Goals, Adaptive Self-Regulation, and Psychosocial Adjustment to Lower Limb Amputation: A Longitudinal Study

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ABSTRACT

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Lower limb amputation is a life-changing event that can cause significant disruptions in many important areas of existence. Although a substantial minority of individuals suffer from emotional difficulties following this procedure, most adapt successfully to the losses and limitations incurred, with some achieving positive change and growth as a result. According to self-regulation theory, the physical, social and psychological upheaval caused by amputation is likely to disturb progress towards goal attainment, which may leave individuals vulnerable to negative psychosocial outcomes if they do not regulate their goals in response to these challenges.

The aim of the present study was to examine the relationships between goal disturbance, tenacious goal pursuit (TGP), flexible goal adjustment (FGA), and various positive and negative psychosocial outcomes (participation, positive and negative affect, quality of life, psychosocial adjustment to amputation, depressive symptomatology) in a sample of 98 individuals with lower limb amputations, and to investigate whether these self-regulatory constructs predicted psychosocial outcomes in this population after controlling for sociodemographic/clinical variables, optimism, and perceived social support. Participants completed self-report questionnaires on admission to an inpatient prosthetic rehabilitation programme (T1), six weeks post-discharge (T2), and six months post-discharge (T3).

Baseline assessments of the self-regulatory constructs together contributed significantly to the prediction of several psychosocial outcomes at each time point. Higher levels of goal disturbance predicted poorer outcomes at T1, whereas TGP and FGA were predictive of enhanced outcomes at each study time point. These findings indicate the utility of self-regulation theory as an organising framework for research on psychosocial adjustment to amputation. TGP and FGA may help in identifying individuals at risk for long-term adjustment difficulties following limb loss, and represent important targets for interventions to promote adjustment in this patient group.

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This thesis is dedicated to my mother, Laureen.

> …give us grace to accept the serenity the things that cannot be changed,
> courage to change the things which should be changed,
> and the wisdom to distinguish the one from the other.
>
> *Reinhold Niebuhr*

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ABBREVIATIONS USED

ACT	Acceptance and Commitment Therapy
ADLs	Activities of Daily Living
AIDS	Acquired Immune Deficiency Syndrome
ANOVA	Analysis of Variance
BDI-II	Beck Depression Inventory-II
BPI	Brief Pain Inventory
CVD	Cardiovascular Disease
FGA	Flexible Goal Adjustment
GFI	Goal Facilitation Index
HIV	Human Immunodeficiency Virus
HRQL	Health-Related Quality of Life
ICF	International Classification of Functioning, Disability and Health
LOT-R	Life Orientation Test-Revised
MI	Myocardial Infarction
MIM	Metaphoric Identity Mapping
MMSE	Mini-Mental State Examination
MSPSS	Multidimensional Scale of Perceived Social Support
NASD	National Amputee Statistical Database
NHP	Nottingham Health Profile
PANAS	Positive and Negative Affect Schedule
PLP	Phantom Limb Pain

PPA	Personal Projects Analysis
PTSD	Post-Traumatic Stress Disorder
PVD	Peripheral Vascular Disease
QoL	Quality of Life
RLP	Residual Limb Pain
SOC	Selection, Optimisation and Compensation
SPSS	Statistical Package for the Social Sciences
TAPES-R	Trinity Amputation and Prosthesis Experience Scales-Revised
TGP	Tenacious Goal Pursuit
VIF	Variance Inflation Factor
WCQ	Ways of Coping Questionnaire
WHO	World Health Organisation
WHODAS 2.0	World Health Organisation Disability Assessment Schedule 2.0
WHOQOL-BREF	World Health Organisation Quality of Life Assessment-Short Version

THESIS SUMMARY

The loss of a limb is a life-changing event that can have a significant physical, psychological, and social impact on a person’s day-to-day existence. There has been a growing interest among researchers in the psychological and social consequences of amputation, with great diversity being observed in how successfully people come to terms with their limb loss. Although amputation has been associated with negative outcomes such as depression, anxiety, and body image disturbance, recent studies have found that many people report high levels of well-being and show little evidence of psychological distress in the years following limb loss, with some individuals achieving positive change and growth as a result of their experiences.

Self-regulation theory may provide a particularly useful framework for investigating the process of psychosocial adjustment to amputation. According to self-regulation theory, most human behaviour is goal-directed, with progress or failure in goal attainment having affective consequences. Given the emphasis that is currently placed on goal attainment in rehabilitation programmes for persons with amputations, self-regulation theory may prove valuable in offering an insight into the processes involved in striving towards important goals, and the impact that difficulties in goal attainment may have on psychosocial adjustment to amputation. The aim of the present study was to apply self-regulation theory to the experience of lower limb amputation, by examining how the attainment of valued life goals is affected by the loss of a lower limb and the impact this may have on the person’s psychosocial outcomes from admission to an inpatient rehabilitation programme up to six months after discharge.

The design of the present study addressed several of the limitations associated with research on psychosocial adjustment to amputation to date. Firstly, the use of a framework based on self-regulation theory provided the study with a solid theoretical

foundation, which has been lacking in the majority of previous research on this topic. The application of self-regulation theory provided a greater understanding of the mechanisms underlying adjustment to amputation and the role that individuals' goals play in this process. Secondly, the study's longitudinal design contrasted with the volume of cross-sectional research that has been carried out on this topic, and allowed for the exploration of the temporal characteristics of this process and identification of factors that predict long-term psychosocial outcomes following amputation, which could facilitate the early detection of individuals at risk for adjustment difficulties and guide the development of targeted interventions to enhance adjustment in this patient group. Thirdly, the examination of both positive and negative indicators of psychosocial adjustment to amputation addressed the lack of research looking at both aspects of emotional well-being, and allowed for an investigation of whether these different dimensions of well-being diverged in their trajectories and underlying mechanisms.

Chapter 1 provides an overview of the literature on adjustment to amputation. Research on the negative outcomes associated with limb loss will be outlined firstly, followed by an overview of recent attempts to identify positive psychosocial sequelae such as positive affect and post-traumatic growth. An argument for the value of assessing both positive and negative aspects of psychosocial adjustment following amputation will then be put forward, followed by a discussion of the sociodemographic, clinical and psychosocial factors found to predict adjustment to limb loss. The applicability of self-regulation theory as a framework for research on adjustment to amputation will also be considered in Chapter 1. Theories and models that have previously been applied to this experience will be examined, and their various strengths and weaknesses discussed. An overview of the literature on self-regulation theory will then be provided, with a focus on the cybernetic model of self-regulation and the dual-process model. The relevance of the self-regulation perspective to the experience of chronic illness and disability, and to the rehabilitation context in particular, will also be examined.

Chapter 2 outlines the purpose of the present study, as well as its specific aims, objectives and hypotheses. A rationale based on the contents of Chapter 1 is put forward for each of the objectives delineated.

Chapter 3 describes the research design, participants, measures, procedures, and statistical analyses employed in the present study.

Chapter 4 examines the cross-sectional relationships between goal disturbance, tenacious goal pursuit (TGP), flexible goal adjustment (FGA), and a range of positive and negative indicators of psychosocial adjustment on admission to rehabilitation (Time 1), and examines the role of TGP and FGA as moderators of associations between psychosocial outcomes and goal disturbance, pain intensity, and age in this patient group.

Chapter 5 provides a descriptive analysis of the goals that are most valued among persons with amputations in the present study, and those that they are most hindered in attaining as a result of their limb loss. Analyses identifying significant changes in predictor and outcome variables over the course of the study will also be examined.

Chapter 6 looks at the longitudinal relationships between self-regulatory constructs on admission to rehabilitation and psychosocial outcomes assessed six weeks (Time 2) and six months (Time 3) after discharge.

Finally, Chapter 7 provides a general discussion of the present study, exploring its strengths and limitations, the practical and theoretical implications of its findings, and suggestions for future research.

CHAPTER 1

LITERATURE REVIEW

This chapter provides an overview of the literature on adjustment to amputation and examines the applicability of self-regulation theory as a framework for research on this topic.

1.1 Epidemiology of amputation

Amputation is defined as “the surgical or spontaneous partial or complete removal of a limb or projecting body part covered by skin” (Kohler et al., 2009, p. 118), and is one of the most common acquired disabilities (Rybarczyk, Edwards, & Behel, 2004). Individuals with amputations comprise a diverse clinical population, with significant heterogeneity observed in the level, cause, gender, and age distribution of this condition, as well as the degree of disability experienced, both physical and psychosocial (Gallagher & Maclachlan, 2001). The present section will examine the epidemiological characteristics of amputation.

1.1.1 Incidence and prevalence of amputation

The global incidence of amputation is difficult to ascertain, as rates vary widely both between and within countries (Holman, Young, & Jeffcoate, 2012; Moxey et al., 2011; Wrobel, Mayfield, & Reiber, 2001). Comparison of findings is further impeded by the broad range of methodologies and definitions of amputation used by researchers, coupled with significant differences in key characteristics of the populations being studied (Fosse, Hartemann-Heurtier, Jacqueminet, Ha Van, Grimaldi, & Fagot-Campagna, 2009; Unwin, 2000; Van Houtum & Lavery, 1997). The Global Lower Extremity Amputation Study used a standard protocol to assess the incidence of lower limb amputation in ten different locations worldwide, and after twelve years remains the largest multinational study of its kind (Unwin, 2000). Marked differences in the incidence of lower limb amputation were observed between test centres, despite similarities in the age and sex distribution of amputations in their populations. For example, the annual incidence of first major amputations among males ranged from 2.8 cases per 100,000 of the population in Madrid, Spain, to 43.9 cases per 100,000 among the Navajo population in the United States. The significant variation observed across regions was attributed primarily to differences in the prevalence of diabetes and peripheral vascular disease (PVD).

Approximately 185,000 amputations are carried out every year in the U.S. as a whole (Owings & Kozak, 1998), with an estimated one out of every 190 persons currently living with limb loss (Ziegler-Graham, MacKenzie, Ephraim, Travison, & Brookmeyer, 2008). In the United Kingdom, almost 5,000 new cases are referred to prosthetics service centres annually (National Amputee Statistical Database, 2009). The incidence of amputation in Ireland is currently unknown. A recent review of the number of individuals with disabilities receiving services from the country's main rehabilitation hospital found that a total of 2,328 people availed of their prosthetic service in 2003 (Johnstone, Walsh, Carton, & Fish, 2008). Given the fact that such services are provided in several other centres throughout the country, and that many persons who undergo amputation are never fitted with a prosthesis, this statistic is likely to significantly underestimate the number of people living with limb loss in Ireland at present. Indeed, a national representative body for persons with amputations has recently claimed that the number of cases in this country exceeds 4,000 (Amputee Ireland, 2011).

1.1.2 Level and cause of amputation

Amputation can involve either the upper or lower limb, and occurs at a variety of levels. Lower limb amputation may be unilateral, involving a single limb, or bilateral, involving both of the lower limbs, and can be performed at a minor or major level. Minor amputation of the lower limb entails the removal of one or more toes or part of the foot. In major lower limb amputation, a part of the leg is removed. This can occur at different levels. Most procedures are carried out either below the knee (transtibial) or above the knee (transfemoral), although in some instances the amputation is performed through the ankle, knee or hip joint (disarticulation). Lower limb amputation is significantly more common than amputation of the upper limb, accounting for 65% of all existing cases of amputation in the U.S. (Ziegler-Graham et al., 2008). Over 90% of amputations carried out in the U.K. in 2006/07 involved the lower limb, with 53% executed at the transtibial level, and a further 39% at the transfemoral level (National Amputee Statistical Database, 2009).

There are many potential causes of amputation; the four primary etiological factors necessitating this procedure are vascular disease and infection, trauma, tumours, and congenital abnormalities (Rybarczyk, Szymanski, & Nicholas, 2000). Dysvascularity resulting from cardiovascular disease (CVD) and/or diabetes mellitus is the foremost cause of amputation in most developed countries, followed by trauma (National Amputee Statistical Database, 2009; Ziegler-Graham et al., 2008). A recently published five-year review of lower limb amputation prevalence rates in England found that 39% of patients who underwent major amputations during this period had a primary diagnosis of diabetes, and 43% had a diagnosis of CVD, with just 13.9% of procedures being secondary to injury or trauma (Moxey et al., 2010). Fifty four percent of all existing cases of limb loss in the U.S. are secondary to vascular disease, two-thirds of which also involve a comorbid diagnosis of diabetes (Ziegler-Graham et al., 2008). Patients with amputations secondary to dysvascularity tend to be older, experience more comorbid health conditions, and are at increased risk of postoperative morbidity and mortality, whereas traumatic limb loss is more prevalent among younger, otherwise healthy individuals (Dillingham, Pezzin, & Shore, 2005; Dillingham & Pezzin, 2008; National Amputee Statistical Database, 2009).

1.1.3 Morbidity and mortality

Major lower limb amputation is associated with considerable morbidity and mortality. Common postoperative complications include cardiac problems, pneumonia, and delayed wound healing due to infection or necrosis of the stump, which frequently necessitates revision of the amputation to a more proximal level of the affected limb (Aulivola et al., 2004; Ploeg, Lardenoye, Vrancken Peeters, & Breslau, 2005). The risk of losing the contralateral limb following unilateral amputation ranges from 15-20% within the first two years of the initial procedure, and rises to 40% by four years post-amputation (Cutson & Bongiorni, 1996). There is evidence of increased morbidity among individuals with amputations secondary to diabetes, with the probability of experiencing cardiac failure and further amputation being twice as great as that observed among non-diabetic patients (Schofield et al., 2006).

Postoperative mortality rates following amputation are high, ranging between 8% and 23% within thirty days of the procedure (Schofield et al., 2006), and long-term survival rates tend to be quite poor (Pernot, De Witte, Lindeman, & Cluitmans, 1997; Schofield et al., 2006). In a retrospective review of 959 consecutive major lower extremity amputations in 788 patients, for example, a one-year survival rate of 69.7% was observed, with this proportion dropping to 34.7% by five years post-amputation (Aulivola et al., 2004). The presence of comorbid conditions such as diabetes (Aulivola et al., 2004; Schofield et al., 2006) or end-stage renal disease (Aulivola et al., 2004; Dossa et al., 1994) and having a higher level of amputation (Aulivola et al., 2004; Fosse et al., 2009; Moxey et al., 2010; Subramaniam, Pomposelli, Talmor, & Park, 2005) are associated with an increased risk for mortality in this patient group.

