman (1993) indicated, as one of six conclusions, that the mechanism by which the course "… affects health status appears to be more closely linked to changes in self-efficacy than to changes in behaviours" (p. 17).

Likewise, a stress-management course based on the strengthening of exercise-related efficacy belief demonstrated significant improvement in health status over 15 months (Smarr et al., 1997). This randomised three-group study provided correlational data to support the association between a total self-efficacy score and a reduction in depression and pain intensity. The study also found a significant inverse association between total self-efficacy and helplessness that increased over 15 months ($\underline{r}$ = -.31 to -.51). As self-efficacy increased, the sense of helplessness decreased.

A predictive study was also supportive concurrently and prospectively (Schiaffino et al., 1991). The hierarchical regression analysis to determine adaptation to the onset (less than two years) of rheumatoid arthritis (T1 $\underline{n}$ = 101; T2 $\underline{n}$ = 65) found initial specific efficacy belief (total score) and perceived pain could explain concurrent and future functional disability ($\underline{p}s$ < .05) but not depression. Greater efficacy belief was associated with greater use of problem-solving coping behaviour a year later (β = .46, $\underline{p}$ < .01) (Schiaffino et al., 1991). Regardless of pain perception, self-efficacy was related to both less disability and more problem-solving coping.

Contrary to these positive results, Simeoni, et al. (1995) were unable to find a significant difference between the control ($\underline{n}$ = 71) and intervention groups ($\underline{n}$ = 104) for self-efficacy, pain perception, disability index or self-management behaviours over six weeks or six months. Several reasons for the discordant results were evident. They included the lack of focus on strategies to increase self-efficacy belief, the lack of credible role models for vicarious and persuasive sources of efficacy information and the finding that the baseline self-efficacy score was higher for the intervention group and significantly different from the control group ($\underline{p}$ = .01). The combined lack of a self-efficacy focus and higher initial scores would not be conducive to producing a significant increase in efficacy belief.

Findings from the few studies using Fibromyalgia Syndrome (FMS) patients were consistent with the arthritis research in general (Buckelew et al., 1998; Buckelew et al., 1996; Burckhardt, Woods, Schultz, & Ziebarth, 1989). That is, using the Arthritis

Self-Efficacy Scale (Lorig et al., 1989a) as a total score, higher efficacy beliefs were associated with better health outcomes.

The more recent self-efficacy literature with arthritis groups tended to use very similar or identical instruments and the consistency of findings facilitated generalisation. Researchers tended to include the Arthritis Self-Efficacy Scale (ASES) developed by Lorig and colleagues (Lorig et al., 1989a), a variation of the ASES (Taal et al., 1993a; Taal et al., 1993b), or a generalised self-efficacy scale (Barlow et al., 1996).

As stated earlier, the focus for most of the chronic illness studies was the association or prediction of behaviour and health status from the increase in efficacy beliefs. Although the targeted efficacy beliefs were often reported as increasing, findings from the few studies that provided the statistical evidence for the change in efficacy beliefs were inconsistent (Lorig et al., 1989a; O'Leary et al., 1988; Taal et al., 1993b). For example, Lorig et al. (1989a) and O'Leary et al. (1988) found that PSE (pain) and OSE (other symptoms) increased significantly after the ASMC intervention while efficacy belief about function ability (FSE) increased, but not significantly. For studies that included a control group, efficacy belief changes were non-significant. These findings support the theoretical variability in efficacy beliefs for different behaviours, contexts and the intervention emphasis.

The power of a tailored intervention was demonstrated by Taal et al. (1993b) who found that FSE could be significantly improved when a homogenous sample (RA) was selected to test an aspect of the ASMC most resistant to change (Holman & Lorig, 1992). Taal et al. emphasised physical exercise and used a physiotherapist, as opposed to lay leaders. The FSE was significantly improved at six weeks and at 14 months, but not at four months. The non-significant four-month result was not explained and an explanation was not seen in the data. Taal et al., however, indicated that less emphasis was placed on relaxation exercises for pain control than Lorig et al.'s (1989a) study. If this was the case, it could also explain their non-significant increase in PSE and OSE at any of the three test times. Specifically, with changes in the intervention strategy

and inclusion criteria, their significant and non-significant findings were the reverse of Lorig et al. and O'Leary et al. (1988) who used community samples from standard ASMCs.

In summary, Bandura's (1997) self-efficacy theory has provided explicit guidelines for interventions that enable people to exercise some influence over how they live their lives and has been used in a USA developed 12-hour Arthritis Self-Management Course (ASMC) for people with arthritis (Lorig, 1996). Use of the ASMC has been extended to Canada and Australia (Simeoni et al., 1995) and has been the focus for research since its inception in 1978 (Lenker et al., 1984; Lorig & Holman, 1993). Although inconsistency of findings were evident, research based on the ASMC has been able to show at least one consistent finding: That when self-efficacy increased, pain was reduced (Lorig & Holman, 1998) and remained so, despite arthritis-related disability having increased (Holman & Lorig, 1992).

While the ASMC intervention is well documented and replicated in many arthritis and FMS studies, much of the diabetes literature either did not use an intervention or the intervention was not documented sufficiently for replication (Brown, 1999; Fain, Nettles, Funnell, & Charron, 1999).

3.3.2 Diabetes mellitus

The focus of diabetes research has been on educational interventions to improve knowledge of diabetes, self-care behaviours (skill level and compliance behaviour) and improvement in metabolic control (Brown, 1988; Brown, 1990; Fain et al., 1999; Welch, Dunn, & Beeney, 1994). Within the last two decades, however, the focus for diabetes research has gradually expanded to recognise the importance of psychosocial factors (Dunn, 1986; Fisher et al., 1982; Hunt et al., 1998) and cognitive factors such as self-efficacy theory (Anderson et al., 1995; Bandura, 1997; Glasgow et al., 1992; Hurley, 1990).

The first meta-analysis conducted by Brown (1988) indicated that diabetes education improved patient outcomes. The second analysis, however, reflected the change from

conventional education programs to programs that also included psychosocial outcomes (Brown, 1990). In the latter review, the 14 studies (1981 – 1989) with psychosocial outcomes that met the criteria for homogeneity had a combined weighted mean effect size of 0.27 ± 0.08 SD). The comparative analysis for education as a global variable was moderate (0.49 to 1.05), but the effect size for specific patient education was only small (i.e. insulin injection skill, 0.23 with a 95% confidence level near zero). Similarly, Padgett et al.'s (1988) meta-analysis of 94 education and psychosocial intervention studies related to diabetes management found the mean effect size for social learning interventions (11 of 94) to be non-significant {ES = + 0.51 (0.27)}.

Of relevance to the current study was the recommendation by Brown (Brown, 1990) that educational programs incorporate specific strategies to improve adaptation to diabetes, the rationale being that such studies would result in larger effect sizes. A similar suggestion was also put by Beeney and Dunn (1990) who, like O'Connor et al. (1992), found that the significant improvement in diabetes knowledge was not correlated with changes in glycated haemoglobin (GHb) ($\underline{r}$ = .03). Furthermore, Campbell, Redman, Moffitt and Sanson-Fisher (1996) found, in a randomised trial of persons ($\underline{N}$ = 238) with type 2 diabetes using four treatment groups, that the educational program group was least able to lower their diastolic blood pressure and did no better than the other groups on other measures. Campbell et al.'s study supported the findings of Brown (1990) and suggested that outcomes should reflect well-being and quality of life using strategies to encourage patient empowerment along the lines suggested by Anderson et al. (1995).

The main reason for the emphasis on the client's behaviour and knowledge in earlier studies may have been related to an assumption that the right behaviour will result in a positive health outcome. In fact, there is evidence that this view still prevails among medical practitioners (Hunt et al., 1998), nurses (Michael & Sabo, 1996) and the research literature (Brown, 1999; Fain et al., 1999; Glasgow, 1999). To an extent the clinical focus can be understood, in that non-compliance with a diabetic self-care

regimen has serious medical consequences, including death. Diabetes education programs are important (Glasgow, 1999), but an increase in knowledge to predict behaviour change or health status has rarely been supported in the short term and its effect after three months is untested (Fain et al., 1999). The complexity of diabetes self-management is such that some individuals will need to attend several courses with years of guidance to learn the principles of diabetes knowledge (Brown, 1999).

Two other issues were also found when the diabetes patient education research was reviewed. Most studies lacked a theoretical framework and there was insufficient detail about an intervention to replicate the research (Fain et al., 1999). This latter point was consistent with Brown's (1999) review of the diabetes education literature.

Apart from knowledge, the discourse in the diabetes-related self-efficacy research has focused on predicting one of two things. First, the prediction of diabetes related self-care behaviours such as blood glucose management, diet, exercise, insulin use, and or diabetes self-care in general. Efficacy belief scores related to regimen specific behaviours were found to predict the related self-care behaviour (Hurley & Shea, 1992; Kavanagh et al., 1993; Kingery & Glasgow, 1989).

Secondly, the strengthening of diabetes-specific efficacy beliefs has been associated with various health status outcomes such as a reduction in glycated haemoglobin (Anderson et al., 1995; Rubin et al., 1989) or weight (Glasgow et al., 1992). In those studies in which glycated haemoglobin (GHb) has been measured, blood glucose self-management (BGSM) behaviours were more often found to be independent (Glasgow et al., 1987; Glasgow et al., 1992; Glasgow et al., 1989; Padgett, 1991; Toobert & Glasgow, 1991). In diabetes research (type 1 & 2), the link between efficacy beliefs and self-care behaviours has proven to be stronger than the relationship between these behaviours and subsequent improvement in glycemic control (Glasgow et al., 1989; McCaul et al., 1987).

This point was made even clearer in a randomised control trial of a group of persons described as either using or not using insulin (Anderson et al., 1995). This study had a patient empowerment focus with the aim of improving psychosocial self-efficacy in eight areas relevant to the diabetes course content. Although a significant increase was found for only four of the self-efficacy subscale measures, all of the mean scores increased for the intervention group ($\underline{n}$ = 22) but not the control group ($\underline{n}$ = 23). Furthermore, in relation to health outcomes, the intervention group showed significantly greater reduction in GHb ($\underline{p}$ = .05) and negative attitude ($\underline{p}$ = .01) that was attributed to significantly increased efficacy beliefs related to the ability to set goals, manage stress, make decisions and obtain social support. Compliance behaviour itself was not improved.

There are, however, inconsistencies in the literature. For example, Kavanagh et al. (1993) found that self-efficacy could predict post-test behaviours, and that both behaviour and self-efficacy could explain post-test GHb for a sample of type 2 diabetics ($\underline{N}$ = 63). By contrast, Padgett (1991) found that glycaemic control was not significantly correlated with either adherence ratings or with self-efficacy belief for a type 2 diabetic group. When a measure of general belief in ability was used (Sherer et al., 1982) in testing the association between self-efficacy and glycaemic control, a type 1 diabetic group was found to have a significant negative correlation ($\underline{r}$ = -.31) with GHb (better) while no association was found for the type 2 group (Rapley, 1991).

On balance, however, it can be argued that self-efficacy theory has proven to be a useful heuristic to explain health status outcomes associated with the management of diabetes (Anderson et al., 1995; DiClemente, 1986; Shillitoe, 1995). However, the degree to which the diabetes-specific self-efficacy measure is able to detect changes in efficacy beliefs is not clear. Most authors have reported the stability statistics of the measure without regard for the change statistics (Hurley & Shea, 1992; Kavanagh et al., 1993; Kingery & Glasgow, 1989; McCaul et al., 1987; Sallis et al., 1988; Skelly et al., 1995).

The few diabetes studies that measured the change in efficacy beliefs were either non-significant (Glasgow et al., 1992; Skelly et al., 1995) or reported on the stability of the measure over time (Kavanagh et al., 1993; Kingery & Glasgow, 1989). An exception was Rubin et al. (Rubin et al., 1989), whose study involved a five day intensive education course for types 1 and 2 diabetics ($\underline{n}$ = 122). The mean self-efficacy score (one score) increased significantly from pre-course to post course (1 week) and six months later (p < .001).

Considerable variability existed within these studies as to the mix of diabetes type, age range and diabetes-specific self-efficacy measures. In addition three studies did not have an intervention but relied upon normal clinic visits and the passage of time (two to four months) for the diabetes-specific efficacy beliefs to increase (Kavanagh et al., 1993 54; Kingery & Glasgow, 1989; Skelly et al., 1995). Of the two studies that reported non-significant changes in behaviour-specific efficacy beliefs, at least one result could be attributed to the lack of an intervention and small sample. Skelly et al.'s (1995) study had 118 adults with an average illness duration of 10 years. Any reciprocal effect of successful behavioural influence on efficacy beliefs would have been minimal. Hence, the small increase in mean scores and large standard deviations that were reported indicated insufficient power to reject the null hypothesis.

Rarely was statistical power to reject the null hypothesis discussed as a possible cause for non-significant results. For example, the non-significant change in diet and exercise efficacy beliefs for two groups over six months after an intervention (immediate $\underline{n}$ = 52; delayed $\underline{n}$ = 50) could have been due to inadequate power to detect a difference (Glasgow et al., 1992). Alternatively, the intervention itself has been implicated in non-significant findings. Rubin and colleagues (Rubin et al., 1989) suggested that courses that focus on an overview of diabetes knowledge without self-care psychomotor and coping skills are less likely to make a difference in health outcomes.

The variability in the diabetes research in terms of interventions, diabetes-specific self-efficacy measures and lack of standard behavioural or health-outcome measures (Brown, 1990) limits the ability to generalise the findings. Padgett et al.'s (1988) review of studies between 1978-86 concluded that the "quality of methodology for each study was inversely related to the mean effect size (ES) (r = -.28, p < .05), i.e. weaker studies were significantly associated with higher ES values " (p. 1023). It could be argued that this result reflects the early stage of instrument development and associated measurement difficulties. For example, nearly a third of the studies included a health-related compliance measure. More recently, researchers have come to accept that non-compliance is the norm (Blackwell, 1992; Glasziou et al., 1994; Hunt et al., 1998; Thorne, 1990). Diabetes knowledge measures were used in 26 (28%) of the studies reviewed by Padgett, et al., yet knowledge alone does not lead to behaviour change for the person with diabetes (Beeney & Dunn, 1990; Dunn, Beeney, Hoskins, & Turtle, 1990), or for health promotion in general (Paul & Redman, 1997).

Although adjustment to diabetes is a process of behavioural self-regulation (Gonder-Frederick & Cox, 1991; Wing et al., 1998), there has been limited research on the usefulness of one of the more powerful cognitive control variables, such as self-efficacy, that can facilitate self-regulation. Studies have not been replicated and the focus has been on regimen behaviour change.

Despite the limitations of the various methods used, the findings at least indicate a trend. Self-efficacy is associated with behaviour change, whether it was analysed as a single behaviour efficacy belief score or multiple efficacy beliefs were combined as a composite score (Hurley & Shea, 1992; Kingery & Glasgow, 1989; McCaul et al., 1987; Padgett, 1991; Skelly et al., 1995). Furthermore, supportive evidence for the role of self-efficacy in improving the health status of persons with diabetes resulted in a recommendation for diabetes educators to incorporate self-efficacy strategies into self-care education programs (Anderson et al., 1995; Glasgow & Osteen, 1992; Hurley & Shea, 1992).

3.4 PSYCHOSOCIAL ADAPTATION TO ILLNESS

Conceptually, psychosocial adjustment and psychosocial adaptation have both shared distinguishing features (Livneh & Antonak, 1997). Livneh and Antonak saw psychosocial adjustment to chronic illness as the theoretical endpoint in the unfolding process of adaptation to chronic illness. Adaptation as a process, was manifested differently depending upon the chronic illness and the long-term implications.

Although empirical evidence was not available to support any particular model of adaptation, Livneh and Antonak (1997) suggested that psychosocial adaptation occurred on a continuum from maladaptation to successful adaptation. Features related to the maladaptation end included anxiety, depression, anger, denial and negative self-esteem. The adaptive end of the continuum reflected positive self-esteem, self-efficacy, personal mastery and adaptive coping. Support for this conceptualisation came from the association of distinct psychological reactions with onset of illness through to adjustment (Livneh & Antonak, 1997).

For the purposes of the current study, the term 'adaptation' is used unless referring to the full name of the Derogatis and Derogatis instrument PAIS (1990). (See Explanation of Terms, p. xi) It could be argued that the target population for the study was still coping with the impact of the illness experience and therefore adaptation as a process, rather than adjustment as an endpoint, was more appropriate.

The individual's psychosocial adaptation to chronic illness, as a health outcome, depends upon the person's perception of the burden of the illness and its intrusiveness (Devins et al., 1992). The degree to which a chronic illness becomes overly intrusive depends upon the severity of the illness itself and the person's response to the illness. Personal resources such as coping skills or belief in one's ability to manage will determine the response. Fulfilling social roles is also important to psychological well-being (Blalock et al., 1998; Newman, 1990). According to Derogatis & Lopez (1983), psychosocial adaptation is correlated with the individual's role competence. It is not surprising, therefore, that studies have found that the best index of adaptation to

chronic illness is the person's perception of the limitations to their lifestyle, not the type or severity of the disease (Felton et al., 1984; Westbrook & Viney, 1982).

Pollock (1993) found that psychosocial adaptation did not differ among adults ($\underline{N} =$ 597) with hypertension, diabetes, cancer or rheumatoid arthritis. Other studies also supported the notion that psychological response to chronic illness is independent of diagnosis (Cassileth et al., 1984; Pollock et al., 1990). Similarly, psychological response to chronic illness was found to be independent of disease severity for rheumatoid arthritis patients (Eberhardt et al., 1993).

It has been suggested that psychological and physiological well-being for individuals with arthritis was facilitated by improving arthritis specific-efficacy beliefs (Bowsher & Keep, 1995; Holman & Lorig, 1992; Lorig et al., 1989a; Schiaffino et al., 1991). Likewise, emotional adjustment to arthritis has been associated with a greater sense of personal control over the condition (Affleck, Tennen, Pfeiffer, & Fified, 1987). Individuals who were identified as being better adapted, believed they could control their symptoms, believed in and understood their treatment, and were more likely to carry out self-care. Hence, educational interventions for the arthritis groups should include effective coping strategies as part of enhancing arthritis-specific efficacy beliefs (Freeman et al., 1996).

In the diabetes literature, the relationship between self-efficacy and psychosocial adaptation has been studied sporadically (Livneh & Antonak, 1997). In fact, a review of psychosocial problems in diabetes and possible interventions did not mention self-efficacy theory (Rubin & Peyrot, 1992), but commented on the scarcity of research addressing coping and stress reduction strategies. Concomitantly, the psychosocial impact of diabetes has been found to be a better predictor of mortality than many clinical and physiological variables (Davis, Hess, & Hiss, 1988). The positive influence of psychosocial adaptation on metabolic control, however, has been a consistent finding (Dunn et al., 1990; Mazze, Pasmantier, Murphy, & Shamoon, 1985; Pollock, 1986; Rapley, 1991). Of equal importance is the finding that the negative

effects of stress on blood glucose levels can be buffered by psychosocial variables (Griffith et al., 1990). And yet, conversely, increased stress associated with negative diabetes-related experiences and the onset of complications has been demonstrated to lead to psychosocial problems (Cox & Gonder-Frederick, 1992). In fact, Pollock (1993) found that 34% of the variance in predicting PAIS for individuals with one of four chronic illnesses (diabetes type 1, arthritis, hypertension and multiple sclerosis) was accounted for by five variables, including the ability to tolerate stress.

In chronic illness in general, stress has been associated with the loss of social and or vocational roles, permanent changes to life-style, uncertainty of the future and threats to self-esteem (Feldman, 1974; Livneh & Antonak, 1997). Furthermore, a perceived lack of control or sense of helplessness is itself stressful (Buckelew & Parker, 1989). These factors, alone or in combination, contribute to the adaptive demands made by chronic illness. Nevertheless, it has been accepted that the person's response to a stressor determines health outcomes more accurately than the type of stressor (Lazarus, 1974). For example, the individual's capacity to give up false hope (Feldman, 1974) and adapt to the chronic illness has a direct effect on the successful outcomes of the illness (Adams & Lindemann, 1974; Davis et al., 1988; Holman & Lorig, 1992).

Unfortunately, only a few studies have used the instrument PAIS with a diabetic group (Connell et al., 1995; Landis, 1991; Pollock, 1993; Trief, Elbert, Grant, & Weinstock, 1998; White et al., 1992; Willoughby et al., 2000). Less often, studies used PAIS with an arthritis group (Blalock et al., 1998; Pollock, 1993). Studies could not be found that used PAIS and an illness-specific efficacy scale.

It has, however, been suggested that since self-efficacy belief can mediate the relationship between competence and a sense of well-being (Bandura, 1977; Bandura, 1986; McAuley et al., 1993), future health-related self-care studies should include a combination of perceived self-efficacy and psychosocial adaptation (White et al., 1992). The purpose of the current study was to explore this relationship further.

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3.5 CONCLUSION

Studies into self-efficacy theory have demonstrated it has the potential to improve health outcomes and facilitate behaviour change in chronic illness, both concurrently and in the future. Few studies have specifically included newly diagnosed individuals as part of their methodology or considered the individual's efficacy beliefs about their abilities in general during the period when task-specific efficacy beliefs are developing. The current study seeks to address both issues in the belief that task-specific efficacy beliefs need time to develop for effective self-care. Differences between these two efficacy beliefs at initial diagnosis, when the person is being assisted with the self-care regimen, may be clinically significant.

Self-efficacy theory suggests that people with strong efficacy beliefs are more likely to persist with difficult tasks, even after experiencing an initial setback or failure. This is important as chronic illness regimens to manage the symptoms of diabetes and arthritis, as well as prevent further complications, are psychologically and behaviourally demanding (Freeman et al., 1996; White et al., 1992). Comparing the differential effect of efficacy belief in ability in general, and the more task-specific efficacy beliefs as they develop over time, may assist in the development of clinically relevant strategies for chronic illness management programs. Furthermore, self-management programs that facilitate increased confidence in specific self-care behaviours are more likely to contribute to the adaptation process and health outcomes in general.

CHAPTER 4: METHOD

The purpose of the study was to determine the relative impact of general versus task-specific self-efficacy on psychosocial adaptation to illness over nine months for three chronic illness groups. A secondary purpose was to explore the degree of and change in association between general and task-specific self-efficacy for selected illnesses over this time.

This chapter describes the research design, sampling method and plan, instruments, data collection procedures and the planned statistical analysis. Ethical considerations are also discussed. Sample letters of invitation to participate in the study, consent form and instruments are attached as Appendices A to G.

4.1 STUDY DESIGN

The study design was a longitudinal, parallel group study that employed an exploratory predictive design to examine general and illness-specific efficacy beliefs. The study had two stages. The initial stage was to provide information on the ease of recruitment into the main study, information for improving the data collection procedure as a whole and the appropriateness of the wording for the condition-specific scales for the accessible target groups. The second stage was a nine months, longitudinal, parallel group study. The study did not include a specific intervention and participants acted as their own controls for comparison of the dependent variable, psychosocial adaptation to illness over time and repeated measure analysis. The longitudinal nature of the study helped to reduce the influence of extraneous variables that may account for psychosocial adaptation to illness – for example, skill at regimen tasks. Hence, changes in variables of interest were expected to reflect the real-life situation giving the study stronger external validity compared to a clinical trial (Drummond & Jefferson, 1996). The testing threat to internal validity was considered in the use of three data collection points over nine months. Carmines and Zellor (1979) suggested that the influence of memory was not a threat when two tests are more than one month apart. General self-efficacy (GSE - Appendix D) and condition specific self-efficacy (diabetes - Appendix E; arthritis - Appendix F) measures were

administered at three points in time over nine months. The self-report version of the Psychosocial Adjustment to Illness booklet (PAIS-SR) was administered at the second and third data collection points only (Appendix G – see attached).

4.2 INITIAL STAGE – TRIAL OF INTENDED STUDY PROCEDURES

Once ethics approval was received from the first major teaching hospital and the Arthritis Foundation, volunteers were sought for the trial of study procedures. Participants for this stage were not included in the main study (see Table 4.1) but the same sampling criteria were used.

4.2.1 Purpose

Protocol testing was used as a trial run for the main study to ascertain the ease of recruitment into the study, obtain information for improving the data collection procedure as a whole and the appropriateness of the wording for the condition-specific scales. Both scales to be used at this stage had previously been developed and tested in the United States of America and needed to be tried locally. Results on ease of access to the target groups would also give an indication of the maximum sample size that could be expected in the time available.

4.2.2 Instruments

The relevant disease-specific scale was discussed with a Diabetes Educator at a major teaching hospital and the Education Officer at the Arthritis Foundation in Western Australia. They were reviewed for content validity and appropriateness of wording for the local target populations. The Arthritis Self-efficacy Scale (Lorig et al., 1989a) did not require changes for the protocol trial. Some minor changes to the Insulin Management Diabetes Self-efficacy Scale (Hurley, 1990) were made for the protocol trial and are discussed in the instrument section to follow (4.5.4). In short, the questions related to insulin were removed for the N-IU participants in the trial run and removal of one other diet related question was recommended.