1.1.4 Current trends in amputation

Despite calls by the World Health Organisation (WHO) and U.S. government to reduce lower limb amputation rates (U.S. Department of Health and Human Services, 2000; WHO and International Diabetes Federation, 1990), it has been estimated based on current trends that the number of persons living with amputation in the U.S. will increase over twofold to 3.6 million by the year 2050 as a result of population aging and associated increases in the number of people suffering from dysvascular conditions, particularly diabetes (Ziegler-Graham et al., 2008). In contrast to these projections, however, a number of recent studies have reported a decline in amputation rates among individuals with diabetes in both Europe (Canavan, Unwin, Kelly, & Connolly, 2008; Ikonen, Sund, Venermo, & Winell, 2010; Trautner, Haastert, Mauckner, Gatcke, & Giani, 2007; van Houtum, Rauwerda, Ruwaard, Schaper, & Bakker, 2004) and the U.S. (Li, Burrows, Gregg, Albright, & Geiss, 2012), while incidence rates for other etiology groups have remained stable or increased slightly (Canavan et al., 2008; Li et al., 2012; van Houtum et al., 2004). For example, in a U.S. population-wide study of trends in hospitalisation rates for non-traumatic lower limb amputation among persons aged 40 years and older, the age-adjusted discharge rate per 1,000 persons in those with a diagnosis of diabetes declined significantly from 11.2 in 1996 to 3.9 in 2008, whereas the rate remained stable among non-diabetic individuals during this period (Li et al., 2012).

Decreasing amputation rates among individuals with diabetes have been attributed to the growing use of innovative procedures to tackle dysvascularity, such as angioplasty and the prescription of lipid-lowering, antihypertensive and antiplatelet medications. Preventive health care and education for persons with diabetes may also have played a significant role, with diabetic foot care programmes proving highly effective in preventing or delaying the need for amputation in this population (Canavan et al., 2008; Fosse et al., 2009). These developments, along with the overall aging of the population, have additionally contributed to an increase in the average age at which amputation is performed. Across all etiologies, 42% of individuals in the U.S. presently living with limb loss are aged 65 years or older. In the U.K., over half of persons who undergo amputation annually are over 65 years of age, and more than a quarter are aged 75 or over (National Amputee Statistical Database, 2009).

1.2 Consequences of amputation

The loss of a limb confronts individuals with a wide range of extensive and evolving threats and challenges to their physical, psychological and social functioning (Desmond et al., 2012). These may include impairments in physical functioning (Schoppen et al., 2003), the experience of amputation-related pain (Ephraim, Wegener, MacKenzie, Dillingham, & Pezzin, 2005), learning how to use a prosthesis (Raichle et al., 2008; Robinson, Sansam, Hirst, & Neumann, 2010), alterations in one's body image (Gallagher, Horgan, Franchignoni, Giordano, & MacLachlan, 2007), sexuality (Geertzen, Van Es, & Dijkstra, 2009) and self-concept (Grobler, 2008), changes in personal relationships (Williams et al., 2004) and occupational status (Whyte & Carroll, 2002), limitations in carrying out everyday and valued activities (Couture, Caron, & Desrosiers, 2010; Williamson, 1995), and restrictions in participating in the community and wider society (Gallagher, O'Donovan, Doyle, & Desmond, 2011).

The WHO's International Classification of Functioning, Disability and Health (ICF: WHO, 2001) provides a convenient framework for understanding the various physical, psychological and social consequences of amputation, how they interact with each other, and how they influence, and are influenced by, different personal and environmental factors (Gallagher et al., 2011; Kohler et al., 2009; van Velzen, van Bennekom, Polomski, Slootman, van der Woude, & Houdijk, 2006). As shown in Figure 1.1, this universal disability and health classification system delineates three levels of human functioning: functioning at the level of the body or body part (body functions and structure), the whole person (activity), and the whole person in a social context (participation). Disability occurs as a result of dysfunction at one or more of these levels.

The primary goal of rehabilitation following amputation is to restore an acceptable degree of functioning at each of these levels (Geertzen, Martina, & Rietman, 2001; Robinson et al., 2010; van Velzen et al., 2006). Given the varied and complex rehabilitation needs of persons with amputations, a multidisciplinary team approach is required to achieve this goal, with input from various healthcare professionals including physiotherapists, occupational therapists, and clinical or counselling psychologists (Robinson et al., 2010).

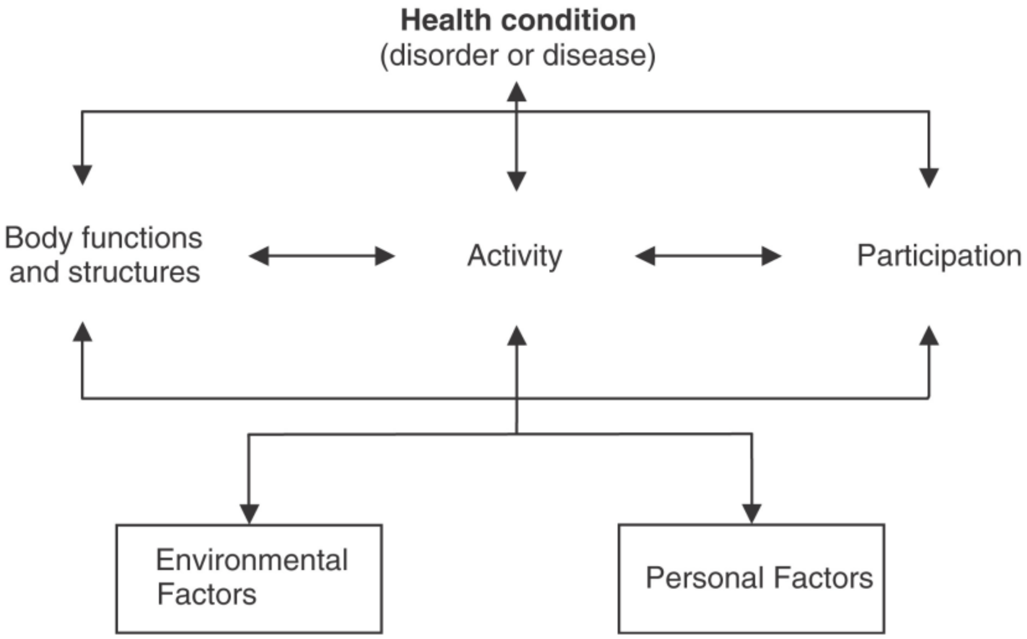

Figure 1.1. The International Classification of Functioning, Disability and Health (WHO, 2001)

1.3 Physical adjustment to amputation

The physical consequences of amputation constitute the main focus of rehabilitation following amputation. A prosthetic limb is fitted to compensate for functional losses, where appropriate. The most immediate challenge facing many is thus to become proficient in prosthesis use (Desmond & MacLachlan, 2006a). The main phases of prosthetic rehabilitation are pre-prosthetic management, postoperative care, prosthetic training, and long-term follow-up care, which incorporates vocational rehabilitation and assistance in reintegrating back into the community following discharge (Esquenazi, 2004; Munin et al., 2001; Đurović, Ilić, Brdareski, Plavšić, & Đurđević, 2007). During prosthetic training, the patient is taught the skills necessary to perform activities of daily living (ADLs) in different environmental conditions. The patient initially engages in basic tasks such as donning and doffing the prosthesis, transfers and standing balance, during which intensive physical support and supervision is provided by the rehabilitation team. These skills serve as a foundation for more complex locomotor abilities, which are learned with progressively less physical support and supervision over the course of the rehabilitation, until the patient achieves independence in essential daily activities while wearing the prosthetic limb (Gauthier-Gagnon, Grisé, & Potvin, 1999).

A substantial proportion of individuals who undergo lower limb amputation are never fitted with a prosthesis. In addition, many who do receive a prosthetic prescription never attain successful prosthetic fit or use, and rates of prosthetic abandonment are high, particularly among older candidates (Fletcher et al., 2001; Levin, 2004; Schoppen et al., 2003). Such outcomes may occur for a variety of reasons, including the presence of comorbidities or cognitive impairment, having a more proximal level of amputation, poor condition of the residual limb, patient preference or dissatisfaction with the prosthesis, and limited ambulatory status prior to amputation (Coffey, O'Keeffe, Gallagher, Desmond, & Lombard-Vance, 2012; Desmond et al., 2012; Robinson et al., 2010). Individuals who are not suitable candidates for prosthetic fitting are often provided with alternative assistive technologies such as wheelchairs, which may also necessitate changes in lifestyle and self-image (Desmond et al., 2012; MacLachlan & Gallagher, 2004).

Outcome measurement is essential to effective rehabilitation practice and sound clinical decision-making (Hebert et al., 2009). The majority of research on rehabilitation outcomes among persons with lower limb amputations has centred on functioning at the level of body functions and structures (Hebert et al., 2009), such as pain and musculoskeletal function, and activity (Deathe et al., 2009), such as mobility and engagement in ADLs (Gallagher et al., 2011; Xu, Kohler, & Dickson, 2011). According to the ICF (WHO, 2001), however, disability can also be caused by dysfunction at the level of participation, defined as involvement in life situations. Many researchers have argued that restrictions in participation should be assessed in order to fully understand the impact of chronic illness and disability on psychosocial adjustment (Cardol et al., 2002; Dijkers, 1997; Gallagher & Mulvany, 2004), as reflected in the emphasis on the role of contextual factors in current conceptualisations of this process (Elliott, Kurylo, & Rivera, 2002; Livneh, 2001). In recent years, there has been a growing understanding of the need to employ more holistic measures of functioning that acknowledge the social and environmental context in which amputation occurs (Gallagher et al., 2011; Kohler et al., 2009).

Although amputation is likely to have a considerable influence on participation, this aspect of functioning has rarely been examined among persons with limb loss (Gallagher et al., 2011). Research on activity restriction in this patient group has tended to incorporate aspects of this construct, however. In a study of 42 elderly individuals with lower limb amputations, for example, Nissen and Newman (1992) evaluated the extent to which participants resumed well-adjusted living after amputation in eight areas of activity and daily living. Poor reintegration was found to occur in the areas of community mobility, work, and recreation, with inability to participate in recreational activities being the most restricted aspect of patients' reintegration to normal living following amputation. Williamson, Schulz, Bridges, and Behan (1994) assessed restriction in nine different areas of activity in a sample of 160 persons with amputations. At least some restriction in activity was experienced by participants due to their amputation, particularly in the areas of self-care, household chores, shopping, visiting friends and providing care to others. The only existing study to specifically investigate restrictions in participation was carried out by Gallagher and colleagues (2011) in a sample of 148 individuals with upper and lower limb amputations. It was found that restrictions were most commonly experienced in the areas of sports and physical recreation, leisure and cultural activities, and employment. These findings indicate that the loss of a limb has a negative impact on people's level of participation, thus demonstrating the importance of including this aspect of functioning in examinations of disability among persons with amputations.

1.4 Psychosocial adjustment to amputation

Amputation is a distressing experience that is likely to pose considerable challenges in terms of psychological and social adjustment. Not only does this procedure incur permanent physical loss, but it may also lead to restrictions in many other important life domains. The negative impact of limb loss on psychological well-being has been the central focus of most of the research on psychosocial adjustment to this condition (Desmond & MacLachlan, 2002). There is still little agreement in the literature regarding the prevalence of clinically significant psychological morbidity in this patient group, however, either during the initial post-amputation period or in the longer term (Desmond et al., 2012; Desmond & MacLachlan, 2006a).

1.4.1 Depression

Depressive symptomatology is the most frequently assessed indicator of affective distress following amputation, with anywhere between 13% (Atherton & Robertson, 2006) and 32% (Desmond & MacLachlan, 2006a) of individuals experiencing elevated levels of depressive symptoms at some stage of their recovery. The disparities observed in these estimates are due in large part to methodological differences in the assessment of this outcome (Cavanagh, Shin, Karamouz, & Rauch, 2006; Horgan & MacLachlan, 2004). Another possible explanation is the heterogeneity of study samples in terms of demographic and clinical factors such as age, amputation etiology, time since amputation, and the existence of premorbid psychological dysfunction (Cavanagh et al., 2006; Desmond et al., 2012; Horgan & MacLachlan, 2004; Singh et al., 2009). Evidence suggests that the initial two years following amputation represent a period of heightened risk for the experience of depressive symptoms in this patient group (Horgan & MacLachlan, 2004; Singh et al., 2009).

The presence of depressive symptomatology has been linked with a broad range of negative psychosocial outcomes including increased anxiety (Atherton & Robertson, 2006; Donovan-Hall, Yardley, & Watts, 2002; Livneh, Antonak, & Gerhardt, 1999; Singh et al., 2009), public self-consciousness (Atherton & Robertson, 2006; Donovan-Hall et al., 2002), vulnerability (Behel, Rybarczyk, Elliott, Nicholas, & Nyenhuis, 2002), and body image anxiety (Fisher & Hanspal, 1998a; Rybarczyk, Nyenhuis, Nicholas, Cash, & Kaiser, 1995), reduced self-esteem (Donovan-Hall et al., 2002; Dunn, 1996), and poorer quality of life (QoL) (Asano, Rushton, Miller, & Deathe, 2008; Rybarczyk et al., 1995). Indeed, Asano and colleagues (2008) found that depressive symptoms accounted for 30% of the variance in QoL among their sample of 415 individuals with lower limb amputations, with greater symptoms of depression predicting lower quality of life. The presence of depressive symptomatology has been linked with negative physical outcomes also, such as increased pain intensity (Ephraim et al., 2005; Hanley et al., 2004; Jensen et al., 2002) and greater activity restriction (Williamson et al., 1994).

1.4.2 Anxiety

Anxiety is a relatively common psychological sequela of amputation in the early postoperative period, but does not appear to persist in the long term (Horgan & MacLachlan, 2004). Up to 29.9% of persons with limb loss exhibit moderate to severe symptoms of anxiety post-amputation (Atherton & Robertson, 2006), compared with just 12.6% of the general population (Crawford, Henry, Crombie, & Taylor, 2001). Levels of anxiety among individuals with amputations are similar in magnitude to other patient groups, however, including persons who have undergone spinal (Badura-Brzoza, Matysiakiewicz, Piegza, Rycerski, & Hese, 2008) or limb salvage surgery (Thompson, Sayers, Reid, Underwood, & Bell, 1995). Anxiety is associated with negative psychosocial outcomes such as increased body image disturbance (Atherton & Robertson, 2006; Breakey, 1997; Fisher & Hanspal, 1998a) and public self-consciousness (Atherton & Robertson, 2006; Donovan-Hall et al., 2002), as well as reduced satisfaction with one’s prosthesis (Fisher & Hanspal, 1998a).