The questionnaire booklet consisted of a demographic section (Appendix C) used in a previous study (Rapley, 1989), a General Self-Efficacy Scale (Sherer & Adams, 1983) and the relevant condition-specific self-efficacy scales. These instruments formed the

questionnaire for baseline data (T_0). The PAIS was not included in the protocol trial for two main reasons. First, the researcher had used it in an earlier study involving individuals with type 1 and type 2 diabetes and had determined its reliability for a similar local sample (Rapley, 1989). Secondly, to ensure a reasonable return rate, the initial questionnaire booklet for T_0 could not be too large. Hence, the decision to measure PAIS only in the second and third wave of data collection was based on the time that would be needed to complete an additional five page questionnaire booklet if included with the other T_0 questionnaires. The demographic questionnaire would not be needed at the later test times, allowing more time for completion of the PAIS booklet. Of less importance but nevertheless relevant to the rationale for not including PAIS at T_0, copyright restrictions did not allow questions from the PAIS to be changed or deleted.

4.2.3 Participants and procedure

Twenty participants were recruited from the Arthritis Self-Management Course (ASMC) conducted by the Arthritis Foundation. During the refreshment time of the two-hour class in week two of the ASMC, participants were invited by the researcher to join the study. Using the main study protocol for informed consent, volunteers were asked to complete the arthritis T_0 questionnaire. Similarly, ten diabetes type 2 participants (N-IU) from Diabetes Education classes conducted by the Diabetic Clinic of a major teaching hospital completed the baseline diabetes (T_0) questionnaire. (See Explanation of Terms, p. xi for overview of self-management courses.)

Opportunities were provided for questions to be asked of the researcher directly (telephone number given) or through the relevant health care professional contact in the class. No ambiguities were evident and questions that were asked did not indicate a need to change any instructions or instrument wording.

4.2.4 Findings of the protocol trial

Based on the results from this part of the study, no changes to the questionnaire or data collection procedure were necessary for the main study. The protocol and questionnaires used were subsequently used in the main study. Recruitment for the trial indicated that samples of 100 or more in the N-IU and the arthritis group would

take approximately two years to obtain within Western Australia. Without a self-management class as a recruitment point, the IU group could take longer.

4.3 MAIN STUDY – SECOND STAGE

4.3.1 Sampling criteria

Inclusion criteria were adults (over 18 years) and able to read English. Apart from a lower limit of 18 years, age was not restricted to enable a broad range of ages representative of the target population. The target populations included individuals who had been diagnosed by a General Practitioner or Rheumatologist within the last three to six months preceding their invitation to participate in the study or were attending a self-management class for the first time. It was argued that the decision to attend a self-management course and 'recently diagnosed' could be equated in terms of the individual's level of efficacy belief or confidence to make the necessary behaviour changes.

In relation to the 'three to six months' criterion, advice from several Diabetes Educators indicated that, in their experience, individuals needed at least three months to come to terms with the diagnosis and that intention to undertake a recommended behaviour change may not occur within the first few months after diagnosis. This suggestion is also supported by the literature on behaviour change when efficacy belief is low (Prochaska, 1995).

In relation to the criterion 'attending a self-management class for the first time', it was also recognised that "entrenched habits rarely yield to a single attempt at self-regulation" (Bandura, 1997, p. 281). Habit change has been found to be circular as people spiral through the change phases in response to both success and relapse experiences (Basler, 1995; Maddux, 1995a; Prochaska, 1995). The change phases include: disregarding the need to change, considering change, initiating change and finally, maintaining the change. An assumption was therefore made that attendees at the self-management classes for this study would be at least ready to change (DiClemente et al., 1991; Prochaska et al., 1993). For example, individuals may have

tried to make the behaviour change but attempts were not successful and were now seeking professional help. Alternatively, people may be working hard to change, as evidenced by their attendance at the classes, but were still monitoring their perceived successes and failures. That is, it could be argued that participants at the self-management classes were still developing their illness-specific efficacy beliefs and adjusting to their new health status (Maddux & Lewis, 1995).

Sampling criteria were chosen so that the total study sample would be as homogeneous as possible in relation to changes in the variables of interest across the three illness groups. Extraneous variable influences would be reduced as participants acted as their own controls. Participants were excluded if they had other medical problems or complications.

The relevant diagnoses included individuals with either insulin dependent or insulin requiring diabetes who made up the insulin using (IU) group, and the non-insulin using (N-IU) or diabetes type 2 group. The third group included individuals with rheumatoid arthritis (RA), osteo-arthritis (OA) or fibromyalgia syndrome (FMS). Individuals with FMS were included because research has demonstrated that, when compared to the findings of Lorig and colleagues, they had "… average self-efficacy scores that were similar to scores obtained in a normative, mixed arthritis sample" (Buckelew et al., 1996, p. 101).

4.3.2 Representativeness of sample

An attempt was made to obtain a sample that would be representative of the target population: individuals with diabetes or arthritis whose illness-specific efficacy beliefs were still developing. Nevertheless, individuals who did not attend the classes may differ in some significant personal characteristic from those who did attend. Representativeness of the study sample is therefore not reliable.

4.3.3 Sample size

A minimum of 100 participants per group was required for factor analysis (Hair et al., 1998). With $\underline{N} = 100$, a significance level of .05 and an effect size of .4, the power would be .88 for one-tailed tests (Cohen, 1988). A subgroup sample of 100 would need

to have an effect size of .4, equivalent to a 7.7 point difference for the dependent variable PAIS. This is based on a standard deviation of 19.2 from an earlier study using a similar diabetes group sample (Rapley, 1989).

The trial study had indicated recruitment of at least 100 in each group would take two years. To account for attrition of approximately 20% from this longitudinal study, the projected initial sample size aimed for was 120 for each of the three groups. The initial sample (T_0) included 104 IU, 122 N-IU and 135 arthritis participants (see Fig 4.1).

	IU	N-IU	Arthritis
T_0	104	122	135
	↓	↓	↓
T_3	89	105	119
	↓	↓	↓
T_9	81	100	109

Figure 4.1: Sample size for groups at each test time.

Key: IU = Insulin using group. N-IU = Non- Insulin using group
T_0 = baseline data; T_3 = 3 month data; T_9 = 9 month data.

4.4 PROCEDURES FOR MAIN STUDY

Collection of data for the main study extended over 42 months. The investigator was solely responsible for the distribution, collection and collation of all questionnaires. All questionnaires were distributed and collected in the same way for the three groups.

4.4.1 Sampling procedures

The sampling plan for the three-group cohort study was purposive from the accessible populations. The target population for the study included individuals either recently diagnosed or attending a self-management class for the first time. The accessible population was drawn from self-management classes or by letter from relevant health professionals (see Fig 4.2). In the case of the self-management classes, time was allowed during refreshments for the researcher to explain the study. Those interested

were given a letter with details of the research, consent form and a return addressed envelope (Appendix A). This allowed individuals to take the information home, think about the commitment and return the consent form if still interested. The self-management classes approached were those conducted by the Arthritis Foundation in two Australian States, the Diabetes Association and several teaching and community hospitals in one State.

To maintain the recruitment for the arthritis group, Rheumatologists were also contacted in 1997 when the Arthritis Self-Management classes in Western Australia (AF-WA) were cancelled due to restructuring of the organisation. The classes were resumed in 1998 but approval to access the classes for study participants was only continued for the remainder of that year. An explanation for this was not provided nor sought. Volunteers with arthritis from the ASMC conducted by the Arthritis Foundation of Victoria were included when it appeared that the target number could not be reached in Western Australia before the ethics approval from AF-WA expired at the end of 1998.

Attendance at all self-management classes was voluntary in response to community advertisements placed by the relevant organisations and did not rely upon a recommendation from a health care professional. Neither a formal or informal relationship existed between the self-management courses and this study. Class participants were approached in week two of the six-week course and were requested to return the questionnaire within the week.

Diabetes* Educator	DAWA* Register	DAWA classes	Diabetic clinic classes x 5	Arthritis Foundation classes	Rheumatologist*

Group 1 (IU) n = 104	Group 2 (N-IU) n = 122	Group 3 (arthritis) n = 135
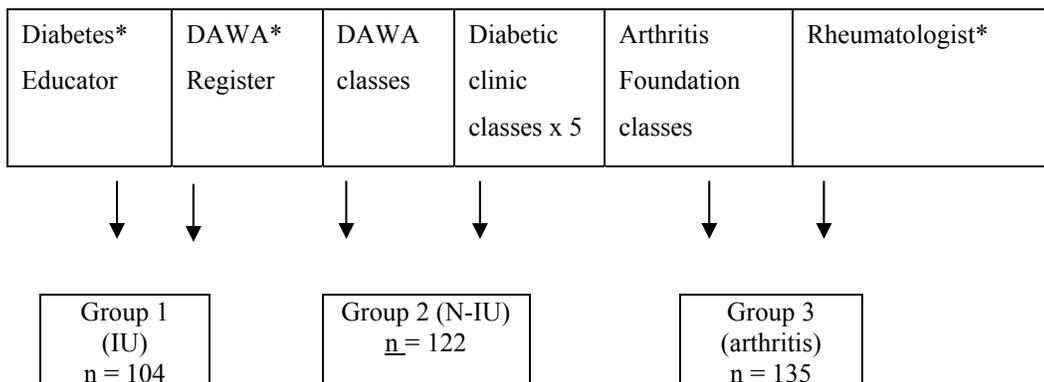
Figure 4.2: Source of sample recruitment – accessible sample.

Key: * Letters sent on behalf of researcher.
         DAWA – Diabetes Australia (Western Australia).

The self-management courses were a convenient source of potential participants for the research. It could, however, be argued that the difference in strategies used by both types of self-management classes would impact differently on the development of individual efficacy beliefs. Only the arthritis self-management course (ASMC) purported to be based on the four sources of efficacy information previously described in Chapter 3. The ASMCs in both Australian states from which participants were selected used the Arthritis helpbook (Lorig & Fries, 1990) developed to guide course content with emphasis on Bandura's (1977) efficacy enhancement strategies. By contrast, the diabetes self-management course did not purport to include self-efficacy strategies.

The Diabetes Association of Western Australia (DAWA), four Diabetes Educators and three Rheumatologists assisted by sending out letters to suitable patients explaining the research. The DAWA was able to identify newly diagnosed type 1 individuals from the register of members. Attached to the letter sent out by these groups was a consent form with return, postage paid envelope addressed to the researcher (see Appendix B). This meant that all of the insulin dependent / requiring (IU) diabetic group and 41 participants of the arthritis group were recruited through personal letters.

4.4.2 Data collection

Baseline data were collected on entry (T_0) to the study and at the first follow-up after a further three months (T_3) to measure early changes in efficacy beliefs specific to the person's condition. Nine months (T_9) was selected as the final data collection point after entry to the study in an attempt to balance the expected high attrition rate with a sufficient time period that would demonstrate change in the variables of interest.

Once the researcher received the consent form, the individual's details were entered on the code sheet for the appropriate group. The questionnaires were colour coded by illness group and data collection round. A covering letter that repeated the research details was sent with the appropriate colour-coded questionnaire and a return, self-addressed, postage paid envelope. The prepaid, commercially printed self-addressed envelope was A4 size with the University Logo and the address in large letters.

Each individual was tracked by the date of the questionnaire sent and returned. If the questionnaire was not returned within three weeks, a reminder telephone call was made to reduce attrition. Every effort was made to find missing mail, track participants who had moved and to prevent late return of questionnaires as attrition threatens the internal validity of a study.

Questionnaires that were sent out for the initial contact (T_0) included demographic information, the general Self-Efficacy subscale (common to all groups) and one of three specific self-efficacy scales. The arthritis group completed the Arthritis Self-Efficacy Scales (ASES) related to self-efficacy pain (PSE), self-efficacy function (FSE) and self-efficacy for 'other' arthritis symptoms (OSE). The IU group completed the Insulin Management Diabetes Self-Efficacy Scale (IMDSES) that covered diet, insulin and general management. The 11-item scale related to insulin use was modified (see 4.5.4.1) for the N-IU group by removing the four insulin-related items; otherwise the scales were the same. The questionnaires sent out at three months (T_3) and at nine months (T_9) included the GSE and the specific self-efficacy scales together with the self-report version of the *Psychosocial Adjustment to Illness (PAIS-SR)* booklet.

Table 4.1: Stages in Data Collection

1995						
Ethics approvals	June through to December					
Protocol trial: type 2 (n = 10)			Sept			
Protocol trial: arthritis (n = 20)				Oct		

	T_0			*	T_9	
1996 Main Study started						
Type 2 group data	May					
Type 1 group data		June				
Arthritis group data			July			
1999 Data collection completed						
Type 2 group data					February	
Type 1 group data						November
Arthritis group data						November

Key: * Individuals were tracked and contacted after three months in the study and again at nine months.
T_0 = entry to study. T_9 = final data collection at nine months.

4.5 INSTRUMENTS

The demographic questionnaire is described first, followed by the two scales that are common to all three groups and then the condition-specific scales. The two common scales were chosen because of their reported reliabilities in different studies. The disease specific scales were chosen because at the time they were the most appropriately worded for the target population, although psychometric testing was incomplete for the self-efficacy scale for the diabetes group. Only this latter scale needed to be modified to meet local content validity requirements. Factor analysis and reliability statistics from the extant literature is presented for each instrument.

4.5.1 Demographic questionnaire

Two variations of the demographic questionnaire were used - one for the arthritis group and one for each diabetic group. Questions were essentially the same, differing only to reflect the condition specific areas. Demographic data collected at baseline (T_0) included: Gender, age, age at diagnosis, education level, marital status, perception of life stress, body mass index (BMI) and type of diabetes/arthritis. Duration of illness was computed from *age* minus *age at diagnosis*.

The Body Mass Index was collected because of its importance in the self-care management of these illnesses. Weight reduction is often recommended for over weight people with arthritis to reduce the strain on weight-bearing arthritic joints.

Individuals with type 2 diabetes who can control their weight reduce the likelihood that insulin will be required.

The inclusion of a question about the type of diabetes or arthritis enabled verification of the study group. This was also used to limit the arthritis group to people with rheumatoid arthritis, osteoarthritis and fibromyalgia syndrome.

4.5.2 Psychosocial Adaptation to Illness

The Psychosocial Adjustment to Illness Scale (PAIS) (Derogatis & Derogatis, 1990) is a 46-item self-report scale developed to measure a person's adjustment to medical illness assessed on behavioural patterns or roles represented by the seven subscales and referred to as measures of functional domains (See Appendix G). The seven domains include *health care orientation* (8 items), *vocational environment* (6 items), *domestic environment* (8 items), *sexual relationships* (6 items), *extended family relationships* (5 items), *social environment* (6 items) and *psychosocial distress* (7 items). According to Derogatis and Derogatis (1990), the scale development process used a combination of rational-deductive and empirical strategies resulting in domains that contain relatively homogeneous items.

The self-report version of the scale *Psychosocial Adjustment to Illness (PAIS-SR)* included comprehensive instructions for participants. For example, participants were advised that the questions refer to the last 30 days, how to answer if hospitalised in this period, how to answer if they did not have a permanent partner, and how to interpret questions if they are not employed in the paid workforce as implied by many of the questions. The use of the word 'illness' was, however, not commented on. Previous research with this instrument (PAIS-SR) (Rapley, 1989) and anecdotal comments from current respondents indicated that individuals in these target populations do not see themselves as ill or having an illness. Prior to starting this study, a request to the copyright owners to change the word 'illness' to 'condition' throughout the questionnaire was denied.

An example of a typical verbal or written comment came from participant #190, who wrote:

> *I found the questionnaire very depressing because I do not consider having arthritis as an 'illness'. It is, in my humble opinion an 'ailment' which can be controlled.*

Factor analysis to confirm the PAIS structure was established on a lung cancer group (N=120) using varimax rotation that resulted in seven factors accounting for 63% of the variance. Although a few items were found to correlate with a factor representing another domain, the authors considered that the hypothesised structure was supported. Each factor (domain) included items relevant to individuals as well as to their interaction with others. For example, Derogatis & Derogatis (Derogatis & Derogatis, 1990) reported that the *Health Care Orientation* (HCO) items covered subjects' expectancies about the disorder and treatment together with their attitude towards doctors and treatment in general. *Psychological distress* measured feelings of depression, anxiety, lowered self-esteem and body image problems.

The reported external criterion measures for development of the PAIS included *Global Adjustment to Illness Scale, SCL -90-R General Severity Index, Affect Balance Scale (ABS) Index* and *Patient's Attitudes, Information and Expectancies Scale*. Derogatis et al. (1979) administered these scales and PAIS at the same point in time to 27 breast cancer patients (cited by Derogatis & Derogatis, 1990). All scales correlated with PAIS domain scores as the authors expected and in a pattern consistent with the construct definitions for each domain. The authors also reported several other studies that were able to demonstrate convergent relationships with scales that could be used as external criteria.

Support for the validity of the PAIS was provided also by the national Diabetes Control and Complications Trial (DCCT) in a report prepared by four authors on behalf of the DCCT Research Group (Jacobson, Barofsky, Cleary, & Rand, 1988). Specifically, PAIS was used as an alternate test for convergent validity of the 46-item

Diabetes Quality-of-Life (DQOL) measure. Significant ($p < .01$) correlations with the DQOL (total score) measure ranged from .34 to .63 for each of the domains when tested on a sample of 134 adults with type 1 diabetes. The *Impact generated by diabetes* subscale of the DQOL was also found to be significantly correlated with all PAIS subscales ($rs = .35$ to .58; $p < .01$). Only the PAIS subscale *Psychological distress* was significantly correlated with all DQOL subscales ($rs = .46$ to .55; $p < .01$).

One hundred and twenty patients, who screened positive for lung cancer and 86 patients who screened negative, were used to determine the predictive validity of PAIS. Comparisons on the PAIS domain and total scores indicated that "the majority of PAIS scales were able to discriminate between the psychosocial adjustment of a seriously ill group of patients and a procedurally similar control group..." (Derogatis & Derogatis, 1990, p. 29). In addition, Derogatis and Derogatis cited several studies that used more diverse illness groups as evidence for the sensitivity and predictive validity of the PAIS.

Reliability coefficients for PAIS subscales and a cardiac patient group ($N = 69$), renal dialysis group ($N = 269$) and a lung cancer group ($N = 89$) ranged from .62 to .93 (Derogatis & Derogatis, 1990) with two exceptions. The two exceptions included $\alpha = .47$ for *Health Care Orientation* (HCO) subscale (cardiac group) and $\alpha = .12$ for *extended family relationships* (lung cancer group). The *Psychological Distress* subscale was consistently high for the three groups ($\alpha s = .85$; .80; .81 respectively).

The reliability coefficients for a study (Rapley, 1991) involving type 1 and type 2 diabetes participants ($N = 98$) achieved alpha scores between .67 and .90 for the seven subscales with .94 for the overall scale. Similar to the reliability coefficients for the separate studies involving cardiac ($N = 69$) and renal dialysis ($N = 269$) groups discussed by Derogatis and Derogatis (1990), Rapley found HCO had the lowest coefficient score ($\alpha = .67$) and *Psychological Distress* the highest ($\alpha = .90$). This pattern did not fit the lung cancer group (Derogatis & Derogatis, 1990).

Items in the PAIS are rated on a four-point scale (0-3) of adjustment with higher ratings intended to indicate poorer adjustment. However, for this study the PAIS scores were reversed to provide consistency with other scales in the current study (higher equals better) and ease in interpreting the regression equation. Alternate items were reverse scored and the range changed to 1 to 4.

The developers believe that three levels of PAIS data can be used. The total score, the domain scores, and individual item scores can be used to form a comprehensive view of each person's adjustment to illness in general, as well as to particular domains of life. The reported usage of the instrument has included a total mean score (45/46 items) (Courts, 2000; Pollock, 1989; White et al., 1992; Willoughby et al., 2000), and its use as an individual domain score (Gerber et al., 1987). It has also been used as a reduced scale in which *sexuality* and *health care orientation* domains were excluded (Gilbar, 1997; Pollock, 1993). Most studies scored the items so that high scores on the 0-3 scale equated with poor adjustment, whereas White (1992) reversed the order so that low scores equated with poor adjustment. White's method is consistent with use of the scale in the current study.

In summary, the PAIS was considered a reliable and valid instrument that was appropriate to use in the current study.

4.5.3 General self-efficacy scale.

The general subscale of the Self-Efficacy Scale (GSE) (Sherer & Adams, 1983; Sherer et al., 1982) used in this study is a 17-item, five-point, Likert scale (See Appendix D). Higher scores equated with higher personal expectations of ability to initiate and persist with a course of action. The scale was reported to be based on Bandura's work (Bandura, 1977; Bandura, 1982), but was designed to measure self-efficacy unrelated to specific situations or behaviour. Items for the GSE were written to reflect the strength of efficacy belief as a willingness to initiate and persist with behaviour in difficult situations as well as with a willingness to make an effort to complete the task.

The original version of Sherer et al.'s (1982) 23-item self-efficacy scale (SE) had 36 items, which were reduced after psychometric testing. The factor analysis for the SE, using principal components analysis with varimax rotation was based on data from 376 introductory psychology students (Sherer et al., 1982). In that study, items belonging to a single factor were required to have a loading of .40 or above. Factor I ($\alpha = .86$) explained 26.5% of total variance and was labelled *general self-efficacy* (17 items). Factor 2 ($\alpha = .71$) explained 8.5% of the total variance and included items related to social situations (social self-efficacy – 6 items). The reduced 23-item scale was confirmed when administered to a new sample of 298 introductory psychology students. Sherer et al. (1982) suggested a possible split in the 17 item, general subscale to reflect *efficacy in the face of adversity* and *initiation / persistence*.

Construct validity testing was assessed with scales that measured other personality characteristics related to personal efficacy. Scales cited by Sherer et al. (1982) included *Internal-External Control Scale (I-E Scale)*, *Personal Control Subscale of I-E Scale*, *Marlowe-Crowne Social Desirability Scale, Ego Strength Scale*, *Interpersonal Competency Scale*, *Self-esteem Scale*. From the modest Pearson correlation results, the authors did not believe that the scales were measuring the same constructs. In addition, the expected positive and negative correlations were confirmed. For the general subscale, the six significant Pearson correlation scores ranged from $\underline{r} = -.29$ to $-.51$ ($\underline{p} < .01$). Five of the six external criteria scales were also significantly correlated with the social subscale ($\underline{r} = -.13$ to $.43$; $\underline{p} < .01$). *Ego strength* was significantly correlated with the general subscale only. Overall, the highest correlation ($\underline{r} = -.51$) was for the general subscale and *Self-esteem*. Low scores on the self-esteem scale indicated high self-esteem was moderately associated with high general self-efficacy. Further construct validation was also provided with another sample of 101 introductory psychology students and three other personality measures (Sherer & Adams, 1983). Similarly, Woodruff and Cashman (1993) were also able to confirm the scale's construct validity.

In relation to criterion validity, Sherer et al. (1982) reported that the general subscale was able to predict past success in vocational, educational, and military areas while the social subscale predicted past vocational success only. However, Sherer and Adams (1983) indicated that additional criterion validity studies were needed to evaluate the clinical utility of the Self-Efficacy Scale (p. 901).

Woodruff and Cashman (1993) repeated the reliability and factor analysis with 400 introductory management students. Their Cronbach alpha coefficients of .84 and .69 for the general and social subscales respectively, concurred with those of Sherer et al. (1982) (α = .86 and .71). In the factor analysis, although Woodruff and Cashman found the items to load on the same factors with only slight differences in correlation, the scree plot suggested a five or six factor solution (eigenvalues greater than 1.0). Their findings, after a five-factor solution and a varimax rotation, resulted in three factors within the general subscale items and two within the social subscale items. While the foci for the two subscales remained general and social, the additional sub-groupings of items were seen by the authors to represent magnitude, strength, and competence related to general efficacy belief together with strength and competence related to social efficacy belief. Woodruff and Cashman (1993) considered their findings from the factor analysis to be consistent with Bandura's idea of efficacy belief. Their suggestion of a split in the general subscale is also consistent with the tentative suggestion by Sherer et al. (1982).

By contrast, Earley and Lituchy (1991) found that their principal component analysis with varimax rotation of the 17-item subscale (GSE) suggested a single component explaining 48% of the variance with another three smaller components explaining only an additional 9% of the variance. This study sample included undergraduate business students ($\underline{N}$ = 100). The Cronbach's alpha for the 17-item subscale was reported to be .89.

Both Sherer (1990) and Woodruff and Cashman (1993) suggested more development of the SE scale and that it be tested outside the vocational / educational arena.

Concomitantly, Hays and Buckle (1992) sought to test the SE measure with hospitalised, mentally ill patients ($\underline{N}$ = 105). The psychiatric sample data were compared to the combined introductory psychology student data ($\underline{N}$ = 477) used by Sherer and colleagues (1982; 1983). When the mean scores for the patient and the student groups were compared, both subscales were found to differ significantly (general $\underline{t}$ = 3.76; social $\underline{t}$ = 2.74, $\underline{p}$s < .01). The psychiatric patients had a lower mean with a larger standard deviation for both subscales when compared to the psychology students. The results suggested that hospitalised psychiatric patients were less confident about their abilities in general and about their ability in social situations.

In summary, the PAIS was considered a reliable and valid instrument that was appropriate to use in the current study.

4.5.4 Condition specific self-efficacy scales

4.5.4.1 Diabetes Mellitus

The Insulin Management Diabetes Self-Efficacy Scale (Hurley, 1990) measures people's belief in their self-management ability related to insulin administration, blood-glucose monitoring and other diabetes activities of daily living. It was designed to be used as an assessment guide to complement diabetes education programs so those individuals with low efficacy beliefs could be assisted with specific competence building strategies.

The Insulin Management Diabetes Self-Efficacy Scale (IMDSES) (Hurley, 1990) was based on a 25-item, Likert-type, Diabetes Self-Efficacy Scale (DSES) developed for adults with diabetes, whether using insulin or not (Crabtree, 1986, with advice from Bandura, cited by Hurley, 1990 and Padgett, 1991). The instrument used with permission in the current study (IMDSES) was developed as a further refinement of the DSES for adults who use insulin. Access to the original DSES was not possible – Crabtree's unpublished 1986 doctoral dissertation.

Hurley (1990) reported that refinement of the six-point Likert-style scale included modifying Crabtree's original DSES using a literature review, information from

diabetes content experts and five patients who reviewed it for clarity and meaning with subsequent further evaluation by diabetes experts after patient input. Six experts reviewed the scale for its relevance to self-efficacy theory, conceptual distinction and clarity.

The two phases of empirical testing that followed (Hurley, 1990), using four different samples, included internal reliability ($\alpha \geq .6$), test retest stability, construct validity and exploratory factor analysis. Paired t-test indicated the scale means were unchanged ($\underline{t}$ (24) = .59, $\underline{p}$ < .56) from the test ($\underline{M}$ = 4.95) to the retest ($\underline{M}$ = 5.01) over mean duration of 22 days.

The construct validity of the IMDSES (total scale) was based on its correlation with GHb (biochemical marker of diabetes control) as well as its association with a behaviour scale (Hurley & Shea, 1992). The behaviour scale, also used as a total score, equated with the three domains of diet, insulin management and general diabetes management of the IMDSES. Since construct validity requires consistent findings from different studies using different theoretical structures (Carmines & Zeller, 1979), it may be too early to say that construct validity for IMDSES can be fully supported.

Based on published information, it would appear that the factor analysis for the IMDSES was completed with 4.5 participants per item (Hurley, 1990). Nine factors with an eigenvalue equal to or greater than one explained 69% of the variance. Hurley reported that five factors were interpretable and labelled them as dietary control, insecurity, general confidence, treatment decision, and discipline. Details about Bartlett's test of sphericity, which is useful when ratio is less than 5:1 (Tabachnick & Fidell, 1996), method of factor extraction, rotation method or item loading were not given.

In a later study, a 26-item IMDSES was reported by Hurley and Shea (1992) to have three internally consistent scales: general diabetes management (6 items, $\alpha = .67$), diet (7 items, $\alpha = .78$), and insulin (9 items, $\alpha = .77$). Two exercise and two foot-care items

complete the 26-item scale. Two insulin related items were removed from the 28-item version because "… almost all subjects strongly agreed with both items" (p.148). More recently, Cronbach's alpha for the 26-item scale was reported to be greater than .70 for each of the three scales in an adult Hispanic (N = 97) sample of insulin requiring persons (Bernal, Wooley, Schensul, & Dickinson, 2000).

As mentioned in the protocol trial discussion, the only change to IMDSES was the deletion of one diet-related item from the 28-item scale on advice from local Diabetes Educators as it referred to food exchange. This concept was not used in self-management classes for the local population. Items in the IMDSES were scored from 1 to 6 using a Likert format of strongly disagree to strongly agree with higher scores equating with higher specific efficacy beliefs. A 'not applicable' choice was available and recorded as missing data (Hurley & Shea, 1992). Although Hurley reported that a total score from the three scale scores could be used, the scale was not used in this way in the current study.

Hurley (1990) reported that during the development of the IMDSES items were worded as an act, not an outcome, items referred to one behaviour and were relevant to the present. For example, "I can recognise when my blood sugar is too high" or "I don't think I can follow my diabetes routine every single day". In addition, the word 'diabetic' was used as an adjective, not a noun and 'insulin' was used to replace the generic term 'medication'.

Preparation for the protocol trial involved checking the wording for relevance to the local target population. The 28-item self-efficacy scale (IMDSES) that was sent by Hurley for use in this study had three scales with two additional items each for exercise and foot-care. The three scales were labelled general management (6 items), diet (7 items) and insulin administration (11 items). Apart from the deletion of one diet-related item referred to on the previous page, changes made to the IMDSES prior to the protocol trial included the deletion of 'or urine' from three items. The 11-item insulin administration scale had four questions specific to insulin use and seven

questions related to frequency of blood-glucose self-management, recognition and treatment of blood glucose level variations. The final questionnaire used the 27-item IMDSES for the insulin using group (IU) and a reduced 23-item DSES for the non-insulin using group (N-IU). Only the reduced 23-item DSES was tested at step one of the study (see Appendix E).

In summary, modification of the IMDSES for use with the diabetes type 2 (N-IU) group in the protocol trial and the main study involved the removal of the four insulin specific items to create a 23-item questionnaire. The two questionnaires used for the IU (27 item) and the N-IU group (23 items) were identical except for the four insulin specific items excluded for the later group.

4.5.4.2 Arthritis

Arthritis Self-Efficacy Scales (Lorig et al., 1989a) refers to three separate self-report questionnaires: a 5-item self-efficacy pain scale (PSE), a 9-item self-efficacy function scale (FSE) and a 6-item self-efficacy for other symptoms scale (OSE) (see Appendix F).

Development of the ASES started with a 43-item self-efficacy questionnaire using participants recruited for an Arthritis Self-Management Course (ASMC) in 1984 ($\underline{N}$ = 97) and replicated in 1985 ($\underline{N}$ = 144) (Lorig et al., 1989a). Twenty-three items from a rheumatologist were tested and modified by three patient focus groups that also added an additional 20 items. The initial study to test the 43-item questionnaire, reduced the number of items to 25 by removing items that were not related to the total score, and by using the results of the principal component analysis with varimax rotation. The two components identified by the analysis were labelled self-efficacy for physical function (FSE) and self-efficacy for managing other arthritis symptoms (OSE). Item loadings ranged from .41 to .82. The eigenvalues or variance of the factors within each scale were 4.83 and 4.76 for FSE and OSE respectively. Internal reliability coefficients were found to be .93 and .90 respectively (Lorig et al., 1989a).

Correlations between three health status measures (Pain, Disability, Depression) at baseline and 4-month self-efficacy data established that the measures acted as self-efficacy theory predicted. That is, construct validity was supported with significant correlations ($p < .01$) between all measures at both times with FSE most highly related to disability and OSE most highly related to depression (Lorig et al., 1989a).

The concurrent validity test used a new arthritis sample of 43 people who completed the FSE scale by mail. A trained observer, blinded to FSE responses, observed actual performance compared with the person's perceived ability as measured by the FSE. A moderate correlation between the two was achieved ($r = .61$, $p < .01$) (Lorig et al., 1989a).

The replication study ($n = 144$) re-analysed the 43-item questionnaire in a second factor analysis which resulted in three factors from the 20 items retained. The factors were labelled FSE (9 items), OSE (6 items) and a new factor labelled pain management self-efficacy (PSE) (5 items). Eigenvalues were 4.47, 3.61, 2.11 for FSE, OSE and PSE respectively. Internal reliability alpha scores were .89, .87 and .76 respectively. Again, the three scales were correlated with present and future health status as predicted by self-efficacy theory. The three scales identified in the replication study were then applied to data from the initial 97-person sample. The scales were said to be supported by results from a confirmatory factor analysis (details not given) and internal reliability estimates (Lorig et al., 1989a).

4.6 ANALYSIS OF DATA

The SPSS statistical package (version 7.5) was used for descriptive and inferential statistics. The *explore* command was used to assess violations of normality of distributions, homogeneity of variance and univariate outliers. To test the five hypotheses non-parametric tests, one-way repeated measures MANOVA and regression analyses were used. See Fig 4.3 for the plan of hypothesis testing.
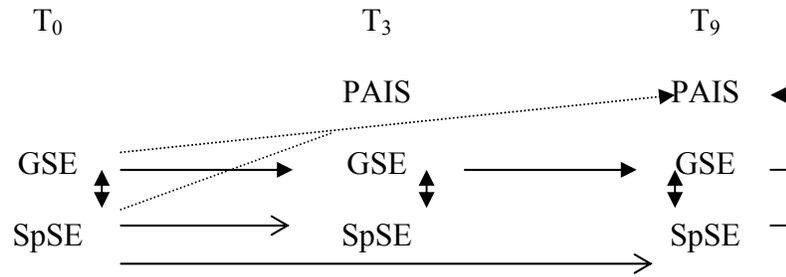
Figure 4.3: Plan of hypothesis testing

Key: GSE = general self-efficacy, SpSE = Illness-specific self-efficacy, PAIS = Psychosocial
adjustment to illness.

Hypothesis 1
Hypothesis 2
Hypothesis 3
Hypothesis 4
Hypothesis 5

The hypotheses from Chapter 1 are restated for convenience.

1. General efficacy belief will be stable over time.

2. Illness-specific efficacy belief will increase over time.

3. The strength of the relationship between general and illness-specific efficacy
   beliefs will increase over time.

4. A general efficacy belief (trait) is a better predictor of future adaptation to
   illness than illness-specific efficacy belief.

5. The influences of illness-specific efficacy beliefs, relative to general efficacy
   belief, are better predictors of concurrent adaptation to illness.

Power-efficiency of the non-parametric tests was a consideration as it was assumed
that many of the variables would depart substantially from normality. Use of
distribution free tests results in decreased power. According to Siegal (1956), power-
efficiency for Mann-Whitney and Kruskal-Wallis tests approach 95.5% as N increases.
Similarly, Spearman's rho is about 91% as efficient as Pearson correlation in rejecting
the null hypothesis for an equivalent sample size.

An adjustment for multiple comparisons in the current study was not considered necessary since all statistically significant and non-significant results will be reported. Regardless of the number of data sets, Rothman (1986; 1990) recommends the reporting of all findings regardless of 'statistical significance' rather than using an adjustment strategy. Rothman (1986) indicates that it is a mistake to believe that "… interpretation can be improved by adjusting the P-value or changing the criteria for "significance" " and, furthermore, that "… it merely produces a smaller Type I error at the expense of a greater Type II error" (p. 149). Rothman, however, does suggest that the number of false positive associations could be ascertained by multiplying the number of tests per hypothesis (*a priori*) by the level of significance. For example, N_{test} x .05 = number of "… statistically significant associations that occur only by chance" (p. 147). Most of the analyses for the current study will not involve simultaneous multiple analyses within the same comparison. For those that will, a notation about expected significant associations would be reported with the relevant table in the Results chapter.

Principal component (PC) analysis was used to determine component structures of each instrument. This process was guided by statistical and *a priori* criteria. The internal consistency (Cronbach's alpha) for all instruments was estimated. "Alpha provides a conservative estimate of a measure's reliability" (Carmines & Zeller, 1979).

Hierarchical multiple regression analysis was carried out after determining that the assumptions of linearity, normality and homoscedasticity and independence of error term could be met. In addition, potential multicollinearity of predictor variables or evidence of suppressor variables were considered (Hair et al., 1998). In order to control for the influence of illness duration on the variables of interest, *duration* was considered in each of the regression analyses.

4.7 ETHICAL CONSIDERATIONS

This study received the approval of the Curtin University of Technology Human Ethics Committee based upon NH&MRC guidelines, relevant ethics committee within

seven hospitals, the Arthritis Foundation (Western Australian and Victorian branches) and Diabetes Australia (WA). Ethical considerations included beneficence, respect for human dignity, justice, informed consent and protection of vulnerable participants. There were no costs to participants, other than their time to complete the questionnaires. The study procedures did not involve any foreseeable risks or harm beyond that associated with completing a questionnaire. All questionnaires were mailed to participants and returned in pre-paid, self-addressed envelopes.

Informed consent was obtained through a letter to all potential participants, disclosing details of the study, its purpose and procedures, potential benefits, expectations of participants, time commitments and telephone numbers to ask questions. An explanation about confidentiality and the right to withdraw from the study at any time without effecting treatment was also mentioned in the letter. Return of the signed consent form provided with the letter of invitation to join initiated the person's coded entry to the study. At the time of starting the study, participants' signatures were only required to be witnessed by one of the ten agencies from which permission was obtained. Hence, for the agency that required it, the researcher witnessed and signed the consent forms as they were completed during the class refreshment break.

Assurance of anonymity and confidentiality were maintained through the use of sealed envelopes for completed questionnaires and coding of data. The participants' forms were coded and stored separately from consent forms. One list of codes and corresponding names was held by the investigator and kept separate from the questionnaires. Access to the data was limited to the investigator and research supervisors. As required by Curtin University of Technology policy, all data will be kept locked in a secure place for five years from the date of completion of the study. Publications that arise from the study will not identify individuals.

4.8 SUMMARY

The reliability and validity of three scales to be used in the current study have been established and they will be used as intended by the developers. These include the

Psychosocial Adjustment to Illness Scale (Derogatis & Derogatis, 1990), Sherer et al.'s (1982) general self-efficacy subscale and the Arthritis Self-efficacy Scale (Lorig et al., 1989a). The only instrument to be modified is the Insulin Management Diabetes Self-efficacy Scale (Hurley, 1990). The change was needed to meet content validity for the local study participants. According to Nunnally (1978), cited by Redland and Stuifbergen (1993), content validity is sufficient when the intent is to show group differences. In the current study the repeated measures analysis will provide an opportunity for more testing of the scale and all instruments will be tested (reported in Chapter 5) to ensure they are reliable and valid before testing of the hypotheses occurs.

As part of the conclusions for this chapter, it should be said that the prior use and testing of instruments to be used in the current study varied considerably. The Psychosocial Adjustment to Illness Scale has been used in a variety of chronic illness studies. It has undergone extensive psychometric testing by Derogatis and Derogatis (1990), and further reliability and validity testing by others, including being used to test for convergent validity of the Diabetes Quality of Life scale (Jacobson et al., 1988). By contrast, Sherer et al.'s (1982) Self-Efficacy Scale has rarely been used in a chronic illness study, but its structure, reliability and validity have been confirmed in several vocational / education-based studies. The limited use of the scale in chronic illness research, however, is suggestive of its relevance beyond the vocational domain.

Likewise, the two illness-specific self-efficacy scales also have different histories. The 20-item Arthritis Self-Efficacy Scale (ASES) has been used over a decade or more by more than one research team involving a variety of arthritis groups and contexts. Its predictive validity and reliability was confirmed in each study. Most of the arthritis self-efficacy research has used the ASES. On the other hand the Insulin Management Diabetes Self-Efficacy Scale (IMDSES) started as an instrument for both insulin-using and non-insulin-using persons with diabetes. Both Hurley (1990) and Padgett (1991) modified the scale. The former developed the scale for use with an insulin-using sample, and the latter for use with a non-insulin-using sample. Of the two very different second-generation scales, only the IMDSES was subjected to further

psychometric testing (Hurley, 1990; Hurley & Shea, 1992). During the time in which the current study was undertaken, neither of the scales had been tested further. The IMDSES used in one recent study reported adequate internal reliability scores greater than .7 but their report of a "… confirmatory principle (sic) factor analysis …" (Bernal et al., 2000, p. 676) did not indicate factors as identified by Hurley. In essence, while the arthritis self-efficacy literature is based on a confirmed scale used in a variety of studies, the diabetes self-efficacy literature has rarely replicated studies and a consistently reliable and valid diabetes self-efficacy scale is yet to emerge.

CHAPTER 5: RESULTS

The purpose of the study was to examine the relative impact of general and illness-specific efficacy beliefs on psychosocial adaptation to illness. Descriptive, non-parametric and multivariate statistics were used to describe the sample and test the hypotheses stated in Chapters one and four. Results of the psychometric tests for the four instruments will be discussed prior to the presentation of tests of hypotheses.

5.1 INITIAL ANALYSIS

The results of the univariate analyses are presented first. A significance level of alpha equal to .05 was used for all statistical tests and the SPSS default settings were used unless stated otherwise.

Non-parametric techniques were used for bivariate analyses as the significance level for the Kolmogorov-Smirnov statistic (with Lilliefors correction) was less than .05 for all but two subgroup demographic variables. For example, demographic variables that were assumed to be normally distributed included *age* for the IU group and for males in the total study sample. However, the only demographic variables to have a significant Levene statistic, unequal variance, were gender and illness group comparisons for both *duration* of illness and *education*.

Transformations were undertaken to improve normality for hypothesis testing and reduce outliers that would influence the regression analysis. The method of transformation chosen was to square the variable. Although outliers were reduced, normality statistics were only partly improved. Fox (1991) suggested that when values are stacked at the boundary, transformations do not usually work. After transformation, normality could be assumed for the arthritis group's GSE scores at each time, ASSE at each time and PAIS at T_3. The IU group could be assumed to have a normal distribution for PAIS at T_9.

After transformations, equality of variance could be assumed for most variables compared across the three illness groups, across the diabetic and arthritis groups or by

gender. Variables not found to have equal variance included the diabetic group comparisons of the *self-treat* subscale for DSES at T_0 and T_3, together with PAIS at T_9 for the three illness groups.

Missing values were not replaced in this study. From the participants who returned the questionnaire at each test time, three cases (one from each group) were deleted because all of their responses to one of the key variables of interest were missing. One IU and one N-IU participants did not complete the relevant diabetes specific self-efficacy scale at T_9. One arthritis participant did not complete the GSE at T_0 . This was not noticed until data collection was completed. Pairwise deletion (SPSS option) was used to manage missing cases.

Post hoc analysis of variables created to compare the group of respondents ($\underline{n} = 323$) who completed all items with the group with incomplete data ($\underline{n} = 38$) indicated a significant difference in relation to duration of illness (Mann-Whitney Z = -3.07, $\underline{p} =$ .002). The 'complete-respondent' group had a *duration* of illness mean score of 3.93 years ($\underline{SD} = 7.48$), compared to a mean of 11.11 years ($\underline{SD} = 14.03$) for the 'incomplete' data group. No significant differences were found between the complete and incomplete data groups for *age* in years, *gender*, *illness* group, *duration* of illness, *education* level, *marital* status, BMI or perception of life *stress*.

Furthermore, comparing the group who responded to all GSE items ($\underline{n} = 345$) with the group with one or more missing responses ($\underline{n} = 16$), no significant differences were found in relation to *age*, *gender*, *illness* group, *duration* of illness, *education* level, *marital* status, level of perceived life *stress* or BMI. The GSE scale was used for the comparison analysis, as it was the only instrument common to all groups when the initial data were collected.

5.1.1 Sample Description

The final sample consisted of 361 adult participants. The sample composition included 104 insulin using individuals (IU group: insulin dependent type 1 diabetes mellitus or insulin requiring type 2 diabetes mellitus), 122 non-insulin requiring type 2 diabetes

mellitus (N-IU group), and 135 participants in the arthritis group (see Table 5.1). The arthritis group included rheumatoid arthritis ($\underline{n}$ = 54), osteoarthritis ($\underline{n}$ = 67) or fibromyalgia ($\underline{n}$ = 14).

The response rate was variable. For example, when volunteers were sought through direct contact with the researcher at the self-management classes, the response rate was 60-90% per class. Letters from diabetes educators or medical practitioners, on behalf of the researcher, were least effective at around 25 – 40% response rate per health care professional. In the case of the IU group, this rate was based on verbal feedback from the diabetes educators who had made personal approaches. The researcher withdrew seven participants recruited through arthritis self-management classes because they did not fit the inclusion criteria for arthritic conditions. The conditions excluded were systemic lupus ($\underline{n}$ = 1), ankylosing spondylitis ($\underline{n}$ = 2), and psoriatic arthritis ($\underline{n}$ = 4).

Table 5.1: Number of participants in the study at entry, three months and nine months

Group	0 mths	3 mths	9 mths	% Retained
Insulin using[#]	104	89	81	77.88
Non-insulin using	122	105	100	81.97
Arthritis (total)	135	119	109	80.74
Rheumatoid	(54)	(45)	(42)	
Osteo-arthritis	(67)	(63)	(56)	
Fibromyalgia	(14)	(11)	(11)	
Total	**361**	**313**	**290**	**80.33**

Key: (arthritis subgroups).
Refers to newly diagnosed insulin using diabetics (insulin dependent type 1 individuals and type 2 insulin requiring individuals).

Reasons for individuals withdrawing before completing the questionnaires at three and nine months included insufficient time to complete a large questionnaire or a major change in health status. In addition, participants were lost to the study because they changed their address or telephone number, return of questionnaires by the participant was more than two months late or the questionnaires were not received. In the latter case, when contacted, some participants declared it had been posted, while others took the opportunity to withdraw.

5.1.2 Age and Gender Demographics

The age range for the study sample ($\underline{N} = 361$) was 18 to 82 years ($\underline{M} = 53.57$; $\underline{SD} = 14.67$ years) with the assumption of normality not met as data were negatively skewed. The *age* ranges for each of the three illness groups were 28-82 years ($\underline{M} = 56.72$) for the arthritis group, 18-81 years ($\underline{M} = 44.31$) for the insulin using (IU) group and 26-81 years ($\underline{M} = 57.98$) for the non-insulin using (N-IU) group. The mean *age* for the combined diabetic group was 51.69 years. See Table 5.2 for means and standard deviations by group. The mean age for the arthritis and the N-IU group reflect the increasing incidence with age. The mean age for the IU group, however, was higher than was expected with only newly diagnosed type 1 participants because of the inclusion of insulin using type 2 participants. An upper age limit was not used, as this would have extended the time for recruitment and would not have enabled comparisons across the wide age-range relevant to the target population. The descriptive statistics for each group reflected population statistics relevant to the target population for this study.

The gender balance was approximately equal for two of the three illness groups. Males in the IU group represented 54.8%, with N-IU males 51.6%. The percentage of males in the arthritis group was 29.5%. A significant difference was found in gender composition for the arthritis group (χ^2 {1, $\underline{N} = 135$} = 43.92, $\underline{p} < .001$).

Table 5.2: Mean & standard deviation (SD) for selected demographic variables by group.				
Variable	**Arthritis ($\underline{n}$=135)**	**IU ($\underline{n}$=104)**	**N-IU ($\underline{n}$=122)**	**Diab ($\underline{n}$=226)**
	$\underline{M}$ (SD)	$\underline{M}$ (SD)	$\underline{M}$ (SD)	$\underline{M}$ (SD)
Age (years)	56.72 (12.58)	44.31 (16.20)	57.98 (11.71)	51.69 (15.51)
BMI*	2.79 (.89)	2.61 (.93)	3.26 (.74)	2.96 (.89)
Duration (years)*	7.94 (12.12)	4.05 (5.64)	1.61 (3.36)	2.73 (4.70)
Median	2.0	1.0	0	0

* See table 5.3 for missing values.
BMI = Body Mass Index, ordinal variable (1-4) based on the formula kg/m^2.
Diab = combined IU and N-IU groups.

5.1.3 Duration of Illness

One of the inclusion criteria for the study was to include individuals diagnosed for less than one year. This was only partially achieved in the time frame. The sampling

method, however, resulted in the *duration* of illness being positively skewed ($\underline{M}$ = 4.67 years, median = 1 year, $\underline{SD}$ = 8.64 years, range = 0-69 years). Although the mode for the three illness groups was zero, indicating less than one year since diagnosis, the median for the arthritis and IU groups was two years and one year respectively (see Table 5.2). The variability evident in the large standard deviation reflects the inclusion of participants who were not recently diagnosed but attending a self-management course. The one missing case was a male from the arthritis group, aged 82 years, who did not report age at diagnosis and for whom *duration* could not be computed.

When combined, the mean *duration* of illness for the two diabetic groups was 2.73 years compared to the arthritis group mean of 7.94 years. Duration of illness was found to be significantly different for the three illness groups (Kruskal Wallis χ^2 (2) = 42.68, $\underline{p}$ < .01). Further analysis using Mann-Whitney test indicated a significant difference ($\underline{z}$ = -5.55, $\underline{p}$ < .01) for duration of illness between the total (combined) diabetic group compared to the arthritis group. Similarly, a significant difference was found between the two diabetic groups ($\underline{z}$ = -3.53, $\underline{p}$ < .01).

5.1.4 Body Mass Index

The BMI is an ordinal scale of 1 to 4 representing underweight, normal, over-weight and obesity respectively. Table 5.2 shows that the N-IU diabetic group had the highest mean BMI (3.26) indicating 40.2% who were overweight and 41.8% who were obese. See Table 5.3 for the BMI category differences. More than one third (41.3%) of the IU group were within the normal BMI range with 24.0% and 21.2% in the overweight and obese categories respectively. The high number of missing data for this question, especially for the arthritis group, was because these individuals were not able to provide weight and or height details to enable the BMI to be calculated.

5.1.5 Education Level

The question related to education level had nine categories that ranged from less than year 10 high school, to postgraduate diploma or higher. The educational level for each chronic illness group was predominantly year 12 or less. Specifically, 51.9% of the IU group, 64.2% of the N-IU group and 52.2% of the arthritis group indicated their

education level to be year 12 or less (See Table 5.3). Given the mean age for the total study sample and for each of the groups, this finding was to be anticipated.