1.4.3 Post-traumatic stress disorder

Post-traumatic stress disorder (PTSD) is a “psychiatric disorder that can emerge after an individual is exposed to an event involving threatened or actual serious injury to self or others that causes a response of fear, helplessness, or horror” (Cavanagh et al., 2006, p. 459). Symptoms of PTSD include intense distress from and avoidance of stimuli representing the traumatic event, detachment, numbness, anger, difficulties in concentrating, and a sense of a foreshortened future (American Psychiatric Association, 1994). Existing research indicates that up to 26% of individuals with amputations may experience symptoms of PTSD, although heterogeneity in means of assessment as well as the demographic and amputation-related characteristics of samples preclude any firm conclusions being reached regarding the prevalence of such symptoms in this patient group (Cavanagh et al., 2006; Desmond & MacLachlan, 2004; Fukunishi, Sasaki, Chishima, Anze, & Saijo, 1996; Martz & Cook, 2001; Phelps, Williams, Raichle, Turner, & Ehde, 2008). There is longitudinal support for a relationship between amputation and the experience of PTSD, however, with symptoms appearing to increase over time. Phelps and associates (2008) examined the presence of PTSD symptoms in the year following amputation in a sample of 83 individuals, and found that 22.9% of participants had symptoms consistent with a diagnosis of PTSD 6 months post-amputation, with the proportion rising to 26% at 12 months after amputation. Additionally, significant associations were observed between the presence of PTSD symptomatology and symptoms of depression in this sample.

As the bulk of research on the presence of PTSD symptoms following limb loss to date has concerned persons with amputations due to accident or injury (Cheung, Alvaro, & Colotla, 2003; Fukunishi et al., 1996; Gustafsson & Ahlstrom, 2004; Martz & Cook, 2001), it is difficult to determine whether the experience of these symptoms is due to the traumatic effects of the event which necessitated the amputation, or the loss of the limb itself. Two recent studies examining the presence of PTSD symptoms in samples with mixed amputation etiologies have observed conflicting findings. Cavanagh and associates (2006) interviewed 26 rehabilitation patients an average of 6 weeks after amputation surgery, and found that only one of 23 patients with non-traumatic amputations in the sample, a man who had previously suffered from combat-related PTSD, met the criteria for PTSD, whereas two of the three persons with traumatic amputations in this sample did so, with the third demonstrating elevated scores just under the threshold for diagnosis. In contrast, Phelps and colleagues (2008) failed to observe a significant relationship between amputation etiology and PTSD symptomatology in their sample, 63.1% of whom had lost their limb due to illness.

1.4.4 Body image disturbance

Body image can be defined as “a person’s perceptions, thoughts, and feelings about his or her body” (Grogan, 2008, p. 3), and represents “a component of the self-concept, which is formed from both sensory and social experiences, with cultural and familial reactions to one’s body having great importance in determining one’s own attitude” (Fisher & Hanspal, 1998b, p. 357). Persons who undergo amputation are required to balance up to three distinct body images: the intact body prior to amputation; the body with the newly missing limb; and the image of the body with a prosthetic limb (if fitted) (Breakey, 1997; Wetterhahn, Hanson, & Levy, 2002). Such disruptions in body image can have an enduring impact on an individual’s sense of identity and the nature of their social interactions (Desmond et al., 2012).

Body-image anxiety following amputation is related to a number of negative psychosocial outcomes including increased symptoms of anxiety and depression (Atherton & Robertson, 2006; Breakey, 1997; Coffey, Gallagher, Horgan, Desmond, & MacLachlan, 2009; Fisher & Hanspal, 1998a; Rybarczyk et al., 1995), reduced quality of life (Breakey, 1997; Rybarczyk et al., 1995), lower self-esteem (Breakey, 1997), greater public self-consciousness (Atherton & Robertson, 2006), and poorer psychosocial adjustment to amputation (Atherton & Robertson, 2006; Coffey et al., 2009). Prosthetic provision and mastery (Fisher & Hanspal, 1998a; Murray & Fox, 2002) appear to mitigate the impact of amputation on one’s body image. Qualitative findings suggest that the use of a prosthetic limb not only minimises the discrepancy between the person’s body image before and after the amputation, but also minimises the sense of being different from others, which reduces concern over social reactions and leads to the development of a more positive body image (Gallagher & Maclachlan, 2001; Lundberg, Hagberg, & Bullington, 2011; Saradjian, Thompson, & Datta, 2008).

1.4.5 Social consequences of amputation

As highlighted in the ICF (WHO, 2001), the experience of disability is embedded in a particular cultural, social, and environmental context, and is thus likely to have a substantial impact on the person's social identity, roles, and relationships. Recovery following lower limb amputation involves successful reintegration back into the family, home environment, workplace, and community, requiring significant personal and environmental adaptations, and many individuals encounter ongoing restrictions in participation in one or all of these settings (Couture et al., 2010; Gallagher et al., 2011; Nissen & Newman, 1992; Schoppen et al., 2001; Williamson et al., 1994; Zidarov, Swaine, & Gauthier-Gagnon, 2009a). The loss of a limb may also affect the person's intimate relationships due to its negative impact on sexual functioning (Geertzen et al., 2009). Amputation sometimes gives rise to feelings of social discomfort or public self-consciousness, which may be attributable to the social stigma people with amputations perceive to be associated with their condition (Rybarczyk et al., 1995; Williamson & Schulz, 1995). Social discomfort has been linked with further psychosocial problems such as increased activity restriction (Burger & Marinček, 1997; Nissen & Newman, 1992; Williamson, 1995), heightened anxiety (Atherton & Robertson, 2006) and depressive symptoms (Atherton & Robertson, 2006; Rybarczyk et al., 1992, 1995). As in the case of body image anxiety, it appears that the provision of a prosthesis may lead to reductions in feelings of social discomfort and increased social participation (Donovan-Hall et al., 2002).

1.4.6 Quality of Life

Quality of life (QoL), defined as "an individual's perception of their position in life in the context of the cultural and value systems in which they live and in relation to their goals, expectations, standards and concerns" (WHOQOL Group, 1993, p. 153), is a multidimensional construct that offers a comprehensive insight into living with chronic illness or disability. Measures of QoL provide an holistic assessment of the impact of amputation that fits well into the framework of the ICF (WHO, 2001), taking into account a broad range of areas including perceived health and physical functioning, social relationships, psychological well-being, and environmental support. QoL assessments have been recommended for inclusion in routine clinical assessment following amputation, due to their utility in identifying issues of relevance to the rehabilitation process, facilitating communication and shared decision making between rehabilitation team members, screening for potential psychological and social problems that are frequently overlooked in the rehabilitation setting, and monitoring changes or responses to treatment (Gallagher & Mulvany, 2004; Gallagher & Desmond, 2007; Horgan & MacLachlan, 2004; Polliack & Moser, 1997).

Research examining QoL following amputation often employs generic measures such as the Short Form-36 Health Survey (SF-36: Ware, 1993), the Nottingham Health Profile (NHP: Hunt, McEwen, & McKenna, 1985), and the WHO Quality of Life Questionnaire-Brief Version (WHOQOL-BREF: WHOQOL Group, 1998) (e.g., De Godoy, Braile, Buzatto, Longo, & Fontes, 2002; Deans, McFadyen, & Rowe, 2008; Demet, Martinet, Guillemin, Paysant, & Andre, 2003; Gallagher & MacLachlan, 2004; Hagberg & Brånemark, 2001). These measures contain items that capture the impact of health conditions on the individual’s physical and psychological well-being, social relationships, and interactions with the environment. Although generic measures of QoL enable comparison between different populations, they are less sensitive to unique aspects of the condition being examined, such as body image disturbance or the experience of phantom limb pain in the case of amputation (Gallagher & Desmond, 2007).

A number of amputation-specific quality of life instruments have been developed in recent years, which assess life domains relevant to the experience of limb loss and prosthetic use, such as psychosocial adjustment to limb loss, satisfaction with prosthesis, and restrictions imposed by amputation. Examples include the Trinity

Amputation and Prosthesis Experience Scales (Gallagher & MacLachlan, 2000a) and the Prosthesis Evaluation Questionnaire (Legro et al., 1998), which are both widely used in research with this population (Asano et al., 2008; Coffey et al., 2009; Deans et al., 2008; Harness & Pinzur, 2001; Unwin, Kacperek, & Clarke, 2009; Zidarov, Swaine, & Gauthier-Gagnon, 2009b). Such measures have the added benefit of being more relevant to respondents and providing greater detail on experiences specific to the population being examined, but are limited in terms of comparison with other patient groups and the general population (Zidarov, Swaine, & Gauthier-Gagnon, 2009b). Given the different advantages and disadvantages associated with generic and condition-specific measures, they may serve to complement each other in investigations of QoL among persons with amputations (Gallagher & Desmond, 2007).

Despite the significant and wide-ranging influence that amputation may have on a person's existence, a number of studies suggest that the loss of a limb has a negligible impact on non-physical aspects of QoL (Deans et al., 2008; Harness & Pinzur, 2001; Nagarajan, Mogil, Neglia, Robison, & Ness, 2009; Zidarov, Swaine, & Gauthier-Gagnon, 2009b). For example, Zidarov and colleagues (2009b) assessed QoL in a sample of 19 individuals with unilateral lower limb amputations on admission to rehabilitation, at discharge, and three months post-discharge, and observed that subjective QoL was relatively high at all three time points, except for items relating to physical functioning. A study by Deans and associates (2008), which examined QoL in 75 individuals with above- or below-knee amputations secondary to PVD using the WHOQOL-BREF, indicated that QoL in the physical domain was the most affected in this patient group, with participants placing greater importance on social standing and relationships with family and friends than on physical ability. In addition, several studies have observed little or no difference between individuals with amputations and matched controls or samples drawn from the general population on mental health variables assessed using the SF-36 (Callaghan & Condie, 2003; De Godoy et al., 2002; Pezzin, Dillingham, & MacKenzie, 2000). Research employing amputation-specific measures of QoL has also observed higher scores on psychosocial subscales of adjustment than those addressing mobility and physical function (Atherton & Robertson, 2006; Coffey et al., 2009; Harness & Pinzur, 2001). Overall, findings have been mixed, however, and the research on QoL in this population to date has been hampered by methodological issues such as heterogeneity of samples and measurement tools (Sinha & Van Den Heuvel, 2011).

The observation that people may fail to show the expected reduction in subjective quality of life following amputation is not unique to this condition, and has repeatedly been noted among persons facing various chronic or life-threatening illnesses (Ahmed, Mayo, Wood-Dauphinee, Hanley, & Cohen, 2004; Bach & Tilton, 1994; Dempster, Carney, & McClements, 2010; Groenvold et al., 1999). This phenomenon has been referred to in the literature as the ‘disability paradox’ (Albrecht & Devlieger, 1999) or ‘response shift’ (Sprangers & Schwartz, 1999). Albrecht and Devlieger (1999) believe that quality of life is relatively unaffected by the experience of living with disability as “one dimension of the self may compensate for the loss/chaos in another so that a relatively balanced self is maintained” (p. 986). According to Sprangers and Schwartz (1999), the stability in quality of life scores observed is due to gradual changes in people’s values (recalibration), their internal standards (reprioritisation), or their definition of what constitutes a good quality of life in response to their adverse experiences (reconceptualization). Further support for the occurrence of a ‘response shift’ among persons with amputations comes from cross-sectional and longitudinal studies revealing a gradual improvement in QoL over time, which may represent this process at work (Asano et al., 2008; Behel et al., 2002; Demet et al., 2003; Hagberg, Brånemark, Gunterberg, & Rydevik, 2008; Spincemaille, Klomp, Steyerberg, & Habbema, 2000).

1.4.7 Positive psychosocial consequences of amputation

The majority of research on psychosocial adjustment to amputation has tended to focus almost exclusively on negative outcomes, equating the absence of psychological dysfunction with favourable adjustment (Desmond & Gallagher, 2008; Desmond et al., 2012). This unidimensional conceptualisation of adjustment is by no means unique to the study of persons with amputations, and can be observed throughout the literature on adaptation to chronic illness and disability (Bishop, 2005). Several researchers have called for greater inclusion of positive outcome variables in studies of psychosocial adjustment to amputation in order to redress this imbalance (Dunn & Dougherty, 2005; Elliott et al., 2002; Gallagher, Desmond, & MacLachlan, 2007; Rybarczyk et al., 2004; Rybarczyk, Nicholas, & Nyenhuis, 1997). This is consistent with the move towards a ‘positive psychology’ approach in the general psychological literature (Seligman & Csikszentmihalyi, 2000; Snyder & McCullough, 2000). Positive psychology is the science of understanding human strengths (Dunn & Dougherty, 2005), and aims to promote “the building, reinforcing and extending of persons’ strengths and capacities to optimise (as opposed to normalise) their functioning in all aspects of life and thereby promote wellness” (Gallagher et al., 2007, p. 3).

Various qualitative studies have detailed evidence of positive adjustment and growth amongst individuals who have experienced the loss of a limb (Couture, Desrosiers, & Caron, 2011; Gallagher & Maclachlan, 2001; Livingstone, Mortel, & Taylor, 2011; Oaksford, Frude, & Cuddihy, 2005; Saradjian et al., 2008). For example, men with upper limb amputations reported having gained a high sense of self-worth from their success in overcoming the functional and psychosocial challenges posed by limb loss and being able to fulfil personally meaningful activities and roles (Saradjian et al., 2008). Oaksford and colleagues (2005) noted that ten of the twelve people with lower limb amputations interviewed for their study said that they had experienced psychological growth as a result of their limb loss. Reported benefits included gaining a new appreciation of what it is like to live with a disability, being more inclined to help others, having more patience, and having greater appreciation of one’s own resilience and the kindness of others.

A small but growing body of quantitative research on positive psychosocial outcomes following amputation has emerged in recent years. Findings to date indicate that many individuals adjust positively to their limb loss, finding positive meaning and achieving psychological growth as a result of their experiences (Dunn, 1996; Gallagher & MacLachlan, 2000b; Phelps et al., 2008; Unwin et al., 2009). For example, Dunn (1996) examined the salutary effects of finding positive meaning in the experience of amputation among 138 members of an amputee golfing association, and found that over three-quarters of participants reported that something positive had happened since their limb loss. Of these, 60% found side benefits such as becoming more outgoing or making positive life changes. Persons who were able to see a positive side to their amputation in this sample experienced significantly fewer symptoms of depression than those who were unable to find a ‘silver lining’. Benefit finding among persons with amputations was also observed in a study by Gallagher and MacLachlan (2000b). Forty-six percent of their sample reported that something good had happened as a result of their limb loss. The beneficial effects included gaining independence through the use of an artificial limb, developing a more positive outlook, leading a better life, viewing the experience as character-building, and experiencing less pain as a result of amputation. Finding positive meaning in amputation was associated with better self-reported health and physical capability, and greater adjustment to limitations.