Table 5.3: Frequencies and percentages (%) for selected demographic variables by group.			
Variable	**IU**	**N-IU**	**Arthritis**
Gender - males	57 (54.8)	63 (51.6)	29 (21.5)
Education:			
Year 12 or less	54 (51.9)	77 (64.2)	70 (52.2)
Apprenticeship / trade	18 (17.3)	12 (9.8)	7 (5.2)
Certificate (non-trade)	8 (7.7)	11 (9.0)	12 (8.9)
Diploma	5 (4.8)	7 (5.7)	15 (11.1)
Bachelor degree	11 (10.1)	7 (5.7)	14 (10.4)
Postgraduate or higher	6 (5.8)	2 (1.6)	10 (7.4)
Other	2 (1.9)	4 (3.3)	6 (4.4)
Missing	-	2 (1.6)	1 (.7)
Body Mass Index:			
<20 (underweight)	9 (8.7)	1 (.8)	6 (4.4)
20-25 (normal)	43 (41.3)	18 (14.8)	39 (28.9)
25.1-30.0 (overweight)	25 (24.0)	49 (40.2)	36 (26.7)
>30 (obese)	22 (21.2)	51 (41.8)	28 (20.7)
Missing	5 (4.8)	3 (2.5)	26 (19.3)

5.1.6 Perception of life stress

The question related to perception of life *stress* at T_0 used an ordinal scale that ranged from one (not at all) to six (excessively). The mean score for the sample was 3.26 (<u>SD</u> = 1.35).

Chi-square analysis of perception of life *stress* by the three illness groups indicated a significant difference (χ^2 {10, <u>N</u> = 360} = 21.35, <u>p</u> = .019). Specifically, the two diabetic groups were significantly different in relation to *stress* (χ^2 {5, <u>n</u> = 225} = 14.61, <u>p</u> = .012) with the non-insulin using group (N-IU) having the lower mean for the two diabetic groups. Perception of life stress was significantly lower for the N-IU group than the IU group. Perception of life *stress* for the arthritis group was not significantly different from either of the two diabetic groups with a mean between that of the two diabetic groups. Further analyses of *stress* found no significant gender differences for the two diabetic groups, analysed together or separately, but a significant gender difference for the arthritis group (χ^2 {5, <u>N</u> = 135} = 11.58, <u>p</u> = .041) was found. The mean score for the larger female group was 3.41 (<u>SD</u> = 1.31)

compared to the male group with 3.03 (<u>SD</u> = 1.43), suggesting that perception of life stress was greater for females in the arthritis group.

Additional analyses explored the influence of *duration* of illness and perceived life *stress*. A Spearman's rho indicated the correlation between perception of life *stress* and *duration* of illness was non-significant for the study sample or for each illness group and gender.

5.2 FACTOR ANALYSIS

Statistical and *a priori* criteria, as suggested by Hair et al. (1998) were used to guide the factor analysis process for the instruments discussed in Chapter 4. All variables in the scales were interval level (Likert-type), not substantially heterogeneous and were not themselves causally related (Graetz, 2000).

Principal component (PC) analysis was chosen as the extraction method as its purpose is to "… summarize most of the original information (variance) in a minimum number of factors for prediction purposes" (Hair et al., 1998, p. 100). The discussion of the process, however, will refer to factors for consistency with literature discussed in this section. Although the processes of principal component and factor analysis are similar, it is recognised that they are not the same. Principally, all of the variance is analysed in PC compared to only shared variance for factor analysis.

The choice of rotation method was balanced between two. First, an orthogonal (varimax) solution would be better for subsequent use in the regression analysis, but the solution may not be meaningful. Secondly, a meaningful solution is more likely from an oblique rotation method (Hair et al., 1998). Initial PC extractions with orthogonal and oblique rotations did not show marked differences in initial analyses for each instrument. Varimax rotation was chosen because of the desirability to have orthogonal data for the regression analysis. For each scale, the iterative process continued until statistical adequacy, simple structure and meaningful factors were obtained. Missing values were handled by pair-wise deletion.

Determination of factors was based on statistical and *a priori* criteria. An eigenvalue greater than 1.0 at first rotation and Cattell's scree test (1966) were used initially. The final solution was influenced by theoretical support (interpretable) and previous research findings. A desirable aim was to have the minimum number of factors that would explain the most variance.

Significant loading was based on sample size with factor loadings of .30 being acceptable when sample size is greater than 350 (Hair et al., 1998). However, Comrey and Lee (1992) suggested that a factor loading of .32 was poor, regardless of sample size. In addition, Stevens (1992) advocated that larger samples still needed factor loadings of .5 or higher to be considered strong. With this ambiguity, a factor loading of .5 was considered significant for this study. Sample size for all analyses were greater than the minimum of 100 suggested by Hair et al.

After determining a simple solution and interpretable factors, the item scores for each factor were summed and the mean used as the factor/scale score (Hair et al., 1998). Hair et al. suggested that the creation of a summed scale should meet four criteria. Specifically, the scale should have a theoretical basis, that items in the scale represent a single concept and that the scale has internal reliability and validity. The first three criteria, as they relate to this study, will be discussed in the relevant section for each scale. Scale validity was discussed in the previous chapter.

5.2.1 Statistical adequacy for scale factorability

The criteria for sufficient evidence for factorability of scales included a significant Bartlett test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy that was greater than 0.6. Furthermore, the measure of sampling adequacy for individual variables needed to be greater than 0.6. See Table 5.4 for initial analysis details about the instruments Psychosocial Adaptation to Illness (46-item PAIS), General Self-Efficacy (17-item GSE), Arthritis Self-Efficacy Scale (20-item ASES) and the Diabetes Self-Efficacy Scale (20-item DSES).

Table 5.4: Factorability statistics for each of the scales in the study: Principal component analysis with varimax rotation.

	GSE	PAIS [a]	ASES	DSES[b]
Bartlett test	$\chi^2 =1652.26$ df = 136, $\underline{p} < .001$	$\chi^2 =4720.53$ df = 1035, $\underline{p} < .001$	$\chi^2 =1449.94$ df = 190, $\underline{p} < .001$	$\chi^2 =1330.65$ df = 190, $\underline{p} < .001$
KMO	.852	.908	.838	.794
MAS	$\geq .78$	$\geq .43$	$\geq .72$	$\geq .65$
Eigenvalue	4	10	4	5
Scree test	2	9/10	4	5
Ratio	21:1	5.8:1 [a]	6.5:1	11:1

[a] T_3 based on the 46-item scale
[b] rationale for the 20-item DSES is explained in section 5.2.4
KMO = Kaiser-Meyer-Olkin measure of sampling adequacy.
MAS = measure of sampling adequacy for individual variables.
Eigenvalues = number of factors suggested by eigenvalues greater than 1.0.
Ratio = subject to variable ratio at T_0.

5.2.2 General Self-Efficacy (GSE)

The 17-item *general* subscale of Sherer et al.'s (1982) 23-item scale was used in the analysis. The study group ($\underline{N}$ = 361) had an acceptable subject to variable ratio of 21:1 for the GSE instrument at T_0 (Tabachnick & Fidell, 1996).

5.2.2.1 General Self-Efficacy factors and statistical adequacy

In the initial analysis, the eigenvalues greater than 1.0 criterion indicated four factors explaining 52.91% of total variance. The eigenvalues were 5.24, 1.62. 1.09 and 1.04 respectively. The last two factors only added a further 12.5% of explained variance. Cattell's scree test (1966) suggested two factors. There was one complex variable (variables with a significant loading on more than one factor) and there were no significant loadings on the variable with the lowest communality. The communality (multiple R^2) values after extraction for each variable in the set ranged from .35 to .71. The four-factor solution was not interpretable.

5.2.2.2 *A priori* criterion

The developers of the 23-item General Self-Efficacy Scale (Sherer & Adams, 1983; Sherer et al., 1982) determined a two-factor solution and that the first factor in their analysis (general subscale) accounted for 26.5% of the variance. The authors also made a tentative suggestion that this 17-item subscale could be two factors reflecting "initiation / persistence" and "efficacy in the face of adversity" (Sherer et al., 1982 p.

666). Using the *a priori* criterion, the analysis for the 17-item scale to be used in the current study was respecified as a two-factor solution.

In the current study, after respecifying the analysis, simple structure was achieved with 16 of the 17 variables having one significant loading on one factor. Variables loaded on the same factor regardless of rotation method. Variable 2 did not have a significant loading on either factor (I = .31; II = .40) and was removed. This variable also had the lowest (.39) factor loading in Sherer et al.'s (1982) study. Similarly, although not the lowest, variable 2 was low (.38) in the Woodruff and Cashman (1993) study. See Table 5.5 for results of the two-factor structure - without variable two.

No complex variables were evident at the significance level determined. Of relevance to later discussion, variable 14 had the lowest communality at T_0 for the whole sample (.29) and for the female group (.26). Nevertheless, it was retained as it had MSAs greater than .70 and had significant factor loadings for the whole group at each test time as well as for the male group.

The two factors reflected negative and positive belief in one's ability. Factor one included variables suggestive of "negative belief about initiation or persistence behaviours". Factor two variables reflected "positive belief in one's ability", including perceived ability to cope with problems. The two-factor solution for the 16-item scale explained 41.62% variance in GSE and both had eigenvalues greater than two after rotation. This finding concurred with 26.5% explained variance for the equivalent scale in Sherer et al.'s study.

Variable number, wording and factor loading		I	II
12	I avoid trying to learn new things when / look too difficult for me.	.762	
16	I give up easily.	.690	
7	If something looks too complicated, I will not even bother to try it.	.680	
11	When unexpected problems occur, I don't handle them well.	.625	
10	When trying to learn something new, I soon give up if I am not /	.617	
5	I give up on things before completing them.	.574	
17	I do not seem capable of dealing with most problems that come up/	.569	
6	I avoid facing difficulties.	.536	
4	When I set important goals for myself, I rarely achieve them.	.535	
14	I feel insecure about my ability to do things.	.533	
9	When I decide to do something, I go right to work on it.		.721
3	If I can't do a job the first time, I keep trying until I can.		.668
8	When I have something unpleasant to do, I stick to it until I finish.		.656
1	When I make plans, I am certain I can make them work.		.544
13	Failure just makes me try harder.		.514
15	I am a self-reliant person.		.506
Explained Total Variance = 41.62%	Eigenvalues =	4.03	2.63
Total scale α = .85	Alpha for each factor	.84	.70

Table 5.5: Results of principal component analysis with varimax rotation of the 16 general self-efficacy variables.

[a] Rotation converged in 3 iterations

/ = words left out of table. Full wording in Appendices.

I = negative initiation / persistence belief.

II = positive belief in one's ability.

There could, however, be an alternative interpretation for the two-factor solution (Carmines & Zeller, 1979). Carmines and Zeller suggested that a method artefact, such as a response set, accounted for this type of result. When variables that formed a factor were worded in a similar way ("can do" or "can't do"), it was likely that a single theoretical dimension had been contaminated by the response set. Carmines and Zeller suggested that construct validity testing was needed to resolve the ambiguity. Construct validity testing was not an option in the current study. Others, however, have confirmed the construct validity for the univariate 17-item scale (Sherer & Adams, 1983; Sherer et al., 1982; Woodruff & Cashman, 1993).

5.2.2.3 Stability of General Self-Efficacy structure

Replication of T_0 structure at T_3 and T_9 indicated that the two-factor structure was stable. All items consistently loaded highly on the same factor. At T_3 and T_9 the two factors together explained 44.38% and 46.36% of variance in GSE respectively. Using the same level of significance for loadings, three variables at T_3 did not meet the .5

significance level (variables 1, 10 & 13). Each loaded correctly but just below selected significance level (.490 - .493). Similarly, at T_9, two variables (1 & 5) loaded below significance (.45 and .49). Although these loadings were not deemed to be significant in this study, other researchers with a similar sample size had used .40 as a significant loading (Sherer et al., 1982; Woodruff & Cashman, 1993).

To test the robustness of the 16-variable factor structure the sample was divided by gender. Using PC with varimax rotations resulted in similar factor loading to the total sample at T_0. For the female group ($\underline{n} = 212$), variable 14 loaded correctly on factor I (.47) but below the designated significance level for the current study. Variable 14 loaded correctly (.61) for male participants. In addition, three variables in the smaller male group ($\underline{n} = 149$), loaded below the .5 significance level (.44 to .48). Nevertheless, the PC for both gender groups resulted in factor variables that had their major loading on the same factor as the overall sample. It could, therefore, be argued that the scale was robust.

5.2.2.4 General Self-Efficacy Reliability

The internal consistency analysis (Cronbach's alpha) for the total 16-item GSE exceeded the generally accepted threshold level of .70 for acceptance at each testing time (.85; .87; .88 respectively). See Table 5.6 for comparisons with other studies. Relative standard deviation is reported because of the variability in range of scores between Sherer et al.(1982) and subsequent reports.

The scale alpha was not improved by the removal of variables at any of the testing times. The Cronbach's alpha for the 10-item and 6-item factors (.84; .70 respectively) were also acceptable at each test time (Hair et al., 1998). Specifically, the alpha scores for the larger, *negative* efficacy belief factor (I) ranged from .84 at T_0 to .86 at T_9. The alpha scores for the *positive* efficacy belief factor (II) ranged from .70 at T_0 to .76 at T_9. Moreover, the average measure of intraclass correlation coefficient of reliability for the 16-item scale was .88 ($\underline{F}$ {284, 568} = 8.34, $\underline{p} < .01$). Specifically, the test-retest indicated stability of GSE over nine months.

Table 5.6: Cronbach's alpha reliability analysis of GSE scale as determined by others compared to T_0 data for the current study

	Items (N)	Alpha	Mean score	Rel SD	Age range
Sherer et al., 1982	17 (376)	.86	172.65 *	15.82	
Sherer & Adams, 1983	17 (101)		64.31	13.34	
Rapley, 1989	17 (99)	.85	82.1	13.28	17-91
Hays & Buckle, 1992	17 (105)		57.5	21.04	18-73
Woodruff & Cashman, 1993	17 (400)	.84			
Current study #	16 (361)	.85	62.94	16.52	18-82

\# Alpha was not improved by the deletion of items.
* 14 point scale. Remainder were 5-point scales.

5.2.3 Arthritis Self-Efficacy (ASES)

The arthritis group ($\underline{n} = 135$) had an acceptable subject to variable ratio for the 20-item ASES (Tabachnick & Fidell, 1996). The significant factor loading criterion was retained at .5 or greater.

5.2.3.1 Arthritis Self-Efficacy factors

Initially, both the scree test and eigenvalues greater than 1.0 criterion indicated four factors explaining 64.84% of total variance. Initial eigenvalues were 7.49, 2.53, 1.66 and 1.29 respectively. The communality (multiple R^2) values after extraction for each variable in the set ranged from .40 to .81. The variables with communalities less than .5 may need to be deleted. The four-factor solution was not interpretable. In addition, the .5 loading criteria was not met for variable three.

The analysis was re-specified as a 3-factor solution to reflect scales used in the literature. However, to achieve simple structure that was interpretable using PC extraction method with varimax rotation, the 20-item scale needed to be reduced. Specifically, to achieve a single significant loading for each variable on only one of the three factors, the ASES scale needed to be reduced to 17 items.

5.2.3.2 *A priori* criterion

The developers of the 20-item Arthritis Self-Efficacy Scale (Lorig et al., 1989a) initially found a 2 factor solution ($\underline{N} = 97$) using PC with varimax rotation. (Detail discussed previously in methods chapter – section 4.5.4.2.) Their later analysis with another sample ($\underline{N} = 144$) determined a three factor solution with factor loadings greater than .40. Since the three-factor structure did not replicate well for the sample

collected for the current study, the two-factor structure was explored. Lorig et al. (1989a) had stated their preference was for a three subscale instrument but also that "… the choice between 2 or 3 instrument subscales was largely arbitrary." (p. 44).

After respecifying as a two-factor solution, simple structure was achieved with all 20 variables having a significant loading on one of the two factors, both of which were interpretable. Complex variables were not evident. This structure replicated the original two factor structure of the ASES (Lorig et al., 1989a) with similar eigenvalues, after rotation, for both factors (see Tables 5.7 and 5.8). The FSE (function) factor did not change its structure with either solution. The second factor included variables from PSE (Pain) and OSE (Other) and was renamed "arthritis symptom management" (ASSE) for this study. The items in the factor referred to the person's perceived level of confidence in the ability to manage arthritis symptoms generally - fatigue, pain and frustration.

5.2.3.3 Stability of Arthritis Self-Efficacy structure

Repetition of T_0 analysis for T_3 and T_9 data indicated that a two-factor solution best suited the data. All items consistently loaded on the same factor. Although variable 1 had the lowest communality at T_0 and T_9 (.243; .299 respectively), and it only loaded .486 at T_0, its MSAs were greater than .6 at both times (.77; .81 respectively). It was retained in the analysis because it loaded significantly at T_3 and T_9 (.62; .53 respectively).

Table 5.7: Results of principal component analysis with varimax rotation of the 20 Arthritis Self-Efficacy Scale variables.

	Variable number, wording, and factor loading [a]	I	II
10	Cut 2 bite-size pieces of meat with a knife and fork in 8 seconds.	.819	
14	Put on a long-sleeved front-opening shirt or blouse / 8 seconds.	.815	
9	Button and unbutton 3 medium size buttons / in 12 seconds.	.803	
13	Get in and out of the passenger side of the car without assistance/	.741	
11	Turn an outdoor faucet all the way on and all the way off.	.699	
12	Scratch your upper back with both your right and left hands.	.660	
6	Walk 100 feet on flat ground in 20 seconds.	.638	
7	Walk 10 steps downstairs in 7 seconds.	.577	
8	Get out of an armless chair quickly, without using your hands/	.541	
19	How certain / you can manage your arthritis symptoms so that /		.720
15	How certain are you that you can control your fatigue.		.703
16	How certain / regulate activities / without aggravating arthritis.		.698
20	How certain / you can deal with the frustration of arthritis.		.693
18	/ how certain / you can manage arthritis pain / daily activities.		.680
5	How / make a large reduction / methods other than / medication.		.656
2	How certain / you can continue most of your daily activities.		.652
4	How / make a small-to-moderate reduction / other / medication.		.644
3	How certain / can keep arthritis pain from interfering with sleep.		.605
17	How certain / can do something to help yourself feel better /		.579
1	How certain are you that you can decrease your pain quite a bit.		.486
Explained total variance = 50.081%		5.07	4.95
	Eigenvalues		
(Total scale α = .9062)	Alpha for each factor	.885	.877

[a] Rotation converged in 3 iterations   / = word left out of table. Full wording in Appendix.
I = Functional ability efficacy belief (FSE). II = Arthritis symptom management efficacy belief (ASSE).

5.2.3.4 Arthritis Self-Efficacy Reliability

The internal consistency analysis (Cronbach's alpha) for the 20-item ASES met the generally accepted lower limit of .70. By way of comparison with other studies, the alpha values for the Lorig et al. (1989a) scales of FSE, PSE and OSE at T_0 were .88; .78; .88 respectively. The Cronbach's alphas for the two factors identified by principal component analysis in the current study were equally strong at each testing time. The combined OSE-PSE renamed ASSE achieved alphas of .88, .87 and .90 from T_0 to T_9. The scale FSE, which was the same in the three-factor as the two-factor solution, achieved .89 and .85 for T_3 and T_9 respectively. The scale alphas could not be improved by the removal of variables at any of the testing times. See Table 5.8 for comparison with Lorig et al.'s study. According to Carmines and Zeller (1979), scales with an alpha of .80 or more have very little random measurement error.

Table 5.8: Cronbach's alpha reliability analysis of ASES scales as determined by Lorig et al. Compared to T_0 data for the current study

ASES	Items (N)	PSE	OSE	FSE
2 factor ASES				
Lorig – initial	20 (97)	Na	.90 [a]	.93
Current study #	20 (121)	Na	.88	.88
3 factor ASES				
Lorig – replication	20 (144)	.76	.87	.89
Lorig – confirmatory	20 (97)	.75	.87	.90
Current study [b] #	20 (121)	.78	.88	.88

[a] OSE refers to the label used by Lorig et al. (1989a) but includes all items from OSE and PSE in her study and the same items re-labelled *arthritis symptom management self-efficacy* (ASSE) in the current study.

[b] Comparative analysis of the 20-item, 3 scale ASES structure (Lorig et al., 1989).

Alpha was not improved by the deletion of items.

5.2.4 Diabetes Self-Efficacy (DSES)

The instrument Insulin Management Diabetes Self-Efficacy Scale (IMDSES) was developed for individuals using insulin and was reported as being stable and internally consistent (Hurley, 1990; Hurley & Shea, 1992). Testing of the IMDSES involved individuals with type 1 or type 2 diabetes who used insulin to control their blood glucose. The factor structure for the IMDSES had not been reported and in the current study, the sample size for the IU group was insufficient for factor analysis of the IMDSES.

It was, however, possible to determine an instrument that was common not only to both diabetic groups but which could also be stable across time. The factor analysis process was initiated with the 23 questions that were common to both questionnaires – the DSES. Levene's test for equality of variance across the two diabetic groups indicated that responses for 20 of the 23-item Diabetes Self-Efficacy Scale (DSES) could be said to be from the same population. Only variables 15,18 and 20 were found to be significantly different across the two diabetes groups ($p > .05$). In addition, a Mann-Whitney U test indicated a significant difference between the two groups at T_0 for two of the three questions in which variance was unequal, and one other ($z = -2.40$, -2.37, -4.03, $ps < .02$). Since the Levene Statistic is the more conservative, it was decided to use the Mann-Whitney U results to determine the variables to be removed

before factor analysis. The factor analysis process was undertaken after the removal of the three questions that were significantly different at T_0 (variables 5, 15 & 20).

The diabetic group (n = 226) had an acceptable subject to variable ratio of 11:1 for the subsequent 20-item DSES (Tabachnick & Fidell, 1996). The significant factor loading for this scale was retained at .5 or greater (Hair et al., 1998).

5.2.4.1 Diabetes Self-Efficacy factors

Initially, both the scree test and the eigenvalues greater than 1.0 criterion indicated five factors explaining 57.34% of total variance in DSES. Initial eigenvalues were 4.98, 2.17, 1.69, 1.50 and 1.14 respectively. The communality values after extraction for each variable ranged from .45 to .72. Variable 21 had the lowest communality and did not correlate with any other variable more than .3. It did not add significant information and was considered for deletion. In addition, the correlation coefficient indicated that two more variables could be redundant in that they only correlated with each other (.38). After rotation, variables 21 and 14 loaded at less than .5 and only four of the five factors were interpretable. Variables 21 and 14 were removed and the analysis repeated for an 18-variable solution.

Varimax rotation resulted in a five-factor solution that was interpretable (see Table 5.9). The five factors explained 60.73% of total variance at T_0. The factors were labelled efficacy beliefs about ability to carry out diabetic *routines* (4 variables), confidence in the ability to *self-treat* (5 variables), *certainty* belief (4 variables), efficacy belief about *diet* (3 variables) and belief about ability to *exercise* (2 variables). These labels are similar to those mentioned by Hurley (1990) and are referred to in section 5.2.4.2.

Four of the labels for the current study describe the task-related nature of the derived efficacy factors. Confidence in the ability to undertake tasks associated with being able to "follow diabetic routines and fit into lifestyle"; being able to "self-treat when remedial action is required"; "follow diet"; and "exercise". The positive form of Hurley's "insecurities" was used for the fifth factor. Although the four variables that

formed this factor were negatively worded, the sample used in this study had a high factor mean indicating that most participants were more certain than uncertain about self-care. A response set was not seen to be implicated as one other negatively worded variable consistently loaded with its positive counterpart (exercise). See Table 5.9 for specific loadings. Factor loadings ranged from .58 to .83 and no complex variables were evident.

5.2.4.2 *A priori* criterion

The report of the factor analysis for the IMDSES (Hurley, 1990) was limited by the research design in that the analysis had 127 participants for the 28 items; less than the minimum requirement for factor analysis. The author reported that the eigenvalue greater than one rule suggested nine factors explained 69% of the variance. Although no details were given about the method of analysis or rotation method used, it was reported that five factors were interpretable. The only details provided were the labels for the five factors: "… dietary control, insecurity, general confidence, treatment decision, and discipline" (p. 39).

5.2.4.3 Stability of the Diabetes Self-Efficacy Scale structure

Repetition of T_0 analysis for T_3 and T_9 data indicated that a five-factor solution had a stable structure. The 18 variables replicated the factor structure at T_9, although one variable loaded correctly but at less than .5 (.45). The five-factor solution explained 62.51% of total variance – sacrificing 5.8% by being reduced from six to five factors. At T_3 the 18 variables explained 61.81% of total variance with five factors (unforced). Four factors replicated the T_0 solution. The fifth (*routines)* factor only had two primary loadings although it had two correct secondary loadings at less than .5. The latter two variables had their primary loading on *self-treat*.

Table 5.9: Results of principal component analysis with varimax rotation of 18 DSES variables at T_0.