Only one quantitative study to date has examined the experience of positive mood following amputation. Unwin and colleagues (2009) assessed positive affect in 99 persons with lower limb amputations six months after being referred to an outpatient rehabilitation centre. The authors’ promising findings showed that the degree of positive affect reported by individuals with amputations was comparable to that reported in a large, non-clinical student sample (Crawford & Henry, 2004). Phelps and colleagues (2008) examined the experience of post-traumatic growth in a sample of 83 persons with amputations over a one-year period. Post-traumatic growth refers to the thriving that may be experienced as a result of coping with an adverse event such as the loss of a limb (Tedeschi & Calhoun, 1996), and has been documented in patients with a range of different medical conditions (Danoff-Burg & Revenson, 2005; Mohr et al., 1999; Stanton, Bower, & Low, 2006). A potential cause for concern is the observation that levels of post-traumatic growth in this sample were low relative to other populations such as cancer patients (Widows, Jacobsen, Booth-Jones, & Fields, 2005) and bereaved parents (Polatinsky & Esprey, 2000) at both six and twelve months after amputation. These findings may be explained by the higher mean age of participants in this study compared with other patient groups, as research has shown that post-traumatic growth tends to be higher among younger individuals (Linley & Joseph, 2004).

1.4.8 Importance of assessing both positive and negative outcomes

The experience of limb loss is likely to produce a diversity of emotional reactions. For example, although amputation imposes significant functional limitations that are liable to incite negative mood, this procedure may also signal an end to the experience of debilitating pain, arousing feelings of relief and contentment. Several researchers have argued for the inclusion of both positive and negative outcomes in research on psychosocial adjustment to amputation (Hanley et al., 2004; Phelps et al., 2008). Indeed, there is an abundance of research to suggest that rather than being end-points on the same unidimensional scale, positive and negative affect are in fact independent constructs, which may co-occur during stressful periods (Folkman, 2008; Watson, Clark, & Tellegen, 1988). Indeed, Phelps and colleagues (2008) found that post-traumatic growth, an indicator of positive adjustment, shared little common variance with emotional distress, with both outcomes being predicted by different types of cognitive processing. These findings suggest that in order to gain a more complete understanding of how amputation affects the individual, an examination of both positive and negative psychosocial sequelae is preferable.

1.5 Factors associated with adjustment to amputation

The ICF (WHO, 2001) framework indicates that various personal and environmental factors influence the physical, psychological and social functioning of individuals with health conditions (see Figure 1.1). Current conceptualisations of psychosocial adjustment to chronic illness and disability also acknowledge the impact that variables associated with sociodemographic characteristics, personality or psychological attributes, elements of the external environment, and the condition itself may have on this process (Elliott et al., 2002; Livneh, 2001). The present section will examine an array of different sociodemographic, clinical, and psychosocial factors that researchers have investigated in an attempt to account for the diversity observed in responses to amputation.

1.5.1 Sociodemographic and clinical factors

Compared with many other conditions causing physical disability, amputations result from a greater variety of medical causes, are distributed more evenly among all age groups, and give rise to a wider range of limitations (Rybarczyk et al., 1997). Numerous studies of adjustment to limb loss have examined the influence of sociodemographic variables, including age and gender, and clinical or amputation-related factors, such as cause and level of amputation, time since amputation, and the experience of amputation-related pain.

1.5.1.1 Age

There are mixed findings regarding the relationship between age and psychosocial adjustment to amputation. A number of studies have linked older age with superior adaptation, as evidenced in fewer symptoms of depression (Dunn, 1996; Frank et al., 1984; Phelps et al., 2008; Williamson et al., 1994), anxiety (Fisher & Hanspal, 1998a; Livneh et al., 1999; Singh et al., 2009) and PTSD (Phelps et al., 2008), as well as higher QoL (Asano et al., 2008). Some researchers have explained these findings by arguing that older adults may not react as strongly to amputation as younger individuals, because they view changes in mobility and body image resulting from limb loss as undesirable but somewhat expected at their age (Horgan & MacLachlan, 2004; Rybarczyk et al., 1997), a view reciprocated in various life-span theories of development (see Section 1.9.4) (Baltes & Baltes, 1990; Brandstädter & Renner, 1990; Heckhausen & Schulz, 1995). A positive association between age and adjustment has not consistently been observed, however, particularly with regard to QoL (Demet et al., 2003; Nagarajan et al., 2009; Sinha, Van Den Heuvel, & Arokiasamy, 2011). For example, Demet and colleagues (2003) found that younger individuals with upper or lower limb amputations had a higher QoL in several domains, including emotional reactions and social isolation. Several studies have failed to identify any significant relationship between age and psychosocial adjustment (Behel et al., 2002; Breakey, 1997; Desmond, 2007; Rybarczyk et al., 1995; Williams et al., 2004), particularly with regard to positive outcomes such as post-traumatic growth (Phelps et al., 2008) and the experience of positive affect (Unwin et al., 2009).

1.5.1.2 Gender

Little evidence exists of gender differences in psychosocial adjustment to amputation, whether operationalised as a negative outcome such as depressive symptomatology (Behel et al., 2002; Phelps et al., 2008; Rybarczyk et al., 1995) or a positive outcome such as post-traumatic growth (Phelps et al., 2008) or quality of life (Asano et al., 2008; Gallagher & MacLachlan, 2004; Rybarczyk et al., 1995; Walters & Williamson, 1998). When differences have been observed, they tend to favour males (Demet et al., 2003; Kashani, 1983; Pezzin et al., 2000; Phelps et al., 2008; Williams et al., 2004). For example, Phelps and colleagues (2008) noted that women in their study sample reported significantly greater levels of PTSD symptomatology six months after amputation. In addition, a study by Williams and associates (2004) found that being female was a significant predictor of greater symptoms of depression at six months post-amputation. The findings regarding the relationship between body image and gender have been mixed, according to a review of the literature (Horgan & MacLachlan, 2004), although research by Murray and colleagues (Murray & Fox, 2002; Murray, 2010) suggests that the aesthetic aspects of prosthesis satisfaction have a greater influence on body image disturbance among females.

1.5.1.3 Level of amputation

The level at which an amputation is performed is an important predictor of functional outcome, as above-knee amputations result in greater physical impairment (Rybarczyk et al., 1997) and increased energy expenditure when using a prosthesis (Waters, Perry, Antonelli, & Hislop, 1976) due to the absence of a knee joint. The relationship between level of amputation and psychosocial outcomes is less clear, however. Surprisingly, a handful of studies have found above-knee amputation to be predictive of enhanced QoL (Gallagher & MacLachlan, 2004; van der Schans, Geertzen, Schoppen, & Dijkstra, 2002). For the most part, however, research has failed to support the existence of a significant association between level of amputation and psychosocial adjustment (Asano et al., 2008; Behel et al., 2002; Breakey, 1997; Unwin et al., 2009; Williamson et al., 1994). This finding is in keeping with the wider literature on chronic illness and disability, which has frequently shown that objective measures of physical impairment tend to be poor predictors of psychological well-being (Maybury & Brewin, 1984). Indeed, Rybarczyk and colleagues (1997) argue that degree of impairment is too simplistic to serve as an important predictor of an individual’s overall adjustment, and the restrictions it causes in ADLs and other life domains are likely to play a more pivotal role in this process.

1.5.1.4 Cause of amputation

Many studies have failed to provide support for a relationship between amputation etiology and psychosocial outcomes such as symptoms of depression and PTSD (Kratz et al., 2010; Phelps et al., 2008; Rybarczyk et al., 1995), post-traumatic growth (Phelps et al., 2008), or QoL (Gallagher & MacLachlan, 2004; Rybarczyk et al., 1995; Walters & Williamson, 1998). However, there is some evidence to suggest that persons with amputations due to chronic causes such as diabetes or PVD may be at greater risk for negative consequences (Demet et al., 2003; Desmond & MacLachlan, 2006b; Williams et al., 2004). In a cross-sectional study of upper and lower limb loss by Demet and associates (2003), it was found that amputations of vascular origin were significantly associated with greater social isolation. Williams and colleagues (2004) also found that persons with limb loss due to non-traumatic causes reported lower levels of social integration. Furthermore, having a disease-related amputation has been found to significantly predict poorer general adjustment to amputation (Desmond & MacLachlan, 2006a). It is hard to disentangle adjustment difficulties associated with the amputation from those related to underlying medical conditions, however, as the most common comorbidities are themselves risk factors for negative psychosocial outcomes such as depression. For example, Singh and colleagues (2009) noted that the presence of comorbidities on admission to a rehabilitation ward was a predictor of greater depressive symptomatology 2-3 years later in a sample of 68 persons with lower limb loss. Presence of comorbidities has also been found to significantly predict poorer QoL in this patient group (Asano et al., 2008).

1.5.1.5 Time since amputation

Current conceptualisations of adjustment to chronic illness and disability emphasise the dynamic and fluid nature of this process (Elliott et al., 2002; Livneh, 2001). The majority of research on psychosocial outcomes following amputation has been cross-sectional in design, and little is currently known about the trajectory of adjustment in this patient group. The growing number of longitudinal studies published in recent years have provided some insight into how individuals adapt to their limb loss over time, however (Callaghan, Condie, & Johnston, 2008; Jensen et al., 2002; Kratz et al., 2010; O'Neill & Evans, 2009; Phelps et al., 2008; Schoppen et al., 2003; Unwin et al., 2009; Williams et al., 2004). According to a comprehensive review of the literature on psychosocial adjustment to limb loss, symptoms of anxiety and depression are quite common among persons with amputations in the first two years following this procedure, but appear to decline thereafter to levels comparable with those of the general population (Horgan & MacLachlan, 2004). However, a longitudinal study of 68 individuals with lower limb amputations conducted by Singh and colleagues (2009) found that although depression and anxiety levels decreased from time of admission to a rehabilitation facility to discharge, by 2-3 years later they had risen again significantly. Kratz and associates (2010) similarly observed a significant linear growth pattern in PTSD symptoms over the first twelve months post-amputation in a sample of 111 individuals with newly acquired limb loss. Furthermore, a cross-sectional survey of war veterans who had experienced limb loss an average of 42.6 years previously noted that 32.5% of the sample met the criteria for depression, and 37.5% reported symptoms consistent with possible clinical anxiety, indicating that psychosocial difficulties may continue to be experienced for many years after amputation (Desmond & MacLachlan, 2006a).

Several cross-sectional studies have failed to find any relationship between time elapsed since amputation and psychosocial outcomes, however (Breakey, 1997; Desmond, 2007; Fisher & Hanspal, 1998a; Frank et al., 1984; Rybarczyk et al., 1992, 1995; Williamson et al., 1994). In addition, some longitudinal studies have failed to observe significant changes in psychosocial outcomes over time among persons with amputations. For example, Williams and colleagues (2004) found that levels of social integration remained stable over the two years following amputation surgery in a sample of 89 adults with lower limb loss. Stability was also observed in depressive symptoms, social constraints, and loneliness over a one-year period in a study by Kratz and associates (2010). Overall, these findings suggest that adjustment to amputation is not necessarily a linear process, and gains made during rehabilitation may diminish following discharge when individuals are confronted with their new reality and its inherent limitations. This highlights the vital role that longitudinal research has to play in identifying fluctuations in psychosocial outcomes that may not be apparent in cross-sectional data.

1.5.1.6 Pain

Approximately three-quarters of all persons who undergo amputation subsequently experience phantom limb pain (PLP), "a painful sensation perceived in the missing body part" (Gallagher, Allen, & MacLachlan, 2001, p. 522). Pain in the remaining part of the amputated limb, referred to as residual limb pain (RLP), is also frequently reported (Ehde et al., 2000; Ephraim et al., 2005; Gallagher et al., 2001). Several studies indicate that amputation-related pain, be it experienced in the residual limb, phantom limb, or other parts of the body such as the back or neck, is a significant risk factor for poor adjustment following limb loss (Hanley et al., 2007; Jensen et al., 2002; Katz, 1992; Murray & Fox, 2002; Pell, Donnan, Fowkes, & Ruckley, 1993; Whyte & Carroll, 2004). For example, Whyte and Carroll (2004) found that both the duration and intensity of pain experienced by 315 individuals with amputations predicted a significant amount of the variance in psychosocial dysfunction, with a longer duration and greater intensity of pain being associated with higher levels of dysfunction. Amputation-related pain has also been associated with decreased sexual satisfaction (Walters & Williamson, 1998) and QoL (van der Schans et al., 2002; Walters & Williamson, 1998). The co-occurrence of PLP and RLP may place individuals at heightened risk for poor psychosocial adjustment. For example, Desmond, Gallagher, Henderson-Slater, and Chatfield (2008) found that participants who had both types of pain reported poorer general adjustment and adjustment to limitations than those with no pain, or those who experienced either PLP or RLP alone. This combination of pain experiences is also associated with increased symptoms of PTSD (Desmond & MacLachlan, 2006a).

The experience of amputation-related pain may affect adjustment indirectly, either through its association with the use of maladaptive coping strategies such as catastrophising (Hanley et al., 2004; Hill, Niven, & Knussen, 1995; Jensen et al., 2002) or its impact on activity levels (Horgan & MacLachlan, 2004). Indeed, PLP intensity has been linked with unemployment (Whyte & Carroll, 2002), and both PLP and RLP are associated with lower levels of adjustment to limitations (Gallagher et al., 2001). Activity restriction has been found to act as a mediator in the relationship between depression and variables such as prosthesis use and satisfaction with social contacts among persons with amputations (Williamson et al., 1994), and may play a similar role in the relationship between amputation-related pain and psychosocial outcomes (Horgan & MacLachlan, 2004). The direction of causation in the relationship between amputation-related pain and poor adjustment remains unclear (Horgan & MacLachlan, 2004; Novy, Nelson, Francis, & Turk, 1995), however, and it is difficult to discriminate between the negative influence of pain and that of the amputation itself (Fishbain, Cutler, Rosomoff, & Rosomoff, 1997).

1.5.2 Psychosocial factors

In general, relationships between sociodemographic and clinical variables and adjustment to amputation have been weak or inconsistent (Horgan & MacLachlan, 2004; Rybarczyk et al., 2004; Rybarczyk et al., 1997), a finding that is in keeping with the broader literature on acquired physical disability (Elliott et al., 2002). In recent years, research efforts to identify predictors of adjustment to limb loss have shifted their focus to the influence of psychological and social factors. Psychosocial variables significantly associated with adjustment in this patient group include hope (Unwin et al., 2009), optimism (Dunn, 1996), perceived social support (Asano et al., 2008; Unwin et al., 2009; Williamson et al., 1994), social activity (Asano et al., 2008), perceived control (Dunn, 1996), sense of coherence (Badura-Brzoza et al., 2008), public self-consciousness (Atherton & Robertson, 2006; Williamson, 1995), perceived social stigma (Rybarczyk et al., 1995), self-esteem (Breakey, 1997; Donovan-Hall et al., 2002; Varni & Setoguchi, 1996), illness perceptions (Callaghan et al., 2008), vulnerability (Behel et al., 2002), and balance confidence (Asano et al., 2008). The influence of three psychosocial factors on adjustment to amputation will be focused on in the present study: optimism, perceived social support, and coping.

1.5.2.1 Optimism

Optimism is defined as a generalised expectation of positive future outcomes (Scheier & Carver, 1985), and a large body of research attests to its positive effects on health and well-being (Carver, Scheier, & Segerstrom, 2010). Persons with an optimistic disposition tend to be confident and persistent in striving towards their goals in the face of diverse life challenges, even when progress is slow or difficult (Carver et al., 2010), and have been found to adjust more successfully than those with a pessimistic outlook to various health threats, including cancer (Allison, Guichard, & Gilain, 2000; Carver et al., 2005; Trunzo & Pinto, 2003) and heart surgery (King, Rowe, Kimble, & Zerwic, 1998; Mahler & Kulik, 2000; Matthews, Raikkonen, Sutton-Tyrrell, & Kuller, 2004). These findings may be explained by differences in coping (Carver et al., 2010; Rasmussen, Wrosch, Scheier, & Carver, 2006). Whereas individuals who are dispositionally pessimistic tend to engage in avoidant coping such as denial and behavioural disengagement, those of an optimistic disposition employ approach coping strategies (Carver et al., 2010; Nes & Segerstrom, 2006). Optimists are also more sensitive to the nature of the stressful situation in their coping responses, using problem-focused strategies such as planning or seeking instrumental social support as long as a stressor appears to be within their control, but switching to emotion-oriented strategies such as positive reframing and acceptance when faced with an uncontrollable stressor such as a traumatic health event (Aspinwall & Richter, 1999; Nes & Segerstrom, 2006). Although optimism is thought of as a stable trait, it has been suggested that changes in this variable may occur during times of life transition, when outcomes become more uncertain (Carver et al., 2010).

Only one study to date has explored how dispositional optimism contributes to adjustment among persons with amputations. In a sample of 138 individuals with either upper or lower limb loss, Dunn (1996) observed that having an optimistic outlook on life was associated with higher self-esteem and fewer symptoms of depression, and was a stronger predictor of these outcomes than either perceived control or finding positive meaning in the experience of amputation. The generalisability of these findings is somewhat limited, however, as persons with upper limb loss and/or a traumatic amputation etiology were over-represented in the sample, and all participants were members of a golfing society for individuals with amputations, potentially representing a particularly well-adjusted, not to mention wealthy, segment of this population. The cross-sectional nature of the study also offers little insight into how this personality factor relates to adjustment over time in this patient group. Further investigation of optimism and its role in this process is thus required.

1.5.2.2 Perceived social support

Social support is widely recognised as a critical resource for managing stressful life events, and has been found to promote health and well-being in a broad range of illness and disability populations (Taylor, 2007). The importance of the support provided by family and friends in the post-amputation recovery process has been emphasised by rehabilitation specialists and patients alike (Furst & Humphrey, 1983; Schoppen et al., 2003). Social support is likely to help people adapt to limb loss in a number of different ways. Firstly, individuals with good social resources may benefit from the practical assistance offered by the people who make up their social support network in renegotiating their physical and social environments following amputation. Indeed, Williams and colleagues (2004) noted that individuals with amputations who had higher levels of social support consistently reported more time out of bed, out of the house, and in their communities, as well as greater participation in social, leisure, vocational and other meaningful activities. Secondly, the presence of high-quality social support after amputation is likely to enhance psychological well-being by providing the person with the emotional support needed to come to terms with this life-changing experience. The evidence that persons with amputations may be at increased risk of social isolation (Pell et al., 1993; Thompson & Haran, 1983), particularly those who are older, unmarried, and have non-traumatic etiologies (Demet et al., 2003; Williams et al., 2004), is thus cause for concern.

Social support is a broad construct that is usually assessed in terms of either social integration or perceived social support (Cohen, Underwood, & Gottlieb, 2000). Social integration is defined as the extent to which one participates in a wide range of social relationships, whereas perceived social support refers to the quality of the social resources that a person perceives to be available. Research carried out with individuals who have experienced the loss of a limb suggest that although both types of social support are related to physical and psychological functioning in this population, it is the perceived quality, rather than quantity, of relationships that determines the degree to which they benefit from their social support systems (Asano et al., 2008). Williams and colleagues (2004) examined the relationship between social integration, perceived social support and a number of physical and psychological outcomes over a two-year period and found that at one month post-amputation, higher levels of perceived social support were predictive of lower pain interference and greater life satisfaction and mobility, whereas higher social integration was only associated with greater occupational function. Six months later, perceived social support continued to be a predictor of greater mobility and occupational function, but social integration was no longer predictive of any of the outcomes examined.

A number of other studies carried out in this population have observed perceived social support to be a significant predictor of many physical and mental health outcomes including depressed affect (Rybarczyk et al., 1995; Williamson et al., 1994), QoL (Asano et al., 2008; Rybarczyk et al., 1995), and activity restriction (Williamson et al., 1994). Prospective studies indicate that greater perceived social support aids individuals in both physically and psychologically adjusting to their limb loss over time (Bosse et al., 2002; Hanley et al., 2004; Jensen et al., 2002; Unwin et al., 2009; Williams et al., 2004). In a two-year prospective study of patients with traumatic lower limb amputations, Bosse and colleagues (2002) reported that reduced levels of perceived social support were predictive of poorer self-reported health status. Jensen and colleagues (2002) found that greater perceived social support at one month post-amputation was a significant independent predictor of improvements in pain interference and depression over the following five months. Perceived social support on commencement of rehabilitation has also been found to predict both positive affect and general adjustment to amputation six months later (Unwin et al., 2009).

1.5.2.3 Coping

The coping strategies that individuals engage in are thought to play a critical role in psychosocial adjustment to chronic illness and disability (Livneh & Wilson, 2003; Maes, Leventhal, & De Ridder, 1996). Coping is defined as “cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person” (Lazarus & Folkman, 1984, p. 141). Given the impact that limb loss has on the person’s physical, social, and psychological functioning, it is deemed a highly potent stressor, and a number of studies have been conducted to investigate the types of coping strategies employed in adapting to this condition (Desmond & MacLachlan, 2006a; Dunn, 1996; Livneh & Antonak, 1997; Livneh, Antonak, & Gerhardt, 2000; Oaksford et al., 2005), with many focusing specifically on how people cope with PLP and/or RLP (Gallagher & MacLachlan, 1999;

Hanley et al., 2004; Hill et al., 1995; Jensen et al., 2002; Pucher, Kickinger, & Frischenschlager, 1999; Whyte & Carroll, 2004).

Research has shown that individuals with amputations share a similar pattern of coping responses with the general population, with three general dimensions emerging: active/confrontive versus passive/avoidant coping, optimistic/positivistic versus pessimistic/fatalistic coping, and social/emotional versus cognitive coping (Livneh et al., 2000). In accordance with the broader literature on coping, the use of problem-focused and approach coping appears to be more adaptive than emotion-oriented and avoidant strategies in adjusting to amputation (Desmond, 2007; Desmond & MacLachlan, 2006a; Gallagher & MacLachlan, 1999; Livneh et al., 1999). For example, Livneh and colleagues (1999) investigated the coping mechanisms used by 61 persons with amputations, and found that active problem-solving was negatively associated with symptoms of depression and internalised anger and positively related to adjustment and acceptance of disability. Conversely, emotion-focusing and cognitive disengagement were associated positively with anxiety, depressive symptoms and externalised hostility and negatively with acceptance of disability. In a sample of 796 war veterans who had experienced limb loss an average of 43 years ago, Desmond and MacLachlan (2006b) found that greater use of avoidance as a coping strategy was associated with higher anxiety, greater symptoms of depression and PTSD, and poorer psychosocial adjustment. In contrast, problem solving was predictive of lower levels of anxiety and depressive symptomatology, and seeking social support was associated with fewer depressive symptoms and greater social adaptation. Hill and colleagues (1995) examined the relationship between coping strategy use and adjustment in a sample of people with amputations who experienced PLP, and found that catastrophising, behavioural activity, and hoping or praying accounted for a significant amount of the variance in pain report, physical disability and psychosocial dysfunction, with catastrophising explaining the greatest proportion of this variance. Indeed, catastrophising has consistently been found to predict negative outcomes among persons with amputations (Hill et al., 1995; Jensen et al., 2002; Whyte & Carroll, 2004).

In recent years, there has been a growing interest in the role of meaning-making or meaning-based coping in adapting to stressful experiences (Folkman, 1997; Folkman, 2008; Park & Folkman, 1997; Park, 2010; Tennen & Affleck, 2002). Meaning-based coping involves people drawing on their beliefs and values to find benefits in stressful experiences, and includes strategies such as reordering life priorities and infusing ordinary events with positive meaning (Carver & Connor-Smith, 2010). This type of coping is most often used when stressful experiences appear to be uncontrollable (Folkman, 2008). A number of qualitative studies have indicated that people engage in meaning-based coping when adjusting to limb loss (Gallagher & Maclachlan, 2001; Oaksford et al., 2005; Saradjian et al., 2008). Meaning-based strategies consistently mentioned in the qualitative literature include acceptance of one’s limb loss (Gallagher & Maclachlan, 2001; Livingstone et al., 2011; Oaksford et al., 2005; Saradjian et al., 2008), engaging in downward social comparison (Gallagher & Maclachlan, 2001; Hamill, Carson, & Dorahy, 2010; Oaksford et al., 2005; Saradjian et al., 2008; Sjödahl, Gard, & Jarnlo, 2004), the use of humour (Gallagher & Maclachlan, 2001; Gallagher et al., 2007; Oaksford et al., 2005; Saradjian et al., 2008), maintaining a sense of purpose in one’s life (Saradjian et al., 2008), and taking pride in one’s ability to cope successfully with amputation (Oaksford et al., 2005; Saradjian et al., 2008).

A small number of quantitative studies have examined the role of meaning-making in adjustment to limb loss. In a survey of 138 individuals with amputations, Dunn (1996) observed that finding positive meaning in the experience of amputation was predictive of lower levels of depressive symptomatology. Phelps and colleagues (2008) found that positive cognitive processing, including strategies such as acceptance of disability and positive cognitive restructuring, was predictive of fewer symptoms of depression and PTSD and higher levels of post-traumatic growth in a sample of 83 individuals with amputations. In contrast, negative cognitive processing strategies such as rumination, anger, and blame were associated with greater depressive and PTSD symptomatology. A recent study by Unwin and associates (2009) looked at the role of hope, defined as a person’s stable thoughts about their ability to find ways to reach their goals and to find the motivation to pursue those steps, in adaptation to lower limb amputation over a six-month period, and found this trait to be a significant predictor of both positive mood and general adjustment to limb loss.

1.6 Limitations of research on adjustment to amputation

Psychosocial adjustment to amputation is a burgeoning field of research, and there has been a proliferation of both qualitative and quantitative studies published on this topic in the past fifteen years. The literature on adjustment to amputation has been beset by a number of limitations, however, which authors have only recently begun to address. The overwhelming emphasis placed on negative indicators of adjustment represents a major shortcoming in the existing research, with knowledge and understanding of positive adjustment remaining underdeveloped. Studies identifying the characteristics of individuals who achieve positive outcomes may usefully inform rehabilitation services aimed at promoting adjustment to amputation (Unwin et al., 2009). In addition, the majority of research conducted to date has been cross-sectional in design, thus precluding the drawing of any firm conclusions regarding the direction of relationships between variables. Longitudinal studies enable the exploration of shifts in variables over time and circumstances, and allow researchers to control for initial levels of the variables being examined, thus permitting inferences to be made regarding the causal pattern of their associations.

Another limitation of the existing research on psychosocial adjustment to amputation is the dearth of studies that have used theories to inform and guide their research. Theory-based research not only expands on existing knowledge, but can also be used to inform evidence-based practice and provide clinicians with empirically-supported techniques. A theory is a “collection of coherent, related ideas derived from what is already known about some phenomenon in order to explain some existing behaviour or to predict the occurrence of future behaviour” (Dunn & Elliott, 2008, p. 255). There are several advantages inherent in adopting a theoretical approach to conducting research in any field. Firstly, theories offer a simple, parsimonious and clear account of the topic of interest that is consistent with existing knowledge and can be used as a coherent, organising framework for research in the area. Secondly, theories are constantly evolving, generating new questions and pointing towards possible avenues for future research, possibly resulting in modifications or extensions to the original theory. Finally, theories, particularly those that are broad in scope, may be able to identify commonalities in different aspects of human behaviour, thus bringing together various strands of knowledge and offering a shared viewpoint on what may appear to be very different behaviours or experiences on the surface (Dunn & Elliott, 2008).

1.7 Theory-based research on adjustment to amputation

Theories and models that have previously been applied to the experience of adjusting to limb loss include Bowlby and Parke’s (1970) grief model, the activity restriction model of depressed affect (Williamson, 1998), the common sense self-regulation model (Leventhal, Brissette, & Leventhal, 2003), hope theory (Snyder, 2002), a cognitive-processing model of adjustment to amputation (Phelps et al., 2008), and the transactional theory of stress and coping (Lazarus & Folkman, 1984). There is significant variation in the scope of these theories, with some being drawn from the wider discipline of psychology, while others represent applications or extensions of existing knowledge to this patient group (Dunn & Elliott, 2008). Each of these models and theories will be examined individually in the present section, and their strengths and weaknesses, particularly in the context of adjustment to amputation, will be discussed.

1.7.1 Grief model

Grief is a normative and universal reaction to loss, encompassing a range of emotional, behavioural and cognitive responses including depression, anxiety, and symptoms of PTSD (Wald & Alvaro, 2004). Bowlby and Parkes (1970) outlined a series of phases that people move between as they come to terms with the loss of a loved one: numbness, in which the individual shuts out further stimuli and absorbs the impact of the event; pining, in which the person strives to get back what has been lost; disorganisation, during which the person gives up on recovering what was lost, but has not yet developed a coherent outlook on his or her new world; and reorganisation, in which a new view of the world is constructed. Suppression of grief is thought to inhibit this natural sequence of emotional reactions, which may lead to psychological disturbance unless the grief is allowed to run its natural course (Bowlby, 1980; Shaver & Fraley, 2008).