Variable number, wording and factor loadings.		I	II	III	IV	V
22	I can fit my diabetes self-treatment routine into my usual lifestyle.	.752				
23	I think I'll be able to follow my diabetes plan even when / routine changes.	.681				
1	I can carry out practically all of the self-care activities in my daily routine.	.663				
2	I am confident in my ability to manage my diabetes.	.660				
16	I can recognise when my blood sugar is too high.		.716			
17	When I feel sick, I can test my blood more than I routinely do.		.714			
18	I can do what was recommended to prevent low blood sugar reactions.		.710			
19	I can figure out what self-treatment to administer when my blood sugar /		.602			
13	I can figure out when to call my doctor about problems with my feet.		.582			
3	I feel unsure about having to use what I know / self-treatment every day.			.758		
4	I don't think I can follow my diabetes routine every single day.			.741		
9	I'm not sure I'll be able to follow my diabetic diet every day.			.693		
8	I'm not sure / my diabetic diet when the people around me don't know that/			.652		
6	I can stay on my diabetic diet when I eat in familiar / (such as a friends house).				.826	
7	I can stay on my diabetic diet when I eat in unfamiliar places.				.797	
10	When I go to parties, I can follow my diet plan.				.676	
12	I can't exercise unless I feel like exercising.			.		.777
11	I can exercise several times a week.					.765
Total scale α = .816; Alpha for each factor		.75	.72	.72	.76	.61
Explained variance = 60.73% Eigenvalues		13.94	13.36	12.59	12.44	8.40

[a] Rotation converged in 7 iterations   / = words left out of table. Full wording in Appendices.

I = Efficacy belief about ability to follow diabetes *routines*.
II = Efficacy belief related to perceived ability to *self-treat*.
III = Belief related to *certainty* with diabetes management.
IV = Efficacy belief about ability to manage *diet*.
V = Efficacy belief about ability to *exercise*.

5.2.4.4 Diabetes Self-Efficacy reliability

The internal consistency analysis (Cronbach's alpha) for the total 18-item DSES scale at T_0 was .82. Four of the five subscale alphas at T_0 were above .7 and ranged from .76 (3-item *diet*) to .61 (2-item *exercise*) (see Table 5.10). The only alpha value below .7

at T_3 and T_9 was for the two-variable factor *exercise* (.58 and .55 at T_3 and T_9 respectively). The low alpha levels for the exercise factor reflected the average inter-item correlation of .4 for a two variable scale (Carmines & Zeller, 1979). The more modest alpha value indicated random measurement error was greatest for the two-variable factor. The greater the random error the harder it is to detect associations and therefore the greater the risk of a Type II error.

The higher alpha values for *diet* confirmed prior reliability tests of the scale (Hurley, 1990; Hurley & Shea, 1992). Furthermore, the alpha for the *diet* scale could be increased from .7 to .8 by the deletion of the same question at each test time. The question so identified was: "When I go to parties I can follow my diet plan".

Table 5.10: Cronbach's alpha reliability analysis of scales for current study (T_0) compared to others.							
Study	**N**	**Diet 7 items**	**Insulin 11 items**	**General 6 items**			**Total**
Hurley – initial [a]	118	.78	.62	.68			.82
Hurley & Shea, '92[b]	142	.78	.77	.67			.86
		Diet 3 items	**Self-treat 5 items**	**Routines 4 items**	**Uncert 4 items**	**Exer 2 items**	
Current study IU [c]	226	.76†	.72+	.75	.72	.61	.82

[a] 28-item Insulin Management Diabetes Self-efficacy Scale (IMDSES). Only the 24 items that formed the three subscales stated above had alphas reported. The other four items in the scale were about foot care and exercise.

[b] 26-item IMDSES. As above but two less items in the insulin management scale.

[c] 18-item DSES scale based on current study sample.

+ Alpha could be improved by more than 0.1 with the deletion of one item.

† Alpha could be improved by more than 0.4 with the deletion of one item.

5.2.5 Psychosocial Adaptation to Illness (PAIS)

The study group ($\underline{N}$ = 313 & 290 at T_3 & T_9 respectively) did not have an acceptable subject to variable ratio for the 46-item PAIS instrument (Tabachnick & Fidell, 1996). Pairwise deletions for missing values resulted in the analysis N range being reduced to 234 from 310 and 218 from 287 respectively. The *sexuality* subscale items ($\underline{n}$ = 6) were removed because they had a high number of missing values. Consequently, the subject to variable ratio was able to meet the minimum level (5:1). Subsequent

removal of other variables for statistical reasons during the factor analysis process also increased the analysis N and ratio.

5.2.5.1 PAIS factors and statistical adequacy

In the initial analysis of T_3 data, the eigenvalues greater than 1.0 criterion and Cattell's scree test indicated ten factors explained 66.10% of total variance. The communality (multiple R^2) values after extraction for each variable in the set ranged from .4 to .84. One variable had a communality value less than .5 and was subsequently deleted as it failed to load at .5 significance level. After rotation, five of the ten factors agreed with the findings of Derogatis and Derogatis (1990). In addition, *health care orientation* was split over two factors and two others were interpretable with the tenth factor consisting of one variable. While there were no complex variables, two variables did not meet criteria for a significant loading. Similar results were also found for the T_9 data, although, with 11 factors explaining 68.54% of variance in PAIS.

5.2.5.2 *A priori* criterion

In order to compare with the published factor structure (Derogatis & Derogatis, 1990), a PC extraction with varimax rotation forced a seven factor solution on the 46-item data for T_3. This solution only explained 58.79% of variance in PAIS. However, except for the first factor, a similar structure emerged in that the factors *sexuality*, *psychological distress* and *social* replicated the published lung cancer patient study (N = 120) (Derogatis & Derogatis, 1990). Furthermore, as for the cancer study and the current study, *health care orientation* was split across two factors. In the cancer patient study, the most complex factor was *domestic environment,* which had significant loadings on three factors and loaded on two factors in the current study. Similarly, in both studies, four variables had not loaded at the .5 level. Repetition of this exercise for the T_9 data achieved similar results but required 42 iterations.

A series of analyses followed to achieve a solution that was interpretable and could explain maximum variance. The variables related to the subscale *sexuality* (n = 6) were removed from the analysis at this stage because all items had more than 50 missing cases per item and the item had previously been excluded with a similar sample (Pollock, 1986) and a cancer sample (Gilbar, 1997). Missing values create power

problems. Other variables were removed from the analysis for each iteration if they did not have a significant loading on one factor or if classified as a complex variable with two significant loadings. The MSAs for two variables were less than .5 but were retained as they consistently formed an interpretable two-variable factor, *self-care* adjustment. They only correlated with each other (.391). Variables with low communalities (< .5) after extraction were also considered for deletion, but if variables met factor-loading criterion they were retained. Removal of too many variables is more of a threat to scale validity than to reliability (see Table 5.11 for details of T_3 analysis).

The final 31-item solution included seven factors at T_3 (65.21% variance), but subsequently reduced to six factors (61.81%) to match T_9 analysis. The factors confirmed four of the six domains (*psychosocial distress*, *social environment*, *health care orientation*, *extended family*) (Derogatis & Derogatis, 1990). The 5-item *extended family* domain also included two additional items from another domain (domestic environment). These two items had theoretical relevance to extended family as "social support within the family". A further five-variable factor, consisting of items from two of the original domains, was interpretable as adjustment in *role functions*. The sixth factor consisted of two variables from the original *health care orientation* (HCO) domain and was interpreted as *self-care* adjustment. These two variables differed from the other items in the HCO domain that were more related to service and resources provided by health care practitioners. See Table 5.12 for comparison of T_3 data with published factor structure (Derogatis & Derogatis, 1990). The Spearman's rho correlation coefficient for the 46-item scale and the 31-item scale at T_3 and T_9 indicated the reduced scale was an adequate substitute ($r_s = .97$; $r_s = .96$, $p < .01$ respectively). The PAIS-SR is included as an attachment.

Var #	I	II	III	IV	V	VI
7.2	.778					
7.6	.764					
7.1	.760					
7.4	.757					
7.5	.690					
7.3	.672					
5.1		.757				
5.5		.754				
5.3		.684				
5.2		.677				
3.4		.592				
5.4		.578				
3.6		.538				
2.1			.782			
3.7			.711			
2.2			.696			
3.3			.687			
2.5			.617			
6.2				.735		
6.1				.734		
6.5				.697		
6.4				.595		
6.6				.590		
6.3				.498		
1.6					.722	
1.3					.717	
1.4					.712	
1.8					.708	
1.7					.590	
1.2						.812
1.1						.812

Table 5.11: Results of principal component analysis with varimax rotation of 31 PAIS variables at T_3.

Components: I = Psychosocial distress   II = Extended family support   III = Role function
            IV = Social environment   V = Health care orientation   IV = Self-care
# See attached questionnaire for full details of question wording.

5.2.5.3 PAIS Reliability

This analysis was carried out on two instruments. First, the 46-item scale for comparison with other studies and secondly, the 31-item scale used in multivariate analyses for the current study. The internal consistency analysis (Cronbach's alpha) of the seven subscales that formed the 46-item PAIS (T_3) exceeded the threshold of .70 and were in accordance with other studies (Derogatis & Derogatis, 1990; Pollock, 1986; Rapley, 1989) (see Table 5.13).

The reliability coefficients (Cronbach's alpha) for the 31-item PAIS at T_3 and T_9 were also acceptable (.93; .94 respectively). Furthermore, five of the six factors identified for this study met the accepted minimum .70 threshold at each test time. The alpha for the two-variable factor at T_3 was only .55, but increased to .65 at T_9.

Table 5.12 Comparison of principal component analysis with varimax rotation for PAIS in the current sample and one other study				
	Current study (T_3)[a]		**Lung cancer [b]**	
Analysis N	266-309		120	
Number of items	31		45➤	
KMO	.915			
Total scale: Factors / % Explained variance	6	61.81%	7	63%
PAIS dimensions:	**Factor**	**%**	**Factor**	**%**
Health care orientation	V ($\underline{n} = 5$)	9.37	I ($\underline{n} = 8$)	18
Vocational environment	III ($\underline{n} = 5$)	11.91	II ($\underline{n} = 6$)	10
Domestic environment	*Role function*		III ($\underline{n} = 8$)	9
Sexual relationships	-	-	IV ($\underline{n} = 6$)	8
Extended family	II ($\underline{n} = 7$)	11.93	V➤ ($\underline{n} = 4$)	7
Social environment	IV ($\underline{n} = 6$)	11.24	VI ($\underline{n} = 6$)	7
Psychological distress	I ($\underline{n} = 6$)	12.67	CII ($\underline{n} = 7$)	5
Self-care *	VI ($\underline{n} = 2$)	4.69		

[a] Rotations converged in eight iterations.   [b] Derogatis & Derogatis (1990).
* new factor (eigenvalue = 1.45 after rotation).
➤ = one variable did not load at .35 or higher: Derogatis & Derogatis (1990) replaced it with two others.
Reduced combination of two original factors.

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Table 5.13: Comparison of Cronbach's alpha for PAIS in the current study (T_3) compared to others

	Current [a]	Current [b]	Cardiac [c]	Lung Ca[c]	Rapley [d]	Pollock [e]
Analysis N	157 – 308	259 – 310	69	89	99	60
Items (range)	46 (1-4)	31 (1-4)	46 (0-3)	45 (0-3)	46 (1-4)	31 (0-3)
Mean score	154.76	102.0			23.6	14.70
SD	21.23	14.77			19.2	11.16
	α	α	α	α	α	α
Total scale	.95	.93			.94	.89
Health orient'n	.73+	.78	.47	.83	.67	-
Vocation envir't	.80	.87	.76	.87	.78	.83
Domestic envir't	.80	Role funct	.77	.68	.85	
Sexual rel'ships	.86+	-	.83	.93	.88	
Ext'd family	.83	.83	.62	.12	.73	.82
Social environ't	.87	.87	.80	.93	.89	
Psych distress	.88	.88	.85	.81	.90	.80
Self-care	-	.55 [†]				

* = range of Analysis N for T_3;   + scale α increased if one item deleted.
[a] Current 46-item for comparison only;   [b] Current study 31-item scale
[c] Derogatis & Derogatis, 1990; [d] Rapley, 1989;   [e] Pollock, 1986.
[†] α = .65 at T_9.
Reduced combination ($\underline{n}$ = 5) of two original factors.

5.3 INDEPENDENT VARIABLE ANALYSIS

5.3.1 General Self-Efficacy (GSE)

The scores for the five-point, 16-item, general self-efficacy scale (GSE) ranged from two to five and high scores indicated higher general efficacy belief. The total sample mean scores were 3.93 ($\underline{SD}$ = 0.65), 3.91 ($\underline{SD}$ = 0.68), 3.92 ($\underline{SD}$ = 0.69) for respective times. Mann-Whitney tests of GSE at T_0 to T_9 indicated no significant differences between the arthritis and diabetic group as a whole or separately or between the two diabetic groups.

Based on a median split of mean GSE scores at T_0, the characteristic *high general self-efficacy* was found in 186 participants with 175 in the *low self-efficacy* group. A

crosstabs analysis of percentage of the three illness groups in each of the high / low GSE categories at each test time was non-significant. Levene's test indicated equality of variance for the high and low GSE groups in relation to age, duration of illness, education, marital status but not BMI. By comparison, a Mann-Whitney U test found no significant differences between the two GSE groups in relation to age, duration of illness, marital status or BMI. Perception of life *stress* (six categories) was found to be significantly different (z = -2.22, p = .03; 2-tailed) with the high general efficacy group having a lower mean for *stress*. The education level of the study sample (nine categories) was also significantly different for the two groups (z = -2.19, p = .03; 2-tailed). The high GSE group had the higher education mean. In summary, individuals with a general belief in ability that was greater than the median GSE score were more likely to perceive life stress as less and to have attained a higher level of education.

5.3.2 Diabetes Self-Efficacy (DSES)

The five scales identified in the factor analysis for this study were efficacy beliefs about ability to manage diabetic *diet,* ability to carry out diabetic *routines, certainty* associated with diabetes management, beliefs about ability to *exercise,* and to *self-treat*. The scale scores ranged from one to six with higher scores indicating higher diabetes-specific efficacy beliefs. The mean for each of the scales ranged from 4.3 (*exercise* T_3) to 5.35 (*routines* T_0) indicating data that were negatively skewed. Seven of the 15 scales had a median score of 5.0 or more. The standard deviation ranged from 0.82 (*routines* T_0) to 1.5 (*exercise* T_0).

One of the five DSES subscales (*routines*) had left skewed data with a concentration of maximal scores at the boundary (ceiling effect) at each test time. Although participants were chosen soon after diagnosis to take advantage of changes in scores over time, most participants scored highly on the *routines* scale at each test time (M = 5.35; 5.32; 5.34 respectively).

Mann-Whitney tests of the five diabetes-specific scale scores (squared) by diabetes type were non-significant for all variables, although, gender differences were identified at T_3 and T_9. Specifically, for all T_0 DSES scales, no significant differences

were found. Significant gender-related differences (2-tailed) were found for efficacy beliefs about *diet* at T_3 ($\underline{z}$ = -2.10, $\underline{p}$ = .036), *exercise* at T_9 ($\underline{z}$ = -2.71, $\underline{p}$ = .007) and *certainty* belief at T_9 ($\underline{z}$ = -2.34, $\underline{p}$ = .019). Descriptive statistics for gender mean scores indicated that females had significantly higher (better) efficacy belief about *diet* at T_3, whereas, males had significantly higher efficacy belief about *exercise* (more positive) and were significantly more certain about diabetes management abilities at T_9.

See Table 5.14 for a summary of significant differences for each of the diabetes-specific scale scores. Given the factor analysis process previously described, it is not surprising that no significant differences were found for T_0 data in relation to diabetes type, but gender-related differences were also not evident at T_0.

Table 5.14: Summary of significant differences for each of the DSES subscales (squared) by gender for the combined diabetic group #			
DSES **Score range 1-6**	**N items**	**Mean (SD)**	**Grouping variable** [a]
Self-treat T_0	5	23.75 (10.03)	
T_3		24.64 (9.80)	
T_9		25.23 (9.88)	
Certainty T_0	4	20.81 (10.72)	
T_3		22.38 (10.79)	
T_9		23.09 (10.57)	Gender [b]; $\underline{z}$ = -2.34, $\underline{p}$ =.019
Diet T_0	3	20.97 (9.93)	
T_3		21.0 (9.97)	Gender; $\underline{z}$ = -2.10, $\underline{p}$ = .036
T_9		21.21 (9.89)	
Routines T_0	4	29.26 (7.63)	
T_3		29.09 (8.02)	
T_9		29.24 (8.04)	
Exercise T_0	2	20.96 (11.75)	
T_3		20.61 (11.81)	
T_9		21.58 (11.27)	Gender; $\underline{z}$ = -2.71, $\underline{p}$ = .007

[a] No significant differences by diabetes type.   [b] Mann-Whitney test (2-tailed).
15 tests x .05 = 0.75 significant results expected by chance.

After transformation, only efficacy beliefs about diabetic *routines* continued to have outliers (13 outliers represented by 11 cases) across the three testing times. It could be argued that the large number of outliers for *routines* was due to the concentration of

maximal scores at the boundary with very high mean scores. By contrast, however, outliers were not evident for *exercise*, which, after transformations, also had concentrations of maximal scores at the boundary but the mean scores were lower. Transformation for 12 of the 15 variables had drawn outliers toward the rest of the data (Fox, 1991).

5.3.3 Arthritis Self-Efficacy (ASES)

The two scales identified in the factor analysis for this study were arthritis efficacy belief about *functional* abilities (FSE) and management of *arthritis symptoms* (ASSE). The scale scores ranged from one to six and higher scores indicated higher arthritis-specific efficacy beliefs. The mean scores for the three ASSE variables ranged from 3.92 (SD = 1.14) at T_0 to 4.15 (SD = 1.12) at T_9. The mean scores for the three FSE variables ranged from 4.49 (SD = 1.33) at T_0 to 4.73 (SD = 1.07) at T_9. A Mann-Whitney test of gender comparisons for the arthritis specific scales found no significant differences.

5.3.4 Hypothesis testing (1 – 3)

Hypotheses one to three were applied, as appropriate. That is, to the total sample, to the arthritis group and to both diabetic groups combined into one group. Type of diabetes might be considered to be a confounding variable since the majority of participants were in the N-IU group. A Mann-Whitney test indicated no significant differences between the scores for the two diabetic groups in relation to the 15 diabetes-specific scales and GSE at each test time. The two diabetic groups were therefore combined for hypothesis testing.

The 16-item GSE was used as a total score (squared) for hypothesis testing for two reasons. First, the part played by method artefact in the two-factor solution for the GSE scale (positive and negative aspects of general efficacy beliefs) was not tested in this study. Secondly, the construct validity of the univariate 17-item scale had been established by others (Sherer & Adams, 1983; Sherer et al., 1982; Woodruff & Cashman, 1993).

Hypothesis 1

General efficacy belief will be stable over time.

To test this hypothesis a repeated measures MANOVA was conducted. The general efficacy belief scores (squared GSE) over time were used as the multiple dependent variable and the impact of age, gender, education, perceived life stress and three illness groups were the independent variables. As required for a general linear model, the independent variables were categorical (Munro & Page, 1993). Sphericity and equality of variance for GSE over time was assumed as neither Mauchly's test of within-subject effects nor Levene's test were significant. However, the assumption of multivariate homogeneity (Box M Test) was not met (M {12, 332038} = 22.95, $\underline{p}$ = .031). Munro and Page (citing Finn & Mattson, 1978) suggest that if "… the assumptions of the univariate model are met, the univariate analysis should be used, because it is more powerful and requires fewer subjects" (p. 164). Therefore, the univariate tests of significance were used.

The univariate between-subject effects indicated that *education* and *stress* were significant ($\underline{F}$s {1, 278} = 7.79 and = 19.05, $\underline{p}$s < .01 respectively). The repeated measures analysis suggested that there was no change in general efficacy belief over time, but that variations in general efficacy belief were related to the perceived level of stress or education level.

Before accepting the null hypothesis in relation to the change in general efficacy belief over time, the probability of making a Type II error was explored using Solo Power Analysis (Hintze, 1991). The lowest bivariate correlation coefficient for GSE at each test time (T_0:T_9 = .6) and the T_9 sample size were used in the analysis. Specifically, with a sample of 289, effect size set at .2 and α = .01, the probability of rejecting the null hypothesis when it was false was .98. The probability of a wrong decision was .02.

The hypothesis that general efficacy does not change over time was supported. Furthermore, age, gender and illness group did not have an impact on GSE.

Hypothesis 2

Illness-specific efficacy beliefs will increase over time.

A Wilcoxon signed-rank test was used to test this hypothesis, as several variables were not normally distributed. This test was used to compare the means between baseline (T_0) and T_3 and between T_0 and T_9. In relation to the arthritis-specific variables (squared), a significant difference (z = -2.118, p = .034; 2-tailed) between T_0 and T_9 efficacy belief related to symptom management (ASSE) was found. The means for FSE and ASSE increased at each test time but the only significant increase was for ASSE between T_0 and T_9 (see Table 5.15).

Table 5.15: Wilcoxon signed-rank test comparison of mean scores for illness-specific variables (2 groups) separated by three and six months (T_0, T_3, T_9).

Specific efficacy beliefs	M rank	-ve	M rank	+ve	Z (T_0-T_3)	Z (T_0-T_9)
Arthritis group:						
FSE (function) T_0: T_3	47.2	50	55.63	52	-.890	
T_0: T_9	40.9	45	50.10	45		-.833
ASSE (symptom) T_0: T_3	51.73	50	55.99	57	-.940	
T_0: T_9	46.56	41	53.24	59		**-2.118***
Diabetic group #:						
Diet T_0: T_3	78.77	71	71.57	78	-.009	
T_0: T_9	72.21	70	69.81	71		-.101
Self-treat T_0: T_3	78.32	75	81.50	84	-.836	
T_0: T_9	69.83	71	81.47	80		-1.449
Certainty T_0: T_3	77.09	72	85.88	91	-1.877	
T_0: T_9	71.06	59	76.78	89		**-2.528***
Routines T_0: T_3	62.48	63	62.52	61	-.152	
T_0: T_9	59.86	70	68.04	56		-.463
Exercise T_0: T_3	66.12	65	62.83	63	-.403	
T_0: T_9	59.56	60	62.42	61		-.303

* p < .05 (2-tailed)   # 10 tests x .05 = 0.5 significant results expected by chance.

A comparison of the diabetes-specific variables (five) indicated a similar trend of increasing means over time. However, only the *certainty* variable increased significantly from T_0 to T_9 (z = -2.53, p = .011; 2-tailed). The means for three of the five diabetes-specific efficacy beliefs increased between each test time. By contrast, the mean for *routines* was marginally (.01) lower than T_0 at T_9. The mean for *exercise* was lower at T_3 than T_0 but increased at T_9.

The hypothesis that illness-specific efficacy beliefs will increase over time was only partially supported. Certainly a trend in the predicted direction was evident but not sufficient to remove the risk that results were due to chance. The negatively skewed data, especially the ceiling effect for *exercise* and *routines* variables for the diabetic group, made it harder to demonstrate a significant increase over time. The long left tail caused by a few individuals with low scores resulted in estimated standard deviations that perhaps overstated the true variance in scores. Consequently, larger effects between scores were needed to demonstrate statistical significance.

Hypothesis 3

The strength of the relationship between general and illness specific efficacy will increase over time.

To test the above hypothesis, a Spearman's rho correlation coefficient of GSE (squared) with illness specific variables (squared) indicated that, overall, the strength of the relationship between concurrent general and illness-specific efficacy beliefs increased over time (see Table 5.16). For example, the correlations between arthritis symptom management (ASSE) and general efficacy belief increased from T_0 (r_s = .243, p < .01) to T_9 (r_s = .552, p < .01). By contrast, for confidence related to *functional* abilities (FSE), the correlation was low, but significant at T_0 (r_s = .217, p < .05), non-significant at T_3 and returned to an increased correlation with GSE at T_9 (r_s = .245, p < .05).

Variations to the trend for the diabetic group related to the variables *certainty* and diabetic *routines*. Significant correlations for the two variables with GSE increased from T_0 to T_3 but remained the same for *certainty* at T_9 and lower for beliefs about *routines* at T_9. Nevertheless, the increased correlation with GSE from T_0 to T_3 for *routines* was substantial, with T_9 stronger than T_0 data. A non-significant correlation between GSE and *diet* at T_0 and T_3 was also lower at T_3 than T_0. However, the increased correlation between *diet* and GSE for T_9 was significant (r_s = .240, p < .01).

Table 5.16: Spearman rho correlation for general and illness specific variables over time (T_0, T_3, T_9) #.

	GSE-T_0	GSE-T_3	GSE-T_9
Arthritis grp	**(n = 131)** [a]	**(n = 116)** [a]	**(n = 109)** [a]
FSE	.217*	.175	.245*
ASSE	.243**	.343**	.552**
Diabetic grp	**(n = 226)**	**(n = 191)** [a]	**(n = 178)** [a]
Diet	.127	.059	.240**
Exercise	.234**	.313**	.351**
Certainty	.288**	.305**	.305**
Routines	.195*	.266**	.239**
Self-treat	.123	.191**	.201**

* p < .05;   ** p < .01   [a] minimum N for the analysis.
# number of tests x .05 = 0.3 and 0.75 respectively: significant results expected by chance

The hypothesis was supported because the correlation between all illness specific variables and GSE increased from T_0 to T_9.