It has been postulated that the loss of body parts, and resultant changes in body image and function, can give rise to a similar grieving process (Maguire & Parkes, 1998). Parkes (1975) conducted a study comparing the reactions of widows to the loss of a spouse with the reactions of individuals with amputations to the loss of a limb, and found many similarities in the process of adjustment to loss between the two groups. Both initially reacted with a sense of numbness and a tendency to deny the affective reality of the loss, followed shortly by a pining for the lost person or limb. In the case of persons with amputations, a greater sense of sadness was experienced at the effects of limb loss on their lives rather than the loss of the limb itself. At 4-8 weeks after the loss, both groups alternated between pining, bitterness and depression, and many individuals became preoccupied with the missing person or body part. A strong sense of the persisting presence of the lost person or limb was felt by both groups, embodied as phantom limb sensation in persons with an amputation. Both widows and individuals with amputations tended to avoid thoughts and situations which reminded them of their loss, leading to social withdrawal among half of the participants in both groups.

Thirteen months after the loss, the two groups showed a similar degree of overall emotional disturbance, although the sense of the presence of the lost object was more common among individuals with amputations at this stage. Overall, Parkes (1975) found that although widows showed more evidence of overt distress than persons with limb loss in the early grieving process, this distress diminished over the course of the following year, whereas it persisted in the group of individuals with amputations, with little or no psychological improvement evident during the first year of living with limb loss.

Although the works of Bowlby (1980) and Parkes (2001) form the cornerstone of the literature on bereavement, their phase model of grief has received numerous criticisms (Shaver & Fraley, 2008). For example, it is widely argued that the grieving process varies between individuals and does not necessarily follow a prescribed sequence of stages, as hypothesised in this model. A number of authors have also suggested that failing to grieve intensely should not be assumed to indicate ‘pathological’ grieving, as it may be a sign of resilience and positive emotion rather than of avoidant suppression (Shaver & Fraley, 2008; Wortman & Silver, 1989). With regard to Parkes’ study (1975), although some parallels can be drawn between this model of the grieving process and the process of psychosocial adjustment to amputation, given their common patterns of pessimism, social withdrawal, and emotional disturbance (Maguire & Parkes, 1998), the research is limited and unconvincing (Lucke & Lucke, 1990). Only half of the participants in Parkes’ (1975) study showed evidence of experiencing a phase of numbness, the phase of pining was less intense for the limb loss group compared with the widows, and persons with amputations had not yet entered a phase of reorganisation thirteen months after limb loss. Furthermore, it is difficult to determine whether the grief-like reactions observed were a direct result of limb loss, or secondary to the restrictions caused by impaired mobility (Pell et al., 1993). Indeed, whereas the widow suffers one major loss, the individual with an amputation suffers an accumulation of losses in several life domains, including self-identity, mobility, employment, and goals for the future, many of which are irrevocable (Wald & Alvaro, 2004). Together, these observations suggest that the grief model may offer a somewhat limited explanation of the unique experience of losing a limb.

1.7.2 Activity restriction model of depressed affect

The activity restriction model of depressed affect (Williamson, 1998) postulates that the restriction of usual activities by a major life stressor plays a central role in psychological adjustment, with greater restriction resulting in poorer mental health outcomes. Despite consistent evidence of a link between depression and a wide range of medical conditions, severity of illness or disability has rarely been found to predict the presence of depressive symptomatology. The activity restriction model of depressed affect explains this counterintuitive finding by proposing that restrictions in daily activities mediate the association between illness and symptoms of depression, both directly and through their associations with social support and psychological factors such as personal control and self-esteem (Williamson & Schulz, 1992; Williamson, 2000). This model has been applied to a number of different patient groups (Walters & Williamson, 1999; Williamson & Schulz, 1995; Williamson, 2000), including persons with limb loss. Williamson and associates (1994) found that activity restriction fully mediated the effects of prosthesis use and household income inadequacy on depressed affect in a sample of 160 individuals with upper and lower limb amputations, and was a partial mediator of the relationship between satisfaction with social contacts and symptoms of depression. Although the activity restriction model of depressed affect has only been examined cross-sectionally in persons with amputations, a longitudinal study of patients with recurrent cancer found that increases in pain over time predicted increases in activity restriction, which in turn predicted increases in symptoms of depression, even when baseline depressive symptomatology was controlled for (Williamson & Schulz, 1995).

A number of limitations are apparent on examining the assumptions of the activity restriction model of depressed affect. Although there is extensive support in the literature for the notion that activity restriction mediates the relationship between chronic illness or disability and emotional well-being, this model has been developed primarily on the basis of cross-sectional research. Given that the presence of depressive symptoms is a risk factor for activity restriction, it is possible that a bidirectional relationship exists between these two factors rather than the unidirectional association proposed in this model. Furthermore, the exclusive focus on depressive symptomatology as an indicator of emotional well-being gives the model a very limited scope, with no attention being paid to the positive outcomes that may result from the experience of adversity. In order to gain an increased understanding of adjustment to amputation and fully capture the essence of this complex experience, it appears that a more broad-ranging theoretical perspective is required.

1.7.3 Common sense self-regulation model

The common sense self-regulation model was developed by Leventhal and colleagues (1980), and outlines the self-regulation processes by which people make sense of their experience of illness. This model posits that individuals develop cognitive representations of illness based on the concrete and abstract sources of information available to them, which determine one’s emotional responses and coping efforts. These cognitive representations of illness lie along five dimensions: identity, which includes perceived symptoms; the perceived cause of the illness; time line (whether the illness is acute, episodic or chronic in nature); perceived consequences of the illness for one’s life; and beliefs about the curability or controllability of the illness. Emotional responses generated by the condition are also incorporated into this model, including negative affect variables such as fear, anger and distress, as well as positive emotions such as relief or determination. Both cognitive representations and emotional responses are thought to initiate coping procedures. Whereas cognitive representations elicit either appraisal-focused or problem-focused coping responses, emotional responses stimulate emotion-focused coping strategies. Feedback from the appraisal of these coping efforts goes on to influence subsequent cognitive representations, emotional responses and coping efforts.

The common sense self-regulation model has been applied to a wide range of medical conditions (Hagger & Orbell, 2003), including multiple sclerosis (Jopson & Moss-Morris, 2003) and rheumatoid arthritis (Scharloo et al., 1999). Callaghan and colleagues (2008) employed this model in a longitudinal study of 166 persons with lower limb amputations in order to determine whether their cognitive representations of amputation and emotional responses during rehabilitation were predictive of prosthetic use and activity restriction at both one month and six months after discharge. A significant model emerged for indoor and outdoor prosthesis use, extent of prosthesis use, and activity limitations at six months after discharge from rehabilitation, with the dimension of timeline emerging as a significant predictor variable for each of these outcomes. Treatment control significantly predicted prosthesis use and activity restriction, while cause was found to predict outdoor prosthesis use and extent of use.

Despite the many strengths of the common sense self-regulation model, its applicability may be limited among individuals with amputations. Although the constructs that comprise this model are relevant to the experience of persons with limb loss secondary to chronic illness, who must continue to manage their underlying medical conditions, cognitive representations such as timeline and curability/controllability appear to offer little explanatory value in the case of traumatic amputation, which usually constitutes an isolated medical event in the absence of ongoing health issues. Furthermore, Callaghan and colleagues (2008) only partially applied the common sense self-regulation model by focusing solely on the influence of illness perceptions and neglecting to examine coping efforts, thus offering an incomplete view and ignoring vital aspects of the process of adaptation to illness. Indeed, most of the research incorporating this model has centred on mental representations of illness (Hagger & Orbell, 2003; Leventhal et al., 2003), an approach that has been criticised for providing little information on the role of coping in attaining a successful outcome (De Ridder & de Wit, 2006). These findings suggest that the common sense self-regulation model may not sufficiently account for the process of adjustment to a permanent condition such as amputation.

1.7.4 Hope theory

Hope theory (Snyder, Irving, & Anderson, 1991; Snyder, 2002) has received considerable attention in the psychological literature over the past two decades. Hope refers to “a positive emotional state that is based on an interactively derived sense of successful (a) agency (goal-directed energy), and (b) pathways (planning to meet goals)” (Snyder et al., 1991, p. 287), and can thus be conceptualised as a goal-directed cognitive motivational process. According to hope theory, when a barrier impeding goal pursuit is encountered, perceptions of unsuccessful goal pursuit elicit negative emotions, whereas perceptions of successful goal pursuit yield positive affect. Persons who are high in hope perceive themselves as being better at creating primary routes (or pathways) to goals, or finding alternative routes to goals when these primary pathways become blocked. In addition, they are more likely to view the barrier as a challenge to be overcome, and to continue directing their energy (or agency) towards pursuing the goal. High-hope individuals are thought to experience greater positive emotions and fewer negative emotions than low-hope individuals as a result of these characteristics (Snyder, Lehman, Kluck, & Monsson, 2006).

Hope theory has been applied to the study of physical and psychological adjustment to a range of different conditions including spinal cord injury (Elliott, Witty, Herrick, & Hoffman, 1991) and breast cancer (Stanton et al., 2000), with high-hope persons faring consistently better than their low-hope counterparts (Snyder & McCullough, 2000). Unwin and colleagues (2009) applied Snyder’s theory to the experience of positive adjustment to amputation in a prospective study of 99 persons with lower limb amputations, which investigated the influence of hope, presence of PLP, and perceived social support, as assessed on referral to an outpatient rehabilitation centre, on the experience of positive affect and general adjustment to limb loss six months later. In accordance with the assumptions of hope theory, it was found that higher levels of hope at baseline were significantly predictive of greater positive affect and enhanced general adjustment to amputation at follow-up.

Despite its popularity in the psychological literature and widespread application in various populations and settings, hope theory has received much criticism for its estrangement from other well-validated theoretical frameworks such as models of self-regulation (Carver & Scheier, 1998), which examine nearly identical goal processes and are supported by an extensive body of experimental and applied research, as well as its failure to adequately explain what distinguishes the concept of hope from other closely related and well-validated theoretical constructs such as optimism and problem-focused coping (Aspinwall & Leaf, 2002; Tennen, Affleck, & Tennen, 2002). This lack of integration with the wider literature prevents the formation of connections between different theoretical concepts and perspectives, thus impeding cumulative progress in the understanding of this phenomenon (Dunn & Elliott, 2008). The narrow focus of this theory on the achievement of personal goals has also been called into question. Although it is now widely accepted that giving up goals is sometimes adaptive, especially in situations of irrevocable change or loss (Brandstädter & Renner, 1990; Carver & Scheier, 2000a; Wrosch, Scheier, Carver, & Schulz, 2003), hope theory remains unclear as to how agency and pathways beliefs influence self-regulation in situations where success is impossible and alternate means of problem solving are unavailable (Aspinwall & Leaf, 2002). Given the fact that amputation is likely to require disengagement from a number of goals that are no longer attainable, it appears that a more broadly focused theory, and one with a firmer grounding in the literature on self-regulation, is required to adequately account for the process of adjustment to limb loss.

1.7.5 Cognitive processing model of adjustment to amputation

In recent years, various researchers have proposed that growth and distress following a traumatic experience are not necessarily mutually exclusive and may in fact represent independent constructs (Linley & Joseph, 2004; Tedeschi & Calhoun, 2004). According to the cognitive processing model, which was derived from the literature on coping (Folkman & Greer, 2000) and post-traumatic growth (Tedeschi & Calhoun, 2004) by Phelps and associates (2008), when a traumatic experience such as amputation overwhelms a person’s usual means of coping, successful adaptation, and indeed post-traumatic growth, may be achieved using positive cognitive processes such as modifying one’s values to accommodate the experience, revising one’s goals, or finding positive meaning in the event (Taylor, 1983; Tedeschi & Calhoun, 2004). In contrast, negative cognitive processes like ruminating over the event and blaming others are thought to result in greater distress and the development of PTSD symptoms (Ehlers, Mayou, & Bryant, 1998).

Using the Cognitive Processing of Trauma Scale (Williams, Davis, & Millsap, 2002), Phelps and colleagues applied this model to a sample of 83 adults with amputations of various etiologies, who were followed over the first twelve months after surgery. In keeping with the model, it was found that positive cognitive processing was related to fewer symptoms of depression and PTSD and higher levels of post-traumatic growth, whereas negative cognitive processing strategies were associated with higher depressive and PTSD symptomatology. Negative cognitive processing at baseline emerged as a significant predictor of PTSD symptoms 6 months after surgery, while baseline scores on positive cognitive processing significantly predicted post-traumatic growth at twelve months post-amputation. These findings indicate that the cognitive processing model may offer a valid description of how people adapt over time to a traumatic event such as amputation, and one which accounts for both positive and negative outcomes. Cognitive processes accounted for only a small proportion of the variance in outcomes, however, and the authors failed to control for baseline outcome values in their analyses, which suggests that the explanatory power of this model may be somewhat limited in this population. Additionally, contextual influences such as personality and environmental factors, which are thought to have a significant impact on this process (Elliott et al., 2002; Livneh, 2001), were not taken into account in this model.

1.7.6 Transactional model of stress and coping

Lazarus and Folkman's (1984) transactional model of stress and coping is a framework for evaluating the processes through which individuals cope with stressful events, and has been applied widely in the study of chronic illness and disability (Maes et al., 1996; Ptacek & Pierce, 2003). According to this perspective, people who are confronted with a stressful situation engage in an evaluation of the demands of the situation (primary appraisal) and the personal and interpersonal resources available to them (secondary appraisal), which determines their emotional and behavioural (coping) responses. In the initial formulation of this model, Lazarus and Folkman (1984) distinguished between coping strategies that are directed at managing or altering the stressor (problem-focused coping) and those that serve to regulate emotional responses to the stressor (emotion-focused coping). A number of studies have investigated the role of problem- and emotion-focused coping in the process of psychosocial adjustment to amputation (see Section 1.6.2.3) (Desmond, 2007; Desmond & MacLachlan, 2006a; Gallagher & MacLachlan, 1999; Livneh et al., 1999). In keeping with the general literature on coping, engagement in problem-focused coping was associated with enhanced psychosocial outcomes among individuals with amputations, whereas the use of emotion-focused coping was related to poorer outcomes.

Although the importance of the transactional stress-coping model in establishing coping as a prominent field of psychological study cannot be underestimated, the research based on this approach has been hampered by a number of problems in the conceptualisation and measurement of stress and coping that have been widely discussed in the literature (Aspinwall, 2004; Skinner, Edge, Altman, & Sherwood, 2003). Firstly, although the original framework did not assert the superiority of one type of coping over the other, there is a general assumption in the literature that problem-focused strategies are adaptive, as they reflect an acknowledgement of the stressor and active efforts to overcome it, while emotion-focused strategies are maladaptive, as they imply passivity and a refusal to acknowledge the problem and its implications (Diamond & Aspinwall, 2003). Research suggests, however, that their adaptiveness is dependent on the nature, duration, context, and controllability of the stressor (Carver & Connor-Smith, 2010). This is of particular salience in complex processes like adjustment to amputation, as the individual is confronted with an array of different practical, emotional and existential challenges, some of which may be insurmountable, and the utility of coping strategies is likely to vary across the different stressors and situations faced. For example, although emotion-focused strategies such as denial or avoidance are generally considered to be maladaptive, they may prove adaptive in the early stages of coping with disability by reducing distress and allowing time for the full impact of the event to be absorbed (Kortte & Wegener, 2004). The categorisation of specific coping strategies as problem- or emotion-focused is also context-dependent. Taking the seeking of social support as an example, this particular coping strategy can be defined as an emotion-focused approach when used to gain reassurance and emotional support, but would be better described as problem-focused when employed to obtain advice or instrumental support (Carver & Connor-Smith, 2010; Skinner et al., 2003).

A further shortcoming lies in the quality of coping measures that have been developed based on this approach. There is a tendency in the literature to rely on the use of generic coping checklists such as the COPE inventory (Carver, Scheier, & Weintraub, 1989) and the Ways of Coping Questionnaire (WCQ: Folkman & Lazarus, 1988), which do not ask for specification of the stressor(s) to which individuals are referring in their responses. As a result, little information is provided on the context of the stressful event in which the coping strategies are being employed or the meaning of this event to the individual (Aspinwall, 2004). In addition, the majority of these measures have been developed using samples of university students, and may not be best suited to use among persons with chronic illness and disability, as reports of coping are often confounded to some extent by the presence of physical and/or psychological symptoms. For example, the WCQ includes items such as “I jogged or exercised”, which may be inapplicable to persons with functional impairment.

Another limitation of transactional stress-coping theory that has been highlighted by several authors regards its failure to take into account the impact a stressor has on the individual’s goals and future life perspective, and the changes in values and priorities that may occur as a result, which have been found to play a significant role in adapting to chronic illness and disability (Aspinwall, 2004; De Ridder & de Wit, 2006). Taking all of these difficulties into consideration, it appears that the transactional model of stress and coping, at least as it is currently operationalized, does not capture the complexity of the process of adjustment to amputation and may have only limited explanatory power in this population.

1.7.7 Summary

The above findings demonstrate the many advantages of incorporating theories into the study of psychosocial adjustment to amputation, including their utility as an organising framework for research, their guidance in the development of testable hypotheses, and their capacity to identify commonalities with other experiences and aspects of human behaviour (Dunn & Elliott, 2008). A number of methodological and conceptual limitations were observed in the theory-driven research that has been carried out in this population to date, however, which reflect the more general limitations of the literature on this topic addressed in Section 1.7, such as a failure to account for positive adjustment outcomes and a lack of attention to the dynamic and changing nature of this unfolding process. In the next section, self-regulation theory will be discussed as an alternative theoretical approach to examining adjustment to amputation that may help to address these shortcomings.

1.8 Self-regulation theory

Self-regulation is defined as “the process through which people control, direct and correct their own actions as they move toward or away from various goals” (Aspinwall, 2004, p. 3), and represents a vital aspect of human existence, casting the individual as an active agent and decision maker in life rather than a helpless spectator of events (De Ridder & de Wit, 2006). The term ‘self-regulation’ has been used to describe a diverse range of theoretical approaches in the areas of personality, social, and health psychology. Although there is significant variation among these different perspectives with regard to the various self-regulatory principles they espouse and the specific mechanisms they propose, all share two basic properties in common. Firstly, self-regulation is conceived of as a dynamic motivational system of setting goals, devising and enacting strategies to achieve these goals, evaluating progress, and revising goals and strategies accordingly. Secondly, emotional responses are seen as crucial elements of this motivational system, and are thought to be intricately linked with cognitive processes (Cameron & Leventhal, 2003; De Ridder & de Wit, 2006).

As discussed in Section 1.7.6, critical reviews of the coping literature have noted shortcomings such as a failure to understand how stressful situations may influence coping responses, or to consider the goals of the individual (Aspinwall, 2004; De Ridder & de Wit, 2006; Lazarus, 1993). Self-regulation models explain stressful situations in terms of interruptions in striving towards valued goals or threats to such goals (De Ridder & de Wit, 2006). From this perspective, coping consists of efforts to either create conditions that allow one to continue making progress towards desired goals, or disengage from goals that are no longer perceived as attainable (Carver & Scheier, 1999). Although the transactional theory of stress and coping (Lazarus & Folkman,

1984) and self-regulation theory have developed largely in isolation, both share a fundamental concern with the relationship between personal, social and situational factors and people's thoughts emotions, and behaviours as they anticipate or experience adversity (Aspinwall, 2004; De Ridder & de Wit, 2006). Indeed, several authors have suggested that theories of stress and coping should be integrated into a more comprehensive framework of self-regulation (Aspinwall, 2004; De Ridder & de Wit, 2006; Maes et al., 1996).

Central to all theories of self-regulation is the assumption that human behaviour is organised around the pursuit of goals (Austin & Vancouver, 1996; Bandura, 1997; Carver & Scheier, 1998; Elliott & Dweck, 1988; Emmons, 1986), which are defined as “internal representations of desired states” (Austin & Vancouver, 1996, p. 338). Different types of goal constructs have been put forward, including ‘current concerns’ (Klinger, 1975), ‘personal projects’ (Little, 1983), ‘personal strivings’ (Emmons, 1986), and ‘life tasks’ (Cantor & Kihlstrom, 1987). Although these constructs may vary in the different goal characteristics that they emphasise, all share the concept that goals energise and direct activities, and in doing so, give structure and meaning to people’s lives, such that understanding the person means understanding the person’s goals (Carver & Scheier, 1998). Indeed, having a clear vision of goals in one’s life is in itself a potent predictor of subjective well-being (Brandtstädter & Rothermund, 2002; Emmons, 1986).

In order to achieve an adaptive outcome, it is vital that people select appropriate goals. Research has shown that individuals prefer to pursue goals that are personally valued and attainable (Atkinson, 1964; Feather, 1982; Vroom, 1964), as they provide meaning in people’s lives while enabling continued progress towards these desired outcomes. There is evidence that higher perceived goal importance is associated with positive outcomes among persons recovering from major health crises. Orbell, Johnston, Rowley, Davey, and Espley (2001) conducted a prospective study of physical disability in persons undergoing joint replacement surgery, and found that the patients who attached more value to functional activity-related goals prior to surgery had lower levels of disability nine months later. Similarly, Boersma, Maes, and Joekes (2005) observed a significant negative correlation between goal importance and depression in a sample of patients who had been admitted to hospital following myocardial infarction (MI). Theories of self-regulation are broadly applicable and relevant in many contexts of human behaviour (De Ridder & de Wit, 2006). Given that illness and disability are likely to have a significant impact on a person’s ability to strive towards valued goals, self-regulation theory may be particularly helpful in explaining the processes that people go through in order to adapt to their new circumstances (De Ridder & de Wit, 2006; Van Damme, Crombez, Goubert, & Eccleston, 2009). Indeed, there have been several calls for the application of this approach to the study of chronic illness and disability in order to further our understanding of cognitive, affective and behavioural responses to these life-altering conditions (Siegert, McPherson, & Taylor, 2004; Sivaraman Nair, 2003; Van Damme et al., 2009). Self-regulation models are likely to be relevant to individuals with amputations, as the impact of limb loss on physical and psychosocial functioning is likely to disrupt the attainment of goals in various domains of life. Furthermore, this life-changing experience may challenge the views people have of themselves and the world around them, which may result in a reorganisation of one’s goals and priorities, and may even lead to the creation of new goals, such as learning how to use a prosthesis. A self-regulatory approach to the experience of adjustment to amputation may help to further elucidate this process and offer some explanation for the diversity observed in people’s psychosocial responses. The next section will examine Carver and Scheier’s (1998) cybernetic model of self-regulation, one of the most prominent theoretical approaches in this field.

1.8.1 Cybernetic model of self-regulation

The cybernetic model of self-regulation (Carver & Scheier, 1981, 1998, 1999, 2000a) has been described as “the bedrock of self-regulation science” (Baumeister & Vohs, 2004), and is one of the most widely adopted approaches in this field. According to this model, self-regulation operates like a negative feedback system to reduce discrepancies between a desired state, or goal, and the person's perception of current conditions. Goal-related processes are organised into feedback loops that consist of four elements: an input function, a reference value, a comparator and an output function. The input function is equivalent to a person's perception of current conditions, and reference values correspond with his or her goals. The comparator is a function that compares the input to the reference value, yielding one of two possible outcomes: either the values being compared (i.e., the person's perceived and desired state) are noticeably different from one another, known as an error signal, or no difference is observed. This comparison results in an output function, which is equivalent to the person's behaviour, and sometimes takes the form of a mental or physiological response (Rasmussen et al., 2006). If the comparison has yielded a discrepancy between perceived and desired progress towards a goal, the person's behaviour will change in order to either reduce the discrepancy, or enlarge the discrepancy if the goal is to avoid a negative outcome.

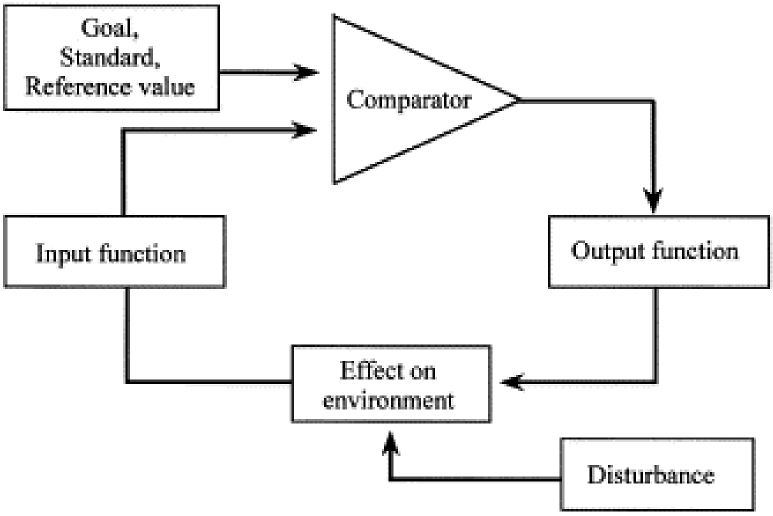

Figure 1.2. Schematic depiction of the feedback loop described in Carver and Scheier's (1998) cybernetic model of self-regulation.

Carver and Scheier (1998) propose that goals differ from each other in a number of ways. Firstly, some goals aim to achieve a positive outcome, whereas other goals are focused on avoiding a negative outcome. There are two kinds of feedback loops that correspond to these different types of goals. In a discrepancy reducing feedback loop, the aim of the output function is to reduce the discrepancy between the input and reference value. This involves the person changing his or her behaviour in order to progress towards achieving a particular goal. Conversely, the output function of a discrepancy enlarging loop aims to increase the discrepancy between the input and reference value. In this case, individuals alter their behaviour in order to distance themselves from an undesired outcome. Additionally, goals may differ in the way in which they are achieved. For example, whereas some goals are relatively constant or recurring (e.g. being a kind person), in which behaviour changes to maintain the status quo, others are dynamic and evolving (e.g. taking a holiday), with the ‘goal’ being the process of traversing the changing trajectory of the activity, not just reaching the endpoint (Carver, 2006).

Goals also vary in their degree of abstraction (Carver & Scheier, 1998; Emmons, Colby, & Kaiser, 1998). At the highest, most abstract level are important life goals, which are concerned with “being” a particular sort of person and thus fundamental to one’s self-identity (e.g., *being kind*). At a lower, more concrete level are goals that are aimed at “doing” particular actions (e.g., *giving money to charity*). Higher- and lower-order goals are thought to be connected to each other in a hierarchical structure based on their level of abstraction (Carver & Scheier, 1999; Powers, 1973; Vallacher & Wegner, 1987). Each higher-order goal is linked with several lower-order goals, such that if a particular lower-order goal is no longer attainable (e.g., if a person can no longer afford to donate money to charity), the higher-order goal it is linked with may be achieved through other means (e.g., *volunteering* or *fundraising for the charity*) (Austin & Vancouver, 1996). This allows individuals to significantly alter the manner in which they strive towards such a goal without changing the goal itself (Carver & Scheier, 1998). By virtue of their close ties with a person’s core sense of self, higher-order goals are considered more important than goals at lower levels of abstraction. However, concrete goals that contribute more directly to the attainment of a higher-level goal, or that are linked with multiple higher-order goals simultaneously, are also of significance.

According to the cybernetic model of self-regulation, affect is produced by a second feedback process that operates in parallel with the behaviour system outlined above. This affect system checks on how well the behaviour system is doing its job by comparing the perceived rate of progress towards one's goal over time (input function) with the desired rate of progress (reference value). The error signal for this feedback loop indicates a discrepancy between one's perceived and desired rate of goal progress, and manifests itself phenomenologically as "affect, feeling, a sense of positiveness or negativeness" (Carver & Scheier, 2000b, p. 1717), as well as a hazy sense of expectancy (confidence or doubt) regarding the immediate future. Positive affect is thought to result when progress towards one's goals is faster than expected, whereas negative affect arises when progress is slower than hoped for. The affect produced by this feedback process goes on to influence subsequent behaviour, as it signals a discrepancy between perceived and desired rate of progress towards one's goals. Negative feelings lead to efforts to speed up progress towards goals, which may manifest itself behaviourally as concentration or reallocation of time and effort, whereas positive emotions leading to coasting, and a subsequent reduction in the rate of goal progress. In both cases, the outcome of this adjustment is a return to neutral affect.

1.8.2 Self-regulation theory and adjustment to illness and disability

As outlined above, Carver and Scheier's model of self-regulation proposes that disruptions in progress towards goal attainment have affective consequences. If goal attainment is slower than desired, negative affect is experienced, whereas positive affect results when goal attainment is faster than anticipated. With regard to persons with amputations, the physical, social and psychological upheaval caused by limb loss is likely to threaten the attainment of important higher-order goals, which may leave individuals vulnerable to negative psychosocial outcomes if they do not regulate their goals in response to these challenges.