5.4 DEPENDENT VARIABLE ANALYSIS

The 31-item PAIS will be used as a total score (squared) for hypothesis testing. The developers of the scale intended it to be used either as an individual domain scores or as a total scale score that reflected adjustment to illness in several domains (Derogatis & Derogatis, 1990).

5.4.1 Psychosocial Adaptation to Illness

In this study the scores for the PAIS scale ranged from one to four, and higher scores indicated better psychosocial adaptation to illness. The total sample means for the two 31-item PAIS variables (T_3 and T_9) were 3.30 (SD = 0.47) and 3.34 (SD = 0.45) respectively.

The Mann-Whitney Tests that compared PAIS (squared) mean ranks by gender at T_3 and T_9 were significant (zs = -3.44; -2.55, ps ≤ .01). Males had the higher mean scores for both times. Similarly, a significant difference was found between PAIS scores for the two illness groups, arthritis and diabetes (zs = -6.59; -6.60, ps < .01 at T_3 and T_9 respectively) and between the two diabetic groups for PAIS at T_3 and T_9 (zs = -4.37; -3.80, ps < .01 respectively). In addition, a Kruskal-Wallis test found a significant difference in ranks between the three illness groups for PAIS at T_3 and T_9 ($\chi^2 (2)$ =

59.70; 56.69, ps < .01 respectively). Further examination of both PAIS scores indicated the mean was higher for the diabetic group and within this group, the mean was higher for the N-IU group. In summary, the higher mean PAIS scores indicated psychosocial adaptation to illness was highest for the N-IU group and for males.

In relation to univariate changes in PAIS over time, an initial analysis using the Wilcoxon signed-rank test indicated no significant differences between the mean scores at T_3 and T_9. Similar within group comparisons for the arthritis and diabetes groups also indicated no significant differences between PAIS at T_3 compared to T_9 (see Table 5.17 for means ($\underline{M}$) and standard deviations ($\underline{SD}$) for PAIS squared). Between group comparisons, however, were found. A Kruskal-Wallis test indicated that there was a significant difference at each test time when PAIS was compared across the three illness groups ($\chi^2(2) = 60.16$; 57.80, ps < .01 respectively). Further analyses using Mann-Whitney U test to identify which groups differed indicated that the arthritis group compared to the diabetic group as a whole differed at each test time ($\underline{z} = -6.58$; $\underline{z} = -6.60$, ps < .01 respectively). In addition, the two diabetic groups were significantly different ($\underline{z} = -4.37$; $\underline{z} = -3.80$, ps < .01 respectively). Considering that the IU group had a higher mean PAIS score than the arthritis group but less than the N-IU group, the IU and arthritis groups were also tested and found to be significantly different ($\underline{z} = -3.47$; $\underline{z} = -3.54$, ps < .01 respectively). Thus, psychosocial adaptation was significantly different between the three illness groups with the N-IU group significantly more adapted than the IU group, and the diabetic group as a whole was significantly more adapted than the arthritis group. Further, the IU group was significantly more adapted than the arthritis group.

Table 5.17: Means ($\underline{M}$) and standard deviations ($\underline{SD}$) for PAIS (squared) at T_3 and T_9 by group							
Variable:	**N**	**Study sample**	**N**	**Arthritis**	**N**	**IU**	**N**	**N-IU**
		$\underline{M}$ ($\underline{SD}$)		$\underline{M}$ ($\underline{SD}$)				$\underline{M}$ ($\underline{SD}$)
PAIS T_3	307	11.10 (2.95)	119	9.72 (2.81)	86	11.15 (2.55)	102	12.68 (2.62)
PAIS T_9	286	11.37 (2.83)	108	9.94 (2.94)	78	11.46 (2.55)	100	12.91 (1.98)

To reduce the probability of making Type I errors (deciding there is a difference when there is none), a repeated measures MANOVA (general linear model) was used to explore the change in PAIS over time (6 months). As part of the analysis, the influence of four covariates was tested with the three illness groups as the between-subjects design. The four categorical independent variables were age, gender, education and perception of life stress. Mauchly's test of sphericity was not applicable, as there were only two levels for PAIS. Box's test of equality of covariance matrices was not met ($p < .05$) and Levene's test of equality of error variances was only met for PAIS at T_3. Therefore multivariate statistics were used, as they are sufficiently robust when assumptions are not met.

The multivariate statistics for between-subject effects indicated that, with a non-significant F statistic and observed power less than .15, there was insufficient evidence that *age*, *education*, *stress* and *illness* group had an effect on psychosocial adaptation to illness. The possibility of making a Type II error was considered. Gender was, however, found to have a significant F value to support the hypothesis that it influenced changes in psychosocial adaptation to illness (F {1, 271} = 6.0, p = .015). Nevertheless, the Eta squared value indicated that the gender effect on psychosocial adaptation to illness over time was small (Eta^2 = .02).

Since repeated measures analysis is sensitive to outliers and their impact on Type I error, the analysis was rerun without the two cases identified as univariate outliers for PAIS at T_9. No difference was detected and cases were retained.

Bivariate correlations for the total sample, using Spearman's rho, indicated significant associations ($ps < .01$, 2-tailed) between the dependent variable PAIS at T_9 (squared) for *duration* (r_s = -.339), *stress* (r_s = -.402), GSE T_0 (r_s = .266), GSE T_3 (r_s = .339) and GSE T_9 (r_s = .354). Strength of GSE correlation with PAIS increased over time. Furthermore, small negative and significant associations ($ps < .05$, 2-tailed) were

found between PAIS at T_9 for *gender* (r_s = -.15) and *education* (r_s = -.14). Variables *age* and *age-group* were not significantly correlated with PAIS.

The effect of *duration* of illness on PAIS at T_3 and T_9 was further analysed by illness group. The Spearman's rho found no significant association for the IU and the N-IU groups. For the arthritis group, PAIS at T_3 was not influenced by *duration*, but duration had a small significant and negative association at T_9 (r_s = -.25, p < .05). Thus, at nine months, individuals with the longer duration of arthritis were more likely to be less adapted psychosocially.

Bivariate correlation coefficients (Spearman's rho) of PAIS at T_9 with each of the variables of interest by illness group are included in Table 5.18. Perception of life *stress* was negatively associated with PAIS for the three illness groups, but no significant association was found in the IU group. Although *gender* and *education* for the total sample had a negative significant association with PAIS, comparisons by illness group were all non-significant. General efficacy was significantly associated with PAIS at T_9 for each of the illness groups, with the arthritis group having the strongest association. Furthermore, the six arthritis-specific variables were significantly associated with PAIS at T_9 but variations existed for the two diabetic groups. The N-IU group, as the better psychosocially adapted group, had a significant association for 11 of the 15 diabetes-specific variables, compared with only seven for the IU group.

It should also be noted that the seven significant IU group associations were common to the N-IU group. In particular, that the strength of association for the situation-specific belief related to diabetic *routines* at each test time and *diet* at T_0 were greater for the IU group than the N-IU group. By contrast, the strength of the associations for exercise at T_0 and T_9 were greater for the N-IU group - that is, five of the seven significant PAIS-DSES associations for the IU group were stronger than for the N-IU group equivalent.

Table 5.18: Bivariate Spearman's rho correlation coefficients for potential predictors of psychosocial adaptation to illness by illness group.

Variable:		Arthritis [a]	Insulin using [d]	Non-insulin using [d]
Stress		-.598**	-.180	-.356**
Duration		-.246*	-.203	-.120
GSE3		.591**	.280*	.222*
ASSE	T_0	.521**		
	T_3	.559**		
	T_9	.651**		
FSE	T_0	.329**		
	T_3	.427**		
	T_9	.401**		
Diet	T_0		.311*	.250*
	T_3		.218	.173
	T_9		.213	.231*
Exercise	T_0		.271*	.303**
	T_3		.190	.280**
	T_9		.231*	.428**
Certainty	T_0		.057	.378**
	T_3		.009	.345**
	T_9		.304**	.285**
Routines	T_0		.235*	.226*
	T_3		.279*	.250*
	T_9		.250*	.217*
Self-treat	T_0		.086	.149
	T_3		.027	.060
	T_9		.178	.100

* $p < .05$ (2-tailed);　　** $p < .01$ (2-tailed).
a = 0.45; d = 0.9 significant results expected by chance
GSE3 composite variable explained in section 5.4.2.1

5.4.2 Prediction of dependent variable

In the previous section (5.3), the hypothesised relationships for general and illness-specific efficacy beliefs were, in the main, supported. Data pertaining to these variables were subsequently employed in sequential (hierarchical) regression analyses to investigate, concurrently, two further hypotheses per illness group. Hypothesis 4 related to future predictions of PAIS based on general and initial illness-specific efficacy beliefs. Hypothesis 5 related to general and concurrent illness-specific efficacy beliefs.

Hypothesis 4

A general efficacy belief is a better predictor of future adaptation to illness than illness-specific efficacy beliefs.

Hypothesis 5

The influence of illness specific efficacy beliefs, relative to general efficacy belief, are better concurrent predictors of adaptation to illness.

Hierarchical regression (sequential) analyses were carried out to determine if information about illness-specific efficacy beliefs improved the prediction of psychosocial adaptation to illness over general efficacy belief. The process was guided by Hair et al.'s (1998) suggestion for regression analysis. The square of the summed scores representing the 31-item PAIS questionnaire, the 16-item GSE (squared) and the relevant illness-specific efficacy variables (squared) were used. Given the sample size and that clinical utility of interaction effects would be minimal, only main effects were considered. According to Jaccard, Turrisi and Wan (1990), critics of multiplicative terms have recommended against their use because of the multicollinearity effects they cause.

The sequence of entry was theoretically and statistically driven by variables that were more distant to the dependent variable being entered first. Potential predictor variables were not included if they were not significantly correlated with the dependent variable. Although it is preferable for the relationship between the independent variables to be uncorrelated, in this study, correlations were more likely to be low to moderate than uncorrelated. Correlations for dependent and independent variables identified in the regression analyses are presented in sections 5.4.2.2 (Arthritis group) and 5.4.2.3 (N-IU group).

The ratio of cases to independent variables met the minimum criteria suggested by Hair et al. (1998). The number of participants in the arthritis group at T_9 ($\underline{n} = 108$) and the N-IU group ($\underline{n} = 100$) indicated sufficient power (.80) to detect small (10-15%) R^2 values with up to 10 independent variables ($\alpha = .05$). The number of participants in the IU ($\underline{n} = 78$) group was insufficient for regression analysis.

5.4.2.1 Initial analysis for arthritis and N-IU groups

Variables found to be independent of PAIS at T_9 were not considered for the regression analysis. These included *age* and *gender* for both illness groups, *duration* for the N-IU group and four diabetes-specific variables – *self-treat* at each test time and *routines* at T_3. The potential negative confounding effect is low, but a disadvantage with this method. More generally, Achen, (1982) suggested that exclusion of variables because they were not significant had its dangers. The result may be regression chosen for irrelevant reasons rather than substantive thinking. "Significance tests are sensitive only to the unique variance an independent variable adds to R^2." (Tabachnick & Fidell, 1996 p. 161).

Correlation coefficients between independent variables were also examined. Correlation coefficients for illness-specific variables in the initial regression model were below .7, indicating that the variables were not redundant to the scale. Tabachnick and Fidell (1996) suggested removal of variables with a correlation equal to or greater than .70. The stability of the GSE variable over time, as hypothesised, meant that a high correlation for these variables was not unexpected. The significant Spearman's rho correlation coefficient between the three variables ranged from .67 (T_0:T_9) to .73 (T_3:T_9) with $\underline{p}$s < .01. To avoid multicollinearity effects, Tabachnick and Fidell (1996) suggested a composite variable be created. In the current study a mean of the three GSE (GSE3) scores was used in subsequent regression analyses for both groups. Normality could be assumed for the squared GSE3 data for the three illness groups. Levene's test for variance comparisons by illness group and gender indicated that the scores for this variable could have been sampled from the same population. Pearson correlation coefficients between GSE at each test time and the new computed variable ranged from .89 to .90 ($\underline{p}$s < .01), indicating it was an acceptable substitution.

The assumptions underlying regression analysis included multivariate normality, linearity, homoscedasticity and independence of error term. The normal probability plot of residuals indicated multivariate normality for all regression analyses. Furthermore, partial regression plots of independent variables to the dependent

variable (squared PAIS) at T_9 indicated normality, linearity and homoscedasticity assumptions were met. In relation to independence of error term for both analyses, the scatterplot of studentized residual regression indicated time-based dependence but the Durbin-Watson statistic for each analysis was non-significant ($\underline{p} > .05$). The data were not autocorrelated and the assumption for independence of error term was satisfied. The Durbin Watson statistic was 2.01 and 1.89 for the arthritis and N-IU groups respectively.

Additionally, as recommended by Hair et al. (1998), the tolerance values for all variables should be greater than .10 with a variance inflation factor (VIF) of less than 10.0. However, with all potential predictors in the analysis, the condition indices at the last step for both groups were greater than 15 but less than 30, which indicated possible collinearity problems (Hair et al., 1998). Final collinearity diagnostics are discussed with the final model for each illness group.

Evidence of suppressor variables was checked in each analysis. For example, absolute values of all correlations should be larger than the relevant *beta* value and the signs consistent for correlations and *beta* values. A variable sign that changed after the entry of other variables indicated that a suppressor variable was active (Tabachnick & Fidell, 1996).

5.4.2.2 Prediction equation: Arthritis group

Variables considered as predictors for the arthritis group included *stress*, *duration*, GSE3 and the six arthritis-specific variables. In the one-tailed Pearson correlation of linear regression, duration was not significantly correlated with PAIS at T_9 ($\underline{r} = -.15$, $\underline{p} = .06$) but was included in the initial analysis because of its previous significant two-tailed association using Spearman's rho. Variables were entered in successive steps as separate time-related blocks of variables. The initial hierarchical (sequential) regression analysis, with all variables in the equation, explained 54% (Adjusted $R^2 = .54$) of the variance in PAIS at T_9.

The six ASES variables significantly correlated with PAIS at T_9 ($p < .01$). For example, ASSE at T_9 had the highest Pearson correlation coefficient ($r = .65$) with function (FSE) at T_0 the lowest ($r = .31$). The three FSE variables had correlation coefficients equal to or less than .40. In addition, GSE3, and *stress* each had a correlation coefficient of .57, with *stress* negatively correlated.

Two outliers were evident in one univariate arthritis group variable. Casewise diagnostics in the regression analysis, however, did not identify multivariate outliers.

Successive regression model analyses eliminated independent variables according to two main criteria. If the t-test statistic for a variable was non-significant ($p > .05$) on entry or if the R^2 change statistic was less than .01. Each variable, however, was reintroduced one at a time to test if still non-significant. This iterative process continued until statistical and interpretation value of the equation was greatest with the smallest set of independent variables.

In the final analysis, after step 1, with *stress* and GSE3 in the model, the adjusted $R^2 =$ .44 ($F^{\blacktriangledown}$ {2, 102} = 41.94, $p < .01$). After step 2, with ASSE at T_0 added to the model, the adjusted $R^2 = .48$ ($F^{\blacktriangledown}$ {1, 101} = 8.55, $p < .01$). At step 3, the addition of ASSE at T_9 to the model resulted in an adjusted $R^2 = .53$ ($F^{\blacktriangledown}$ {1, 100} = 12.25, $p < .01$). See Table 5.19 for results of Pearson correlation of variables in the final model and Table 5.20 for the Adjusted R^2 , R^2 change ($R^2 \blacktriangledown$), unstandardised regression coefficient (B), standard error of B (SE B) and standardised regression coefficient (*beta*).

Of the possible six arthritis-specific efficacy belief variables, the only variables able to continue to make significant contributions were initial and concurrent beliefs about the management of arthritis symptoms (T_0 and T_9). Together, the four variables in the final model were able to explain 53% (Adjusted $R^2 = .53$) of the variance in psychosocial adaptation to illness.

Table 5.19: Arthritis group: Pearson correlation results for variables in the final model.

Variable:	PAIS T_9	Stress	GSE3	ASSE T_0
PAIS T3				
Stress	-.567**			
GSE3	.569**	-.432**		
ASSE T_0	.530**	-.453**	.441**	
ASSE T_9	.647**	-.453**	.554**	.674**

    * $p < .05$;   ** $p < .01$ (2-tailed)

Table 5.20: Arthritis group hierarchical multiple regression analysis: Significance of selected variables in explaining the variance in psychosocial adaptation to illness.

Model	Variable entered	Adjusted R^2	R^2 ▼	B	SE B	Beta
1	Perceived life stress			-.87	.18	-.40**
	GSE3 [a]	.44	.45	.26	.05	.40**
2	Perceived life stress			-.69	.18	-.32**
	GSE3			.21	.05	.32**
	ASSE T_0 [a]	.48	.04	.08	.03	.24**
3	Perceived life stress			-.62	.17	-.28**
	GSE3			.15	.05	.22**
	ASSE T_0			.02	.03	.07
	ASSE T_9 [a]	.53	.05	.12	.03	.35**

** $p < .01$:   * $p < .05$
[a] = squared variables.
ASSE = arthritis symptom management (squared). GSE3 = mean of GSE over time.

The *beta* coefficient in the final model indicated that, when the other variables were held constant, concurrent efficacy beliefs about management of arthritis symptoms (ASSE at T_9) had the most impact on psychosocial adaptation to illness, followed by perception of life *stress*. Furthermore, the impact of general efficacy belief on psychosocial adaptation to illness continued to be more than initial belief about ability to manage arthritis symptoms (ASSE T_0). This is related to the higher bivariate correlation of ASSE T_9 with T_0 ($r = .67$) than for GSE3 ($r = .55$) (see Table 5.19). In effect, ASSE T_9 subsumed the importance of ASSE T_0. In combination with ASSE T_9, the effect of ASSE at T_0 was not significant ($\beta = .07$, $p = .45$).

The negative *beta* coefficient for perceived life stress indicated that as it increased, psychosocial adaptation to illness decreased. Also of interest was the finding that perception of life *stress* and general efficacy belief together contributed 45% of the variance in PAIS in the first model and continued to make a significant contribution after the addition of the two illness specific variables. In fact, the addition of the two illness-specific variables only added a further 9% explained variance to the final model. Stress and GSE3 contributed equally, although inversely, to the variance in model one.

The condition index and other collinearity diagnostics did not indicate a problem with multicollinearity. The only condition index to be more than 15 was the last dimension of step 3 (15.32). The tolerance values, VIF and the variance proportions for coefficients associated with the last condition index met criteria previously discussed (5.4.2.1).

5.4.2.3 Prediction equation: Non-insulin using group

A sequential multiple regression analysis was repeated for the larger of the two diabetic groups – the N-IU group. Potential predictors of PAIS at T_9 for the N-IU group were *stress*, GSE3, *diet* ($T_0 - T_9$), *exercise* ($T_0 - T_9$), *certainty* ($T_0 - T_9$), and *routines* (T_0 & T_9). *Self-treat, routines* at T_3 and *duration* were not significantly correlated with PAIS at T_9. One case was identified in the initial analysis as a multivariate outlier and removed.

The initial hierarchical (sequential) regression analysis, with all variables in the equation, explained 23.3% (Adjusted R^2 = .233) of the variance in PAIS at T_9. *Exercise* at T_9 had the highest Pearson correlation coefficient ($\underline{r}$ = .42) of all variables. In addition, of the T_0 variables, *certainty* at T_0 had the highest correlation ($\underline{r}$ = .37) with PAIS. By contrast, diet at T_3 had the lowest significant correlation with PAIS ($\underline{r}$ = .184, $\underline{p}$ = .034).

A suppressor variable was, however, active. Variable signs changed for models three and four after the entry of T_3 variables. They were removed as $\underline{F}$ change for these models were no longer significant and R^2 change had only increased by one percent. Elimination of further independent variables occurred if the t-test statistic for the variable was not significant ($\underline{p} > .05$) on entry or if the R^2 change was less than .01. Each variable was reintroduced one at a time to test if still non-significant.

Although there were several univariate outliers for *routines* variable at each test time, the initial regression casewise diagnostics did not indicate multivariate outliers. One multivariate outlier was identified by casewise diagnostics in a later regression analysis. A balance between impact of outliers on the regression model and the loss of clinically important data were considered. Nevertheless, the increase in adjusted R^2 after exclusion of the multivariate outlier was sufficient to exclude the case from further regression analysis.

The results of the secondary analysis indicated that the variables in the final model were able to explain 33% (Adjusted R^2 = .33) of the variance in psychosocial adaptation to illness. All variables except $\underline{GSE3}$ made a significant contribution in the final model. From the model summary, $\underline{GSE3}$ was entered at step 1 with an adjusted R^2 = .05 ($\underline{F}^\blacktriangledown$ {1, 96} = 5.64, $\underline{p}$ = .02). The addition of *stress* to the model resulted in an adjusted R^2 = .18 ($\underline{F}^\blacktriangledown$ {1, 95} = 16.53, $\underline{p} < .01$). The addition of *certainty* at T_0 into the model (step 3) resulted in an adjusted R^2 = .24 ($\underline{F}^\blacktriangledown$ {1, 94} = 8.57, $\underline{p} < .01$). In the final model, the addition of *exercise* at T_9 resulted in an adjusted R^2 = .33 ($\underline{F}^\blacktriangledown$ {1, 93} = 14.37, $\underline{p} < .01$). See Table 5.21 for bivariate Pearson correlations (2-tailed) for each of the variables in the model. Table 5.22 displays the Adjusted $\underline{R}^2$, $\underline{R}^2$ change ($\underline{R}^{2}\blacktriangledown$), unstandardised regression coefficient (B), standard error of B ($\underline{SE}$ B) and standardised regression coefficient (*beta*).

Table 5.21: Non-insulin using group: Pearson correlation results for variables in the final model.

Variable:	PAIS T_9	GSE3	Stress	Certainty
GSE3	.236*			
Stress	-.389**	-.067		
Certainty	.352**	.370**	-.089	
Exercise T_9	.457**	.255*	-.137	.315**

* p <.05; ** p < .01 (2-tailed).

Table 5.22: Non-insulin using group hierarchical multiple regression analysis: Significance of selected variables in explaining the variance in psychosocial adaptation to illness.

Step	Variable entered	Adjusted R^2	R^2 ▼	B	SE B	Beta
1	GSE3 [a]	.05	.06	.10	.043	.24*
2	GSE3			.09	.32	.21*
	Stress	.18	.14	-.52	.12	-.37**
3	GSE3			.04	.04	.11
	Stress			-.50	.12	-.37**
	Certainty T_0 [a]	.24	.07	.05	.02	.28**
4	GSE3			.02	.04	.05
	Stress			-.45	.12	-.32**
	Certainty T_0			.03	.02	.20*
	Exercise T_9 [a]	.33	.1	.05	.02	.34**

** p < .01: * p < .05

[a] = squared variables.

GSE3 = mean of GSE over time.

In the final model, *exercise* belief at T_9 had the highest *beta* value, indicating it had the most impact on psychosocial adaptation to illness when the other variables in the equation were held constant. *Stress* was a close second. The negative *beta* coefficient for *stress* indicated that as it decreased, psychosocial adaptation to illness increased. In relative terms, general efficacy belief had less impact than *certainty* belief at T_0. All predictor variables, except GSE3, were significant in the final model. The strength of the correlation between GSE3 and *exercise* (see Table 5.21) is such that *exercise* subsumed GSE3.

It should be remembered that the two-item *exercise* scale at each test time had barely adequate alpha coefficients of reliability and more random error than was desirable. As such, the scale's ability to significantly contribute to the explanation of psychosocial adaptation to diabetes reflected positively on its usefulness as a predictor.

The condition index and other collinearity diagnostics did not indicate a problem with multicollinearity. The condition indices were less than 15, tolerances for all variables were greater than 0.8 and VIF less than 2.0. The variance proportions for coefficients were less than .5 for all condition indices.

5.4.3 Hypothesis results

The order of entry for each of the hierarchical regression analyses was theoretically driven. Variables such as stress and <u>GSE3</u> were entered first, as they were the most distant from the dependent variable. In each analysis, the illness specific variables were able to improve prediction of psychosocial adaptation. General efficacy belief was also a significant predictor of future psychosocial adaptation, but its influence varied between the groups.

Hypothesis 4 was partially supported. Evidence in support of hypothesis 4 can be found in model 2 for the arthritis group (Table 5.20). Information about general efficacy belief improved the prediction of future psychosocial adaptation to illness over illness-specific efficacy beliefs for the arthritis group. The moderate *beta* coefficient for general efficacy at T_0 (β = .32) indicated it had relatively greater impact than the arthritis specific efficacy belief of symptom management (β = .24) at T_0. However, the relationship was reversed for the N-IU group: *certainty* at T_0 had a relatively greater impact (β = .28) than the non-significant general efficacy belief (β = .11) (see Table 5.22, Model 3). In the N-IU analyses, general efficacy belief had the lowest correlation with PAIS at T_9. By contrast, in the arthritis analysis, general efficacy belief had the second highest correlation with PAIS at T_9. Suggestions and implications for this relative difference will be discussed in the next chapter.

Hypothesis 5 was supported for both illness groups. Information about concurrent illness-specific efficacy belief explained more variance in psychosocial adaptation to illness than general efficacy belief could. The evidence to support hypothesis 5 can be found in the final regression models for each group. The relative impact of a concurrent illness-specific variable on PAIS was greater than the more stable general efficacy belief. For the arthritis group, concurrent belief about arthritis symptom management was important in explaining psychosocial adaptation to arthritis. For the N-IU group, concurrent belief about exercise ability was important in explaining psychosocial adaptation to diabetes.

For each illness group, information about the person's perception of life *stress* was able to explain psychosocial adaptation. The inverse relationship in each analysis remained significant after the addition of efficacy belief variables. The unstandardised regression coefficient for *stress* in each equation indicated that perception of life *stress* explained more of the unit change in PAIS for the arthritis group than the N-IU group.

5.5 SUMMARY

The research design for this study was aimed at collecting data related to the change in efficacy beliefs and their impact on psychosocial adaptation to chronic illness over six months. In particular, recently diagnosed individuals were targeted. The mean *duration* of illness, however, was significantly different between each of the illness groups with mean *duration* being lower for both diabetic groups compared to the arthritis group.

Psychometric tests used in the study were limited to principal component analysis and assessment of internal reliability using Cronbach's alpha. Three of the four scales met *a priori* standards. The DSES scale, a shortened version of the IMDSES, was used in accordance with the underlying constructs indicated by the factor analysis for this sample.

The six arthritis-specific efficacy beliefs were positively associated with adaptation to illness. By contrast, only 11 of 15 diabetes-specific efficacy belief variables were positively associated with adaptation to illness in the N-IU group and seven for the IU group. Efficacy beliefs about self-treatment ability were not correlated with adaptation to illness for the IU or N-IU groups. Furthermore, in this study, there was insufficient evidence that age, education and stress influenced adaptation to illness.

This chapter also presented the findings from tests of five hypotheses. Hypotheses 1 to 3 were consistent with self-efficacy theory. Specifically, that general efficacy belief for the adult was stable over time and that specific efficacy belief increased over time. The increase in illness-specific beliefs, however, was only significant for one of the variables in the arthritis and diabetic groups. The current study was able to confirm that the associations between general and specific efficacy beliefs, as measured in this study, were significant and the associations increased over time.

The findings for the arthritis and N-IU groups in relation to hypothesis 5 were consistent with self-efficacy theory. They indicated that concurrent psychosocial adaptation to chronic illness, for the study sample, was best explained by concurrent illness-specific efficacy belief. Specifically, the arthritis group efficacy belief about concurrent *symptom management* was a better predictor of psychosocial adaptation to illness than, general efficacy belief or initial belief about *symptom management*. Similarly, concurrent diabetes-related belief about *exercise* ability contributed more to explained variance in psychosocial adaptation to illness than earlier *certainty* belief or general efficacy belief.

There was some inconsistency in the data in relation to hypothesis four and the ability to predict future psychosocial adaptation to illness based on an initial general belief rather than initial illness-specific efficacy beliefs. Results from the arthritis group supported the hypothesis but the N-IU data did not. Possible reasons for the findings and implications for clinical practice will be discussed in the next chapter.

The findings also indicated that an individual's perception of life *stress* had an inverse relationship in explaining psychosocial adaptation to illness and was consistent for the arthritis and N-IU groups in this study. Overall, psychosocial adaptation to illness was associated with being less stressed and having higher general and specific efficacy beliefs.

CHAPTER 6: DISCUSSION

Chapter five presented the findings related to the five hypotheses tested to determine their support of self-efficacy theory. The assertion in this study, that general efficacy belief has an influence on psychosocial adaptation to illness soon after diagnosis had not previously been tested in a longitudinal study. The study groups used to test the hypotheses were individuals with diabetes or arthritis. By measuring general and illness-specific efficacy beliefs concurrently over time, the study sought to explore the degree to which these variables explained the variance in future and concurrent psychosocial adaptation to illness. In addition, the study sought to explore the period during which it was expected that illness-specific efficacy beliefs were still developing by comparing them to the more stable general efficacy belief.

The principal findings and the implications for existing diabetes and arthritis self-management programs are discussed in relation to self-efficacy theory and psychosocial adaptation. Strengths and limitations of the current study are reviewed separately. Finally, clinical applications and recommendations will be suggested. Clinical applications are also addressed in relation to the fifth National Health Priority Area for Australia (NHPA): Diabetes mellitus.

6.1 BACKGROUND TO FINDINGS

The need for this study was twofold. First, little or no self-efficacy research has been conducted on the recently diagnosed chronic illness groups. Findings from studies in which the mean illness duration was five or more years cannot expect to be clinically useful for self-management programs that target the recently diagnosed. Secondly, given that behaviour-specific efficacy beliefs develop as experience with the illness regimen increases, the value of concurrent general efficacy belief has not been tested. In the early period of learning to manage a chronic illness, general efficacy may facilitate the rate at which illness-specific beliefs develop and could be an additional resource when confidence in the ability to undertake self-care and cope with the normal daily hassles is further taxed in times of undue stress. The first step, however,

was to ascertain if there is a role for general efficacy belief in chronic illnesses such as diabetes and arthritis.

6.2 PRINCIPAL FINDINGS

The contribution of this study to current knowledge of self-efficacy theory is that the longitudinal design of the current study was able to provide empirical evidence of the change in contribution for general and illness-specific efficacy beliefs to psychosocial adaptation in two chronic illnesses requiring very different regimen attributes. That is, while the characteristics of the regimens for arthritis and diabetes are complex, there are differences in regimen attributes that could account for the findings of the study.

The diabetes regimens for types 2 and 3 diabetes could be described as set daily routines with recognised proactive strategies to prevent hypoglycaemia or hyperglycaemia before symptoms occur. Individuals may describe their life as being controlled by strategies to keep their blood glucose within a set physiological range all day, every day. By contrast, the arthritis symptoms are considered to be less predictable and more variable in their response to the same stressors, resulting in a self-care regimen that is ambiguous and more reactive than proactive.

The study has provided empirical evidence to confirm the notion that general efficacy belief is important when the regimen is more ambiguous (Sherer et al., 1982). Based on results from the current study, the increasing strength of illness-specific beliefs subsumes more of the effect of general efficacy belief when the regimen is well defined. Furthermore, the stability of general efficacy belief was established over nine months for individuals from three illness groups.

6.2.1 Prediction of psychosocial adaptation to chronic illness

Chronic illness management emphasises therapeutic self-care and the need to promote the acquisition of personal resources to maintain health-related behaviour modification. Cognitive resources such as efficacy belief about ability influence the likelihood of engaging in health-promoting or illness prevention behaviours. For

example, Pollock (1993) found that people who were more psychosocially adapted were more likely to participate in health promoting activities.

Equally, in relation to chronic illness regimen activities, the current study has provided empirical evidence in support of the relationship between efficacy beliefs and psychosocial adaptation in five domains of functioning as measured in this study. For the arthritis group, general efficacy expectation was able to explain more of the variance in future psychosocial adaptation than the initial 'arthritis symptom management' self-efficacy belief. Although this situation was reversed as arthritis symptom management belief increased, general confidence in ability remained a significant predictor after nine months. Specifically, hypotheses four and five had relevance for the arthritis group and are restated here for convenience.

4. A general efficacy belief (trait) is a better predictor of future adaptation to illness than illness-specific efficacy belief.

5. The influences of illness-specific efficacy beliefs, relative to general efficacy belief, are better concurrent predictors of adaptation to illness.

By contrast, among the type 2 diabetes participants, only hypothesis five was relevant in that information about concurrent exercise belief and prior certainty belief, contributed more to the understanding of psychosocial adaptation than general efficacy belief. Unlike the arthritis group, a general sense of confidence in ability was only a significant predictor initially; before illness-specific beliefs subsumed the importance of the person's general efficacy belief. A general efficacy belief was no better than the diabetes-specific beliefs. As a predictor of both concurrent and future psychosocial adaptation, diabetes-specific efficacy beliefs were better than a general efficacy belief. The role difference in general efficacy belief for the arthritis and diabetes type 2 groups can be explained with reference to the regimen attributes for the illness groups tested in this study.

For example, Sherer et al. (Sherer et al., 1982) have suggested that a general efficacy belief has a greater role when the behaviour requirement is more ambiguous. Findings from the current study suggest that this notion can explain the arthritis group results.

The arthritis regimen has a large component of variability in response to symptoms that are unpredictable (Katz, 1998; McEvoy et al., 1988). The unpredictability is both physiological and a reflection of the person's psychological state (Freeman et al., 1996). The ideal is that a balance between rest and activity is maintained at all times, that joint protection strategies are used at all times and that medication is taken routinely (Lorig & Fries, 1990). For some people, the notion of joint protection is confusing and the idea that activity is important sounds contradictory (Arthritis Foundation, 1995; Gecht et al., 1996). Given the acknowledged high prevalence of non-compliance, the reality of self-care routines is probably different as 'good' days are to be enjoyed and 'bad' days are not predictable.

On the other hand, the diabetic routine is constant, clearly defined, mostly familiar and an immediate physiological response to remedial action occurs. It is familiar in that the need for a healthy diet and more exercise is well known to most of the community. Blood glucose self-management may not be familiar but after an educational program the person knows when, why and how it should be done. This is not to say that compliance with a diabetic regimen is any better, or that uncertainty of future health status is any less than for the non-diabetic population.

6.2.2 Stability of general efficacy belief

The current study provides evidence of the relevance of a general level of confidence in abilities that is stable and that has been described as a coping resource (Barlow et al., 1996) in the context of lifestyle changes necessitated by a complex self-care regimen. This finding was consistent for the three illness groups and was stable over nine months at a time when illness-specific efficacy beliefs were changing. Also, there was tentative evidence that the perceived level of stress or education level influenced the general efficacy belief. Variations were not influenced by age, gender or illness group.

6.2.3 Strength of association between general and specific efficacy beliefs

The association between general and specific efficacy beliefs was significant in both the diabetic and arthritis groups. Furthermore, the strength of the association increased over time. This finding supported Barlow et al.'s (1996) suggestion for arthritis

research and the mixed chronic illness group findings of Becker et al. (1993) and Stuifbergen and Becker (1994). The current longitudinal study confirmed the finding from both of these studies at three test-times (zero, three and nine months) and provided evidence to support hypothesis three.

6.2.4 Increase in specific efficacy beliefs over time

The extant self-efficacy literature suggests that behaviour-specific efficacy belief develops over time (Bandura, 1991; Stretcher et al., 1986) and is represented by hypothesis two. Much of the early self-efficacy research involved an intervention aimed at efficacy beliefs for a single behaviour. By comparison, a complex chronic illness regimen involves more than one type of behaviour and associated efficacy belief, each related to a possible mix of having to start a new behaviour, modify or stop an existing behaviour. Hence, chronic illness research has found that, at any one time, individuals vary in the strength of their efficacy belief for different behaviours (Bandura, 1997) - that is, the increase in behaviour-specific efficacy expectation is not consistent across behaviours or context.

In accordance with Bandura (1997), the current study demonstrated that the sources of efficacy information common to each group impacted differently on different types of behavioural beliefs in each group. For example, the common sources of efficacy information included each person's performance experiences over the study period, vicarious experiences from shared stories with friends and family, the level of support from others and physiological feedback associated with regimen enactment. Since people acted as their own controls, these sources of influence could be assumed to be constant for each person. The main efficacy information source that differed between the groups was the type of education strategy available in the community. That is, the ASMC could be said to facilitate an increase in efficacy beliefs through the specifically designed Arthritis Helpbook (Lorig & Fries, 1990) used by all ASMC groups contacted for this study. The entire N-IU group had access to a diabetes self-management course and the smaller IU group relied on individually arranged meetings with a Diabetes Educator on a need basis. The diabetes management courses did not purport to increase efficacy beliefs but relied upon the debatable association between

knowledge and behaviour (Beeney & Dunn, 1990; Brown, 1999; Dunn et al., 1990; Rubin et al., 1989).

Thus, the current study's mix of significant and non-significant increases in arthritis-specific beliefs was in accordance with the findings in the fibromyalgia and arthritis literature (Buckelew et al., 1998; Lorig et al., 1989a; Smarr et al., 1997; Taal et al., 1993b). Furthermore, the study findings concurred with inferences drawn from the diabetes literature about the variability of different behavioural beliefs (Kavanagh et al., 1993; Kingery & Glasgow, 1989; Skelly et al., 1995).

6.2.4.1 Arthritis group

Although the study involved a non-representative sample of adults with mixed arthritis conditions, the findings are in accordance with those obtained in the United States of America. The increase in behaviour-specific efficacy beliefs within the other studies also resulted in a mix of significant and non-significant arthritis-specific efficacy belief findings after an Arthritis Self-Management Course (ASMC) intervention (Buckelew et al., 1998; Lorig et al., 1989a; O'Leary et al., 1988; Smarr et al., 1997; Taal et al., 1993b). Because most of the arthritis group in the current study was recruited through the ASMC, the aim of which was to increase efficacy beliefs, it could be said to have had the same result. That is, the results of the current study were consistent with research that was based on the standard ASMC offered to community participants (Lorig et al., 1989a; O'Leary et al., 1988). Specifically, that the confidence to manage pain and other arthritis symptoms increased over nine months as participants became significantly more confident in their ability to manage the various aspects of their arthritis symptoms. No significant changes in participants' efficacy beliefs were found at three months. This was attributed to the individual's slow, trial and error process of learning what worked best for each arthritis symptom and the gradual reciprocal increase in arthritis-specific efficacy beliefs. Smarr et al. (1997) found that continued reduction in pain symptoms required time for the effect of behaviour change and improvement in emotional response to occur. In all, this aspect of the study was able to provide tentative data related to the rate of increase in arthritis-specific efficacy beliefs.

The arthritis literature strongly suggests that pain perception is closely linked to the psychological state more than the medical status (Freeman et al., 1996). The intermittent nature of pain and fatigue symptoms and the associated delayed response to pain relief measures was something that participants in this study would have learned to deal with in their own way. Incremental increases in efficacy beliefs are gained from each positive experience with regimen behaviours.

6.2.4.2 Diabetes group

Contrary to self-efficacy theory, but ironically in agreement with the prevailing diabetes self-efficacy literature, four of the five efficacy belief measures tested in the study were unable to demonstrate a significant increase over the nine months of the study. The few diabetes studies that did measure the change in diabetes-specific efficacy beliefs were either non-significant (Glasgow et al., 1992; McCaul et al., 1987; Skelly et al., 1995) or did not report testing for differences (Kavanagh et al., 1993; Kingery & Glasgow, 1989). The instruments these researchers used to test efficacy beliefs over time may not have had "… sufficient impediment and challenge" (Bandura, 1997 p. 43) resulting in high initial scores and ceiling effects referred to by Glasgow et al., and in common with the current study's findings.

Concomitantly, however, *certainty* belief about diabetes management increased significantly in the current study, and could be a reflection of the cumulative increase in confidence for abilities related to the other four more situation-specific beliefs. The *certainty* scale included four negatively worded items expressing uncertainty beliefs that collectively were not behaviour specific. Given that the mean duration of illness for the diabetes type 2 group was 1.6 years, it could be assumed from the high initial efficacy beliefs for *diet*, *self-treatment*, *exercise* and diabetes-related *routines* that participants had adjusted to the demands of their condition. The demand made by diabetes mellitus does not ease up and can become overwhelming if people are unable to integrate the diabetes-related routine into their lifestyle (Fisher et al., 1982; White et al., 1992). It could be further argued that anxiety diminished as increased confidence about their ability to control the perceived threat (the diabetes) increased.

The clinical significance of the study's findings, however, is greater than the statistical significance would suggest. For example, the significant and non-significant increases in illness-specific beliefs over the nine months of the study, according to self-efficacy theory, would have had a positive impact on behaviour, motivation, thoughts and emotions (Bandura, 1977). Incremental changes in efficacy beliefs can ultimately reduce the relapse rate (Basler, 1995; Maddux, 1995b). Nevertheless, from a clinical perspective, the findings suggest that increases in the various illness specific efficacy beliefs are not uniform and are likely to continue over a period greater than nine months. The length of time needs to be considered for long term management beyond the six-week self-management courses currently on offer.

6.3 THEORETICAL IMPLICATIONS OF FINDINGS

A theory provides both an organisational framework for research and clinical practice and suggests ideas for further research related to areas not adequately researched. One such area is the relevance of single-behaviour, situational specificity of self-efficacy theory to recently diagnosed individuals trying to manage a complex regimen of therapeutic self-care. That is, the theory's ability to explain behaviour change soon after diagnosis does not include the effect of a general belief in ability when behaviour-specific beliefs related to a complex regimen with multiple behaviour changes are still developing.

Observations from the current study suggest that general efficacy becomes a personal resource to sustain the person until reciprocal reinforcement from positive experiences increases the more behaviour-specific belief. Reciprocal in that successful enactment of the new behaviour strengthens existing related efficacy beliefs and increases the likelihood of behaviour being continued (Bandura, 1997). Since the study did not include an intervention, the increase in illness-specific beliefs could be attributed to the reciprocal behaviour effect and the outcome of that behaviour over the period of the study. The self-management courses attended by most of the arthritis group and the

diabetes type 2 group would also have influenced the development of the illness-specific beliefs.

Nevertheless, the importance of general efficacy belief, as an explanatory variable, decreases as behaviour specific beliefs increase and, as the regimen requirements become more familiar. Further, it can be postulated that once the behaviour-specific beliefs reach a critical point, they subsume the importance of general efficacy belief.

More specifically, while behaviour-specific efficacy beliefs are developing, people's confidence in their abilities in general is a cognitive resource that mediates behaviour change and persistence in difficult situations. Thus, a greater general belief in ability is more likely to lead to persistence with the requirements of a complex regimen that will ultimately facilitate the development of confidence in more regimen-specific abilities. Behavioural choices that lead to successful outcomes will build confidence as part of an iterative process in which both general and behaviour-specific beliefs have an influence. Should the outcome be perceived as less than satisfactory, a general belief assists with persistence in the slow trial and error process of seeking a personal strategy that works. Inferences about the influence of general beliefs on the slow trial and error approach are based on the current study's finding that the more ambiguous the therapeutic regimen, the greater the need for higher efficacy beliefs in general.

The contribution of the study to the theory of self-efficacy has been based on evidence from two self-selected illness groups. For a similar group of individuals, the degree to which general efficacy continues to contribute to psychosocial adaptation beyond the illness duration of the study sample is unknown. It is plausible that the nature of the arthritis disease process may require more of an ongoing strong belief in abilities in general compared to people with diabetes.

6.4 POST HOC FINDINGS OF INTEREST

6.4.1 Stress as a predictor

It is acknowledged in the chronic illness literature that the physiological response to a competently executed therapeutic regimen is not uniform. Furthermore, it has been shown that variations are unrelated to behaviour for the person with arthritis (Affleck, Urrows, Tennen, & Higgins, 1992; Nicassio, Wallston, Callahan, Herbert, & Pincus, 1985; Smith et al., 1990) or diabetes (Cox & Gonder-Frederick, 1992; White et al., 1992). Ambiguities and uncertainties even under normal circumstances are common in chronic illness (White et al., 1992) and hinder the development of routines and habits which would normally free up cognitive control and thereby reduce perceived stress. When recommended behaviours fail to achieve the desired result, cognitive control is important for maintenance of desired behaviour.

Higher levels of self-efficacy, both general and specific, as the cognitive control resource explored in the current study, were associated with a lower perception of life stress and greater psychosocial adaptation. The IU group in the current study perceived life to be significantly more stressful than the N-IU group. Stress for the IU group was independent of psychosocial adaptation. The arthritis group's perception of life stress was not significantly different from either diabetic group. In addition, strategies to enhance efficacy beliefs are thought to assist in the cognitive control processes necessary for stress management.

It should, however, be noted that the relationship between stress and the disease process for arthritis or diabetes is complex and this study does not pretend to offer further clarity. Only the person's perception of life stress, a single-item categorical variable, was measured in this study. Still, knowledge about the person's perception of life stress was able to predict future and concurrent psychosocial adaptation to arthritis and type 2 diabetes.

6.4.2 Diet and exercise beliefs

The variety of diabetes-specific self-efficacy scales in general use prevented direct comparisons between studies, but most scales include measures of beliefs about diet and exercise. In the current study, the diabetes group as a whole had marginally higher diet-efficacy mean scores than exercise scores at T_0 and T_3, but scores were equal at T_9. This finding concurs with Kingery and Glasgow (1989) and Padgett (1991) who found individuals were least likely to believe in their ability to exercise and had higher beliefs about diet. Lifestyle changes such as diet and exercise are consistently found to be problematic in diabetic groups (Ary et al., 1986; Glasgow et al., 1987; Skelly et al., 1995; Wing et al., 1998).

In the current study, males became more confident about their diabetic diet and exercise ability over nine months with exercise belief scores for females consistently lower than for males and remained unchanged. Likewise, Skelly et al. (1995) found that female participants were most confident about medication and BGSM and least able to deal with exercise. In their study, dietary beliefs were only slightly higher than exercise beliefs. Since Skelly et al.'s study only involved women, the comparative results for males using this measure are unknown. Although Fitzgerald et al. (1995) and Lo and MacLean (1996) did not measure self-efficacy, both studies found that men with diabetes were more likely to exercise than women with diabetes.

These findings were also consistent with survey statistics for the wider Australian community. In fact, exercise participation was found to be least likely for women, older people, and those with a low education level (Bauman et al., 1990). Similarly, the AIHW (1998) indicated that fewer females than males undertook exercise. The impact of inactivity becomes even more of a risk when the inactivity further compounds an illness condition.

6.4.3 Duration of illness

In the current study, psychosocial adaptation to illness did not improve with increasing duration of illness for the total sample or illness groups. Duration of illness was independent of psychosocial adaptation for the IU and N-IU groups but the arthritis

group had a small significant negative association at T_9. Hence, duration of illness was not a predictor of psychosocial adaptation to illness in the regression analyses. Nevertheless, the negative association for the arthritis group could be explained by the increasing impact of the chronic illness on various domains of life contributing to psychosocial adaptation, together with a better understanding of the long-term implications of the disease.

6.5 STRENGTHS AND LIMITATIONS

6.5.1 Strengths of the study

The temporal sequencing of the relationships that were observed in this longitudinal study enables a degree of confidence about the direction of causal relationships. Comparing the same individuals over time has greater rigour than comparing different individuals cross-sectionally. The use of repeated measures enabled participants to serve as their own control such that the changes in variables of interest could be attributed to predicted changes. The repeated measures problems of carry-over effect, latent effect and learning effect should not have influenced the findings as each test was separated by three and six months respectively (Carmines & Zeller, 1979). Additionally, psychosocial adaptation to illness was only tested twice, six months apart.

Without a study intervention, findings reflect the real-life situation for individuals with chronic illness. Hence, any changes to practice derived from these findings may have more practical consequences (Schwartz & Lellouch, 1967). Findings can be easily incorporated into self-management courses. This aspect is discussed in more detail later.

The study was also able to predict psychosocial adaptation to illness over an extended period of time for two illness groups and demonstrated that illness-specific self-efficacy was an appropriate and modifiable psychological factor to facilitate illness adaptation. Given the differences in explanatory power that general and specific self-efficacy demonstrated in the study, however, the usefulness of self-efficacy theory to

psychosocial adaptation for a non-insulin using diabetes group might not be as strong as other psychological constructs.

The fourth strength relates to the instruments used in the study. The psychometric properties for three of the four instruments were confirmed in the current study through principal component analysis and Cronbach's internal reliability coefficient. The structure for each instrument was stable over time and concurred with their use in other studies.

In relation to the psychometric testing of one of these three instruments, general efficacy, it has been extensively tested elsewhere and comparisons between previous findings and this study indicated a similar outcome. The internal reliability at each test time and the intra-class correlation coefficient indicated that the scale was reliable and stable over nine months. The sample used in the current study was therefore able to provide further empirical evidence that efficacy belief related to abilities in general was stable in adulthood (Jerusalem & Mittag, 1995; Sherer, 1992). Furthermore, the probability of erroneously accepting the null hypothesis was small ($\beta = .02$). As recommended by Woodruff and Cashman (1993), the study also confirmed the usefulness and stability of Sherer et al.'s (1982) general subscale in a domain other than in which it was developed. Moreover, the concomitant increase in illness-specific efficacy beliefs did not influence the stability of general efficacy belief. Other researchers can use the instrument with confidence.

The study also confirmed the work of Barlow et al. (1996) who studied participants with a chronic illness. Their study included a different general efficacy scale (Jerusalem & Schwarzer, 1992) and found general efficacy was stable over four months for an adult sample of mixed arthritis conditions. In addition, they also found that general efficacy was independent of age. In the current study, age, gender and illness did not influence general efficacy belief. This finding also confirmed an earlier result by the author in which general efficacy belief was not found to differ between two diabetic groups (Rapley, 1989).

The fourth instrument, Diabetes Self-Efficacy Scale (DSES), was used according to the underlying constructs identified by the principal component analysis of the current study. The stability of the five component DSES structure at each test time was established. In addition, although the internal reliability for one scale (exercise) was below the accepted level for Cronbach's alpha, it was sufficiently robust to explain much of the variance in psychosocial adaptation for the N-IU group.