In accordance with the assumptions of this model, a number of studies have found that perceived difficulties in goal progress have a significant impact on subjective well-being among persons with chronic illness and disability (Affleck et al., 1998; Boerner & Cimarolli, 2005; Schwartz & Drotar, 2009), including cancer (Carver, Pozo, Harris, Noriega, Scheier, Robinson, Ketcham, Moffat, & Clark, 1993; Offerman, Schroevers, van der Velden, de Boer, & Pruyn, 2010), cardiac problems (Boersma, Maes, & Joekes, 2005; Boersma, Maes, & van Elderen, 2005; Echteld, van Elderen, & van der Kamp, 2001; Echteld, van Elderen, & van der Kamp, 2003; Joekes, Maes, Boersma, & van Elderen, 2005), and HIV (Kraaij et al., 2008; Rapkin et al., 1994). For example, van der Veek, Kraaij, Van Koppen, Garnefski, and Joekes (2007) examined the relationship between goal disturbance and psychological distress in a sample of persons infected with HIV, and found that higher goal disturbance was significantly predictive of greater depressive symptoms and poorer mental health. Similarly, Rapkin and colleagues (1994) found that perceived difficulty in attaining goals was associated with lower QoL in a group of patients with AIDS. Boerner & Cimarolli (2005) observed that patients attending rehabilitation for visual impairment who reported higher levels of interference in the attainment of life goals due to their vision loss were more likely to experience greater depressive symptoms and lower levels of life satisfaction. In a sample of young adults with a history of chronic illness, Schwartz and Drotar (2009) found that higher health-related hindrance in personal goal pursuit was a significant predictor of greater emotional distress and reduced subjective well-being. Non-significant associations have consistently been observed between goal disturbance and positive outcomes such as life satisfaction and positive affect, however (Echteld et al., 2001; Van Der Veek, Kraaij, & Garnefski, 2009).

The association between disruptions in goal attainment and negative indicators of psychosocial adjustment has been observed longitudinally also. In a study of patients awaiting heart surgery, for example, Echteld and associates (2003) found that greater perceived disturbance in the attainment of goals as a result of cardiac problems prior to surgery was a significant predictor of lower health-related quality of life (HRQL) and higher negative affect three months after surgery. In addition, Boersma and colleagues (2005) investigated the relationship between goal disturbance and subjective well-being over a four-month period in a sample of patients who had recently experienced an MI. Higher goal disturbance at 2-5 weeks after hospitalisation was found to be a significant predictor of reduced HRQL and greater symptoms of depression four months later, even after controlling for sociodemographic variables and other predictors such as perceived social support and coping.

Conversely, greater progress towards the attainment of goals has been shown to predict positive psychological adjustment among patients with different health problems. For example, Carver and colleagues (1993) observed that among breast cancer patients, the tendency to remain engaged in the pursuit of personally valued goals after surgery predicted lower levels of distress one year later. In a group of women with fibromyalgia, Affleck et al. (1998) noted that those who perceived themselves to have made greater progress towards their goals showed more improvement in positive mood. These findings are also in accordance with the cybernetic model of self-regulation, which proposes that positive affect is experienced when progress towards goal attainment occurs at a more rapid pace than expected.

The perceived importance of one’s goals appears to influence the impact of disruptions in goal attainment on psychosocial outcomes, with such disruptions having a stronger negative influence on subjective well-being when the person's commitment to the goal is high (Brandstädter, 2006; Brunstein, 1993; Brunstein, Schultheiss, & Grässman, 1998; Kuijer & De Ridder, 2003). For example, Kuijer and De Ridder (2003) examined the discrepancy between the importance and attainability of ten illness-related goals among patients with a chronic health condition (asthma, diabetes or heart failure), and found that greater perceived discrepancies were a significant predictor of higher anxiety and depressive symptoms, as well as poorer mental health. These findings are in keeping with the cybernetic model and self-regulation theory more generally, as goals that are more personally valued have closer associations with one's sense of self, and disruptions in their attainment are thus likely to have a greater emotional impact. It is therefore advisable to take perceived goal importance as well as perceived disruptions in goal attainment into account when assessing the impact of life-altering events on a person's subjective well-being.

1.8.3 Criticisms of self-regulation theory

Researchers have pointed out a number of limitations in Carver and Scheier's cybernetic model of self-regulation. Firstly, many have taken issue with the 'mechanistic' terminology it uses to explain human cognition and behaviour (Locke & Latham, 1990). Leventhal and Mora (2005) argue that the technical jargon used in this model is off-putting for clinicians, and needs to be replaced with more practical and user-friendly language. The model has also been criticised for a perceived lack of clarity regarding some of its most important features. For instance, little information is provided on how exactly the comparator component of the feedback system works. Cervone, Shadel, Smith, and Fiori (2006) believe that this aspect of the model requires further explanation, as it may help clinicians in trying to understand why this comparative process is maladaptive in some individuals, such as persons who engage in self-defeating comparisons. Another criticism levelled at this approach to self-regulation is that it focuses on just one stage within a broader process of goal attainment, namely goal pursuit, and pays no attention to the goal selection process (Locke & Latham, 1990). It is argued that in failing to address the processes involved in the formation of individual goals, this model misses the point that people are active, self-organising beings who consciously decide upon which goals are important to strive towards

(Leventhal & Mora, 2005; Locke & Latham, 1990). According to Deci and Ryan (2000), understanding how individuals come to decide which goals are most important to them is as vital as understanding how they attain or fail to attain these goals. A major limitation of the cybernetic model for researchers interested in self-regulation theory is the fact that Carver and Scheier (1998) never developed specific measures to assess the various constructs they outlined, necessitating the employment of instruments based on related concepts from other models to investigate the assumptions of this theoretical framework.

Despite these limitations, self-regulation theory has many qualities to recommend it as a framework for examining the process of adaptation to limb loss. Although Carver and Scheier's (1998) cybernetic model of self-regulation was not specifically designed with behaviours related to chronic illness and/or disability in mind, the authors believe that it can be readily applied to phenomena of interest within the health domain in order to better understand the nature of underlying goal-related activities (Scheier & Carver, 2003). Indeed, a number of authors have highlighted the applicability of self-regulation theory in the context of rehabilitation (Boersma, 2004; Conrad, Doering, Rief, & Exner, 2010; Siegert et al., 2004; Sivaraman Nair, 2003). Furthermore, because of the model's generic nature, research generated from this approach can easily be integrated with evidence of self-regulation from other domains, potentially allowing for bridges to be built with other disciplines (Cameron & Leventhal, 2003). For example, self-regulatory processes have been incorporated in various models of resiliency (Leipold & Greve, 2009) and successful aging (Frazier, Newman, & Jaccard, 2007), as well as a recently developed model of the adaptation process following acquired brain injury (Brands, Wade, Stapert, & van Heugten, in press). Finally, as this model makes very specific predictions about how different emotions arise in response to progress towards goal attainment, or lack thereof, it promises significant utility in terms of generating detailed hypotheses for empirical testing (Siegert et al., 2004).

1.9 Goal engagement and disengagement: Adaptive self-regulation

Goals lend structure, coherence, and purpose to life, but only for as long as they are perceived as meaningful and attainable. Individuals are confronted with unattainable goals on many occasions throughout the life course, which result from a variety of different causes, including the selection of unrealistic goals, having reduced opportunities to attain goals due to age-related declines or the occurrence of critical events, and experiencing limitations in the resources needed to pursue several goals simultaneously (Rasmussen et al., 2006; Wrosch, 2011).

According to Carver and Scheier's cybernetic model of self-regulation (1998), when people encounter adversity in trying to progress towards their goals, they interrupt their efforts intermittently to assess the likelihood of achieving a successful outcome in a more deliberative way. In this assessment, people primarily rely on memories of previous experiences, although consideration is also given to the availability of resources or alternative approaches to the problem at hand (Carver & Scheier, 2000a). If the expectancies that emerge from this assessment are of a positive outcome, the person continues to strive towards the goal. If doubts are strong enough, however, the person may disengage from further efforts towards goal attainment, or even from the goal itself (Carver & Scheier, 1999). Given that optimism refers to having generalised expectancies of a positive outcome, individual differences in this trait are thought to have an important influence how people respond to goal discrepancies. Confident or optimistic people generally expect positive outcomes and are thus more likely to exert continuing effort to address such discrepancies, even when dealing with serious adversity, whereas more doubtful or pessimistic individuals generally expect negative outcomes and are more likely to withdraw effort from attaining the goal (Rasmussen et al., 2006; Scheier & Carver, 2003; Wrosch & Scheier, 2003).

Giving up is seen as a natural and indispensable part of self-regulation. Goal disengagement is not an easy process, however, especially when the goal in question is at the higher end of the goal hierarchy, and disengaging from it means letting go of an important aspect of one’s sense of self. Continued commitment to a goal that is truly unattainable represents a waste of resources on futile efforts, however, which could be channelled into the attainment of more viable goals. There are two consequences associated with remaining committed to unattainable goals. Firstly, the person is prevented from taking up new, more realistic goals. Secondly, negative affect is experienced due to the lack of progress being made towards goal attainment. There is much evidence to suggest that remaining stuck in the past instead of moving on may cause problems among people who have experienced trauma (Holman & Silver, 1998; Stroebe & Hansson, 1993), although premature disengagement from goals may also be harmful, as people who lack the persistence to keep striving towards goals in the face of difficulties may struggle to attain any of their desired goals in life (Carver & Scheier, 2000a).

According to the cybernetic model of self-regulation (Carver & Scheier, 1998), goal disengagement involves either abandoning a goal entirely and shifting one’s focus to a different enterprise, which removes the person from the negative emotional consequences of repeated goal failure, or revising the goal to a less demanding task. This downward shift in reference values, referred to as ‘scaling back’ or ‘limited disengagement’, is thought to occur gradually and unconsciously, allowing the individual to remain engaged in the general domain of the threatened goal, while increasing the chances of goal attainment (Carver & Scheier, 2000a). Carver and Scheier (Carver & Scheier, 2000b) argue that this gradual recalibration of reference values may account for the ‘response shift’ phenomenon discussed in Section 1.5.5. Indeed, a number of studies have shown that persons with disabilities appear to gradually disengage from personally valued goals that are threatened by their condition (McNamara, Durso, & Harris, 2006; Montgomery, Persson, & Ryden, 1996; Sivaraman Nair & Wade, 2003; Weitzenkamp et al., 2000). For example, individuals with spinal cord injuries have been found to rank the importance of work and having children as lower than in the general population (Weitzenkamp et al., 2000). Furthermore, Sivaraman Nair and Wade (2003) noted a significant decline in the perceived importance of work-, partner- and leisure-related goals over a four-year period among patients with various degenerative neurological conditions, relative to persons without such disorders.

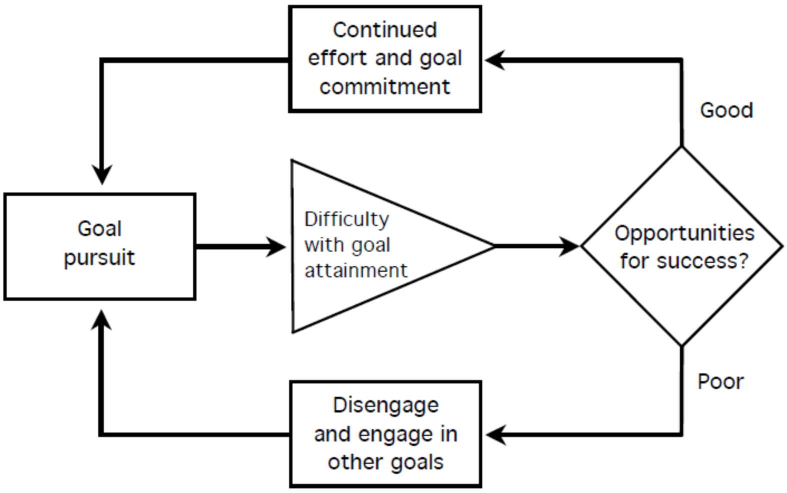

Figure 1.3. Adaptive self-regulation of disruptions in goal attainment (Wrosch, 2011).

It is widely contended that goal disengagement is only adaptive when it leads to the taking up of other goals, and thus returns the person to being actively engaged in living (Carver & Scheier, 1999; Duke, Leventhal, Brownlee, & Leventhal, 2002; Wrosch, Scheier, Miller, Schulz, & Carver, 2003). If abandoned goals are not replaced, the person has nothing left to pursue, leading to a sense of emptiness and despair (Carver & Scheier, 1998). Consistent with this argument and the assumptions of the cybernetic theory of self-regulation, it has been found that disengaging from blocked goals and re-engaging in alternative, more attainable goals is associated with enhanced psychosocial outcomes among individuals with chronic illness and disability (Duke et al., 2002; Garnefski, Grol, Kraaij, & Hamming, 2009; Garnefski, Kraaij, De Graaf, & Karels, 2010; Kraaij et al., 2008; Schroevers, Kraaij, & Garnefski, 2008; Wrosch & Sabiston, 2012). Research involving various patient populations has demonstrated that having a greater disposition towards goal disengagement predicts lower levels of emotional distress (Kraaij et al., 2008; Kraaij, Garnefski, & Schroevers, 2009). Alternatively, a greater tendency towards goal re-engagement is associated with higher levels of positive affect (Schroevers et al., 2008) and fewer depressive symptoms (Garnefski et al., 2009; Garnefski et al., 2010; Offerman et al., 2010).

Self-regulation theory thus distinguishes between two sets of responses to disruptions in goal attainment: goal engagement processes, which aim at overcoming difficulties through continued striving towards goal attainment, and goal disengagement processes, which involve abandonment of the threatened goal and management of the adverse emotional consequences that may ensue (Wrosch, 2011). According to Carver and Scheier (2000a), both engagement and disengagement are essential elements of adaptive self-regulation, with each playing an important role in the flow of behaviour. The adaptive value of these responses depends on the likelihood of the goal in question being attained in the future. Continued goal engagement can promote a positive outcome if the opportunities for future goal attainment are favourable. Sometimes, however, it may not be possible to attain a desired goal due to increasingly unfavourable opportunities for goal progress. In these circumstances, it may prove beneficial to engage in responses aimed at goal disengagement and the pursuit of other valued goals (see Figure 1.3). The next section will examine three different theories that may offer a useful account of the goal engagement and disengagement processes outlined in Carver and Scheier's cybernetic model.

1.9.1 Theories of adaptive self-regulation

A number of theories have been developed to describe the process of adaptive self-regulation (Baltes & Baltes, 1990; Brandstädter & Renner, 1990; Folkman, 1997a; Heckhausen & Schulz, 1995; Wrosch, Scheier, Miller et al., 2003), including the motivational theory of life-span development (Heckhausen & Schulz, 1995;

Heckhausen, Wrosch, & Schulz, 2010), the model of selection, optimisation and compensation (Baltes & Baltes, 1990), and the dual-process model (Brandstädter & Renner, 1990), which will be examined in detail in the following sections. Originally devised to account for successful aging across the life-span, these theories diverge in their definition and operationalization of goal engagement and disengagement processes, but share a common belief that people have the capacity to shape their own development within the context of their own strengths and limitations and to thrive in the face of adversity. This is achieved through a balance of continued goal striving and the adjustment of goals and/or activation of self-protective processes in situations where they are no longer feasible. Such actions allow individuals to remain engaged