The use of two generic measures (GSE and PAIS) enables findings from the research to be coupled with studies of adaptation to other medical conditions. Comparing the results with the larger literature of health sciences and psychology is important for the development of knowledge specific to chronic illness research and its application to self-care interventions.

6.5.2 Limitations of the study

The between-group differences in this study could be a reflection of idiosyncratic illness attributes or a reflection of the differences in resources available to each group. For example, the arthritis group had access to a self-management course that purported to follow efficacy enhancement strategies. By comparison, of the two diabetes groups, only the non-insulin dependent group had access to a self-management program; albeit one that did not utilise efficacy enhancement strategies specifically. The insulin-using group had individual tuition. Neither the idiosyncratic illness attributes, discussed earlier, nor the direct impact of the differences in educational strategy were explored as part of the current study.

Other limitations to the ability to generalise the results outside the sample relate to the statistical limitations of sample size and skewed data. As it was, the incidence of accessible individuals who could be said to want to learn how to manage their condition was barely sufficient in the time available for data collection. This could have accounted for the skewed data that transformations were unable to normalise. Consequently, tests of significance were largely restricted to non-parametric methods. The use of distribution free tests resulted in a slight loss of power and increased the

possibility of erroneously accepting a null hypothesis. See earlier discussion related to power in section 4.5: Analysis of Data.

The IU group was not large enough for factor analysis of the Insulin Management Self- Efficacy Scale (IMDSES). Replication of the structure for the IMDSES was not possible and the lack of consistency in the literature related to diabetes-specific efficacy measures was not made any clearer by this study. For example, the underlying constructs for the 18-item DSES scale identified through principal component analysis could not be compared to other studies. Given that the DSES as used with the current sample has not been used in other studies, measurement error is a possible cause for its low to moderate correlation with psychosocial adaptation. Continued research using the IMDSES and DSES is needed to accrue evidence of scale validity and reliability.

Another limitation associated with sample size was the inability to include interaction terms in the regression analyses for the arthritis or N-IU groups. Although the diabetic groups were combined for testing hypotheses two and three, it was not appropriate to combine the IU and N-IU samples in the regression analysis, even controlling for diabetes type, as stress was significantly different for both groups and interaction terms would be needed.

The method used to determine *duration* was another limitation. Computing duration of illness from *age* minus age at diagnosis, when the latter was only recorded by number of years since diagnosis, created doubt as to the true variability for duration for each group. Also, within the IU group, duration of illness did not reflect duration of insulin use for the insulin requiring participants. Hence, given the insufficient sample size for factor analysis of the Insulin Management Diabetes Self-efficacy Scale and lack of data about duration of insulin use, the lifestyle focus intended for the IU group was not explicated sufficiently in this study.

The study's design limitations included sample selection. The population actually sampled may have differed from the target population. Individuals who do not attend a

self-management course may differ on some key variable from those who choose to attend. Hence, conclusions that generalise the data beyond the sample could be misleading and should only be applied to a similar community sample.

The current study attempted to select participants who were attending self-management classes with the intention of changing behaviour. The expectation was to measure changes in efficacy beliefs over nine months. Given that efficacy beliefs were negatively skewed, a retrospective view might now draw the conclusion that the self-management course was only useful to confirm current behaviour and therefore without behaviour change, the reciprocal effect on efficacy belief did not occur. Another factor contributing to the outcome may be that individuals with high efficacy beliefs in relation to their ability to change behaviour in accordance with the illness regimen were more likely to choose to attend self-management classes. Certainly, the work of Prochaska et al. (1993) suggests that individuals who are not ready to make the behaviour change would not enrol in the class. Alternatively, the instruments may not have had sufficient discriminative power to detect the change in efficacy belief over nine months.

Finally, issues of gender and multicultural influences on psychosocial adaptation to illness were not addressed in the study. Gender differences were identified for the diabetes-specific efficacy beliefs but not for arthritis-specific efficacy beliefs. The degree to which the regression models used to explain psychosocial adaptation for two of the illness groups were also equally relevant to gender groups could not be tested.

6.6 PRACTICAL IMPLICATIONS OF THE FINDINGS

The biomedical approach to chronic illness is of limited value without concurrent use of theory that purports to influence behaviour. Interventions that are based on theory derive, not only strategies from the theory, but also provide a rationale for an evaluation format. A recent study (Hunt et al., 1998) of practitioner perspectives in relation to management of type 2 diabetes found that strategies to increase compliance with a diabetic regimen continued to focus on education but without substantive

theory. The assumption was that a person's lack of knowledge and or self-control were the causes of poor health outcomes. Hunt et al. found that practitioners gave minimal recognition to patients' socio-economic constraints and other competing lifestyle choices or psychosocial factors that could be of more importance to the person.

It takes a good deal of planning and effort for an individual to maintain a routine to manage blood glucose levels or arthritic pain. Even with occasional departures from the routine, the person relies on personal confidence and support from others. If non-compliance is the norm (Blackwell, 1992; Dunn, 1986; Leventhal & Cameron, 1987), intervention strategies need to change from guilt-driven pressure to perform, regardless of choices and context, to one in which facilitation of confidence in ability and belief in outcome are the foci.

6.6.1 Self-management courses

Self-management courses that apply the principles of self-efficacy theory by building on the four sources of efficacy information, facilitate not only confidence in the ability to manage the disease process and a belief that the outcome is worth the effort, but pursuant to that, can also improve psychological well-being. The four sources of efficacy information that can contribute to this process include enactment of the behaviour, persuasion, vicarious learning and emotional feedback provided by the experience. This study has helped to resolve the original question of whether general efficacy belief can assist with the process of psychosocial adaptation when illness-specific efficacy beliefs are still developing. The study found that general efficacy belief needs to be considered in chronic illness self-management courses, but more specifically, it is important when the regimen is complex and or ambiguous.

Inferences from this study suggest that individuals who lack confidence in their abilities in general need to be given additional assistance with stress management, self-regulation skills and coping strategies. In particular, persons with arthritis who have a low efficacy belief in relation to life generally and low illness-specific efficacy beliefs (one or more) are more at risk of relapse than individuals who at least have a higher general efficacy belief. Confidence in ability is susceptible to a variety of internal and

external influences including self-referent processes, support networks and health care professionals. According to self-efficacy theory, greater efficacy belief about ability or a belief that the disease process can be influenced regardless of ability determines the degree of effort or persistence in a difficult situation (Bandura, 1986).

Apart from the person's general efficacy belief, the Diabetes Self-Efficacy Scale (DSES), after further psychometric testing, could be used initially as a diagnostic measure to guide specific efficacy enhancement strategies aimed at one or more of the diabetes-related efficacy beliefs found to be low or in need of strengthening. The self-efficacy literature has consistently found within-individual variations for different behaviour specific efficacy beliefs (Bandura, 1997). Subsequent use of the scale (DSES) by the Diabetes Educator could be to assess changes in efficacy beliefs and to assess the person's continuing needs related to each of the efficacy beliefs.

An additional challenge for self-management courses is the need to devise strategies to maintain behaviour change. Long-term compliance with a therapeutic regimen is more difficult than any short-term behaviour change (Sluijs & Knibbe, 1991; Taal et al., 1993b; Wing et al., 1998) because most people do not want their lifestyle changed by a self-care regimen. Accordingly, the intervention focus needs to be on a sense of balance, to feel normal and to live with the illness rather than controlled by the regimen. By increasing the person's confidence in their self-regulation abilities, maintenance of behaviour change is possible. Benefits may also accrue in other areas of life and co-morbidity.

6.6.2 National Health Priority Areas: Diabetes mellitus
The principles of a diabetes self-care regimen related to exercise and diet are also relevant to other health risk groups as well as to the general adult population. People with diabetes may have an increased risk of coronary occlusion or cerebro-vascular accident, but these conditions are also prevalent in non-diabetics who have hypertension, smoke, are overweight, do not exercise or have a high cholesterol level.

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Diabetes and cardiovascular health were both identified as National Health Priority Areas (NHPA). The putative causal explanations for cardiovascular disease given in the literature are as equally valid for the general population as they are for the diabetic population, but the risk is just greater for the diabetic population. The purpose of the National evidence-based guidelines for the management of type 2 diabetes mellitus (National Health and Medical Research Council, 2000) encompasses both primary and secondary prevention. The first goal is to increase the community's awareness of risk factors for type 2 diabetes to try and prevent new cases. The second goal is to reduce the number of undiagnosed diabetes type 2 individuals. Increasing the diagnosis rate of type 2 diabetes can help to delay the onset of diabetes-related complications by treating the diabetes earlier. Complications are often the trigger for diagnosis. Early detection of type 2 diabetes delays not only the onset of complications, but also reduces health care costs (Western Australian Diabetes Services Taskforce, 1999).

Increasing the diagnosis rate will, however, also increase the demand for diabetes specific self-management courses. The challenge is that the Western Australian Diabetes Strategy 1999 report indicated that universal standards for diabetes education did not exist (Western Australian Diabetes Services Taskforce, 1999). Combined with results from the diabetic sample in the current study, it could be argued that more of the same may not be enough, and the development of a common strategy is overdue. A common strategy along the lines used by Arthritis Australia in each of the State branches would be a worthy goal.

Ideally, a self-management course needs to be inexpensive and able to be replicated in many sites. It also needs to demonstrate more than an increase in knowledge. Results from the American Arthritis self-management course evaluations that were completed over the last decade or more have consistently indicated that a linear relationship between knowledge and behaviour change, or between knowledge and improved health outcomes does not exist (Lorig & Holman, 1993; Lorig & Laurin, 1985; Lorig et al., 1989b). Furthermore, the link between diabetes-specific efficacy beliefs and health status is stronger than the link between behaviour and health status (Anderson et

al., 1995; Johnson, 1992). Hence, utilisation of self-efficacy theory strategies to help individuals maintain and engage in therapeutic self-care skills are likely to improve metabolic control and or control weight to improve blood pressure.

6.7 RECOMMENDATIONS

There are a number of recommendations that arise from the study including those already discussed under practical implications. In particular, before the findings of the study can be considered reliable and valid, it should be replicated with the inclusion of intervention and control groups and, if possible, random assignment to each group. Alternatively, a matched sample design could be used. A multi-site study in more than one Australian State would also overcome the problem of low incidence of recently diagnosed individuals at one site. If more than one illness group is included, a mechanism to disentangle the effect of differences in illness and course attributes is also required. Or else, an efficacy enhancing self-management course that could meet the common needs of a variety of chronic illness regimens could be considered.

The increasing age-related incidence of chronic illness in Australia and the scarce resources in less populated areas would suggest that a mechanism whereby efficacy beliefs for behaviour change common to several chronic illnesses be targeted. Interventions that can be proven to make a difference across chronic illness types will be more cost effective and more likely to meet community needs than a multitude of illness specific self-management courses that cannot be run frequently enough because of limited numbers. Knowledge about the illness and rationale for the regimen is important but it is the person's belief in their own ability to carry out the behaviour, to problem solve, to motivate self and set realistic goals that makes the difference. These beliefs in coping ability are common to many self-care regimens and the basis for an empowerment approach using self-efficacy theory.

6.8 CONCLUSION

Although the results of the study can not be generalised beyond a similar community sample, the findings suggest that individuals who are more confident in relation to

their illness-related behaviours and confident of their abilities in general are more likely to be psychosocially well adjusted.

The theoretical implication that can be drawn from the study is that a generalised belief in self is a personal resource soon after diagnosis. Its importance to psychosocial adaptation, however, decreases as situation-specific confidences increase. Of particular relevance to chronic illness self-management courses that serve recently diagnosed individuals, therefore, is the need to consider their level of confidence in abilities in general. In addition, it could be argued that the less explicit the illness regimen, the more likely that general efficacy belief will be predictive of psychosocial adaptation.

Efficacy beliefs are important determinants, not only of behaviour, but also of methods of empowerment that operate through self-efficacy mechanisms (Bandura, 1986). If increased efficacy belief is the desired outcome, then self-management courses become a process designed to improve psychosocial adaptation by enabling individuals to take charge of their health through informed choices and personal goals. The challenge for health care professionals is to devise a self-management program that can influence behaviour while recognising that individuals still have to find what works best for them. The objective is to enhance the person's ability to live with the disease.

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LIST OF APPENDICES

Pat Rapley
School of Nursing
Curtin University of Technology
GPO Box U 1987
Perth 6845

Dear Sir/ Madam,

I am a Registered Nurse and a student enrolled at Curtin University of Technology. This study has the approval of the University as well as the Arthritis Foundation and this letter is to explain the research.

Persons with a condition that necessitates long term changes to diet or lifestyle in any way have largely been overlooked in the investigation of health-related self-care behaviours. Self-care behaviours are the things you do to care for your condition.

If you agree to help, at three different times over the next year you will be asked to answer a number of written questions about self-care, and about the things you are asked to do by your doctor or other health care professionals. Some questions will be about your life in general and how you feel about the things that help or hinder your ability to carry out these self-care routines.

The questions will take about 25 minutes to answer. You will not have to hurry to answer the questions. You will not be identified by any answer you give and your answers will not affect the health care you receive. No appointments are needed, there are no costs and all information is confidential. The results of this study will be published in a health care journal as well as being made available to the newsletter of the Arthritis Association.

You may ask any questions to help you be clear about the study now or at any time over the next 12 months. My name is Pat Rapley and I can be contacted by phoning xxxxxxx. Should you agree to participate, you still have the right to withdraw from the study at any time without prejudice to your medical management. That is, your withdrawal will not affect any future medical contacts or treatments.

You may withdraw from the study at any time by phoning the above number.
Thank you for reading and thinking about this information. If satisfied and you would like to take part, please sign the Consent Form attached.

Sincerely,

Pat Rapley

CONSENT FORM: Health Related Self-Care Behaviour Study.

I _____ have read the information in the letter and questions I have asked have been answered to my satisfaction. I agree to participate in this project, realising that I may withdraw at any time. I agree that research data gathered for the study may be published provided my name is not used.

Signature: Date:
Address:
Phone number:

Dear

A student from Curtin University of Technology is looking for people to answer some questions related to managing diabetes. The questions are part of a research project approved by this hospital and the University. Her name is Pat Rapley and she particularly needs people like you to volunteer.

Persons with a condition that necessitates long term changes to diet or lifestyle in any way have largely been overlooked in the investigation of health-related self-care behaviours. Self-care behaviours are the things you do to care for your condition.
If you agree to help, at three different times over the next year you will be sent a questionnaire about self-care, and about the things you are asked to do by your doctor or other health care professional. Some questions will be about your life in general and how you feel about the things that help or hinder your ability to carry out these self-care routines.

The questions will take about 25 minutes to answer. You will not have to hurry to answer the questions. You will not be identified by any answer you give and your answers will not affect the health care you receive. No appointments are needed, there are no costs and all information is confidential.
Pat Rapley can be contacted by phoning xxxxxxx. She will answer any questions to help you be clear about the study at any time. Should you agree to participate, you still have the right to withdraw from the study at any time without prejudice to your medical management. That is, your withdrawal will not effect any future medical contacts or treatments.

You may withdraw from the study at any time by phoning the above number.
Thank you for reading and thinking about this consent information. If satisfied and you would like to take part, please sign the attached Consent Form and return in the envelope provided. A questionnaire will then be sent to you with a return addressed envelope.

Thank you for considering this request.

Yours sincerely,

Name inserted

RN Accredited Diabetes Educator

RA Identification No: ☐☐☐ (1-3)

Record No: ☐☐ (4-5)

The first set of questions relate to demographic data to be completed at this contact time only. The other questions seek your views on specific matters. The questions may, at times, appear to be repeated but they are seeking different aspects of the same topic. I realise that your time is valuable and do not wish to ask any unnecessary questions.

It is important that you answer all questions. Please remember that there are no right or wrong answers.

1	Please indicate your gender (Please circle **one** number)	Male Female	1 2
2	Please give your age in years.	(Fill in boxes provided)	☐☐
3	What was your age when first diagnosed?	(Fill in boxes provided)	☐☐
4	What is your highest level of education? (Please circle **one** number)	Less than year 10 Secondary school year 10 Secondary school year 12 Apprenticeship/trade Certificate (non-trade) Diploma Bachelor degree Postgraduate or higher Other _____ Please specify	1 2 3 4 5 6 7 8 9
5	What is your marital status? (Please circle **one** number)	Single Married Divorced/separated Defacto Other _____	1 2 3 4 5

6	How stressful do you consider your life? (Please circle **one** number)	Not at all stressful Minimal stress Mildly stressful Moderately stressful Considerably stressful Excessively stressful	1 2 3 4 5 6
7	What is your weight in kg? What is your height in centimetres? _____ Office use only: ☐☐☐kg BMI:------------ = _____ ☐.☐☐m^2	(Please fill in the boxes) ☐☐☐kg ☐☐☐cm <20 = 1 20-25 = 2 25-30 = 3 >30 = 4	

8	What type of arthritis do you have? (Please circle **one** number only)	Rheumatoid arthritis
		Osteoarthritis
		Systemic Lupus
		    Erythematosus
		Fibromyalgia
		Ankylosing spondylitis
		Psoriatic arthritis
		Scleroderma
		Other. _____
		    Please state
			1
			2
			3
			
			4
			5
			6
			7
			8

Variation for Diabetic group

8	What type of Diabetes do you have? (Please circle **one** number only)	Insulin dependent (type 1) Non-insulin dependent (type 2) Not sure	1 2 3

This questionnaire is a series of statements about your personal attitudes and traits. Each statement represents a commonly held belief. Read each statement and decide to what extent it describes you. There are no right or wrong answers. You will probably agree with some of the statements and disagree with others. Please indicate your own personal feelings about each statement below by marking the number that best describes your attitude or feeling. Please describe yourself as you really are.

Circle 1 if you **disagree strongly (DS)** with the statement.
         2 if you **disagree moderately (DM)** with the statement.
         3 if you neither disagree nor agree **(?)** with the statement.
         4 if you **agree moderately (AM)** with the statement.
         5 if you **agree strongly (AS)** with the statement.

		DS	DM	?	AM	AS
1	When I make plans, I am certain I can make them work.	1	2	3	4	5
2	One of my problems is that I cannot get down to work when I should.	1	2	3	4	5
3	If I can't do a job the first time, I keep trying until I can.	1	2	3	4	5
4	When I set important goals for myself I rarely achieve them.	1	2	3	4	5
5	I give up on things before completing them.	1	2	3	4	5
6	I avoid facing difficulties.	1	2	3	4	5
7	If something looks too complicated I will not even bother to try it.	1	2	3	4	5
8	When I have something unpleasant to do, I stick to it until I finish.	1	2	3	4	5
9	When I decide to do something, I go right to work on it	1	2	3	4	5
10	When trying to learn something new I soon give up if I am not initially successful	1	2	3	4	5
11	When unexpected problems occur, I don't handle them well.	1	2	3	4	5

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		DS	DM	?	AM	AS
12	I avoid trying to learn new things when they look too difficult for me.	1	2	3	4	5
13	Failure just makes me try harder.	1	2	3	4	5
14	I feel insecure about my ability to do things.	1	2	3	4	5
15	I am a self-reliant person.	1	2	3	4	5
16	I give up easily.	1	2	3	4	5
17	I do not seem capable of dealing with most problems that come up in my life.	1	2	3	4	5

Factor analysis removed shaded item

This survey asks you to rate your degree of confidence for being able to carry out your diabetes-related activities. **There are no right or wrong answers**. After reading each statement, circle the number that best expresses your belief.

1 = **strongly agree**.   2 = **moderately agree**.   3 = **slightly agree**

6 = **strongly disagree**.   5 = **moderately disagree**.   4 = **slightly disagree**.

Circle **0** if the statement does not apply to you.

1	I can carry out practically all of the self-care activities in my daily diabetes routine.	1	2	3	4	5	6	0
2	I am confident in my ability to manage my diabetes.	1	2	3	4	5	6	0
3	I feel unsure about having to use what I know about diabetes self-treatment every day.	1	2	3	4	5	6	0
4	I don't think I can follow my diabetes routine every single day.	1	2	3	4	5	6	0
5	I can eat my meals at the same time every day.	1	2	3	4	5	6	0
6	I can stay on my diabetic diet when I eat in familiar places away from home (such as a friend's house).	1	2	3	4	5	6	0
7	I can stay on my diabetic diet when I eat in unfamiliar places.	1	2	3	4	5	6	0
8	I'm not sure I'll be able to stay on my diabetic diet when the people around me don't know that I have diabetes.	1	2	3	4	5	6	0
9	I'm not sure I'll be able to follow my diabetic diet every day.	1	2	3	4	5	6	0
10	When I go to parties, I can follow my diet plan.	1	2	3	4	5	6	0
11	I can exercise several times a week.	1	2	3	4	5	6	0
12	I can't exercise unless I feel like exercising.	1	2	3	4	5	6	0
13	I can figure out when to call my doctor about problems with my feet.	1	2	3	4	5	6	0

14	I can routinely apply the recommended lotion to my feet.	1	2	3	4	5	6	0
15	I cannot test my blood when away from home.	1	2	3	4	5	6	0
16	I can recognise when my blood sugar is too high.	1	2	3	4	5	6	0
17	When I feel sick, I can test my blood more than I routinely do.	1	2	3	4	5	6	0
18	I can take my insulin using the recommended procedure.	1	2	3	4	5	6	0
19	I may have difficulty taking my insulin when away from home.	1	2	3	4	5	6	0
20	I can adjust my insulin dose based on the results of my blood test.	1	2	3	4	5	6	0
21	I'm not sure I can figure out what to do about my insulin dose when changes occur in my usual routine.	1	2	3	4	5	6	0
22 (18)	I can do what was recommended to prevent low blood sugar reactions.	1	2	3	4	5	6	0
23 (19)	I can figure out what self-treatment to administer when my blood sugar gets higher than it should be.	1	2	3	4	5	6	0
24 (20)	I'm not sure I can recognise when my blood sugar is low.	1	2	3	4	5	6	0
25 (21)	I'm not sure I can adjust my diabetes self-treatments if I get a cold or the flu.	1	2	3	4	5	6	0
26 (22)	I can fit my diabetes self-treatment routine into my usual lifestyle.	1	2	3	4	5	6	0
27 (23)	I think I'll be able to follow my diabetes plan even when my daily routine changes.	1	2	3	4	5	6	0

Shaded areas indicate questions deleted to form the DSES

In the following questions, we'd like to know how your arthritis pain affects you. For each of the following questions, please circle the number that corresponds to your certainty that you can **now** perform the following tasks. Please use the scale diagram to select the number.

1	2	3	4	5	6	0
very uncertain		moderately uncertain			very certain	not applicable

1	How certain are you that you can decrease you pain **quite a bit?**	1	2	3	4	5	6	0
2	How certain are you that you can continue most of your daily activities?	1	2	3	4	5	6	0
3	How certain are you that you can keep arthritis pain from interfering with your sleep?	1	2	3	4	5	6	0
4	How certain are you that you can make a **small-to-moderate** reduction in your arthritis pain by using methods other than taking extra medication?	1	2	3	4	5	6	0
5	How certain are you that you can make a **large** reduction in your arthritis pain by using methods other than taking extra medication?	1	2	3	4	5	6	0

We would like to know how confident you are in performing certain daily activities. For each of the following questions, please circle the number that corresponds to your certainty that you can perform the tasks as of **now, without** assistive devices or help from another person. Please consider what you routinely can do, not what would require a single extraordinary effort.

AS OF NOW, HOW CERTAIN ARE YOU THAT YOU CAN:

1	walk 100 feet / 30 metres on flat ground in 20 seconds?	1	2	3	4	5	6	0
2	walk ten steps downstairs in 7 seconds?	1	2	3	4	5	6	0
3	get out of an armless chair quickly, without using your hands for support?	1	2	3	4	5	6	0
4	button and unbutton 3 medium-size buttons in a row in 12 seconds?	1	2	3	4	5	6	0

5	cut 2 bite-size pieces of meat with a knife and fork in 8 seconds?	1	2	3	4	5	6	0
6	turn an outdoor tap all the way on and all the way off?	1	2	3	4	5	6	0
7	scratch your upper back with both your right and left hands?	1	2	3	4	5	6	0
8	get in and out of the passenger side of a car without assistance from another person and without physical aids?	1	2	3	4	5	6	0
9	put on a long-sleeved front-opening shirt or blouse (without buttoning) in 8 seconds?	1	2	3	4	5	6	0

In the following questions, we'd like to know how you feel about you ability to control your arthritis. For each of the following questions, please circle the number that corresponds to your certainty that you can **now** perform the following activities or tasks

1	**How certain** are you that you can control your fatigue?	1	2	3	4	5	6	0
2	**How certain** are you that you can regulate your activity so as to be active without aggravating your arthritis?	1	2	3	4	5	6	0
3	**How certain** are you that you can do something to help yourself feel better if you are feeling blue?	1	2	3	4	5	6	0
4	As compared with other people with arthritis like yours, **how certain** are you that that you can manage arthritis pain during your daily activities?	1	2	3	4	5	6	0
5	**How certain** are you that you can manage your arthritis symptoms so that you can do the things you enjoy doing?	1	2	3	4	5	6	0
6	**How certain** are you that you can deal with the frustration of arthritis?	1	2	3	4	5	6	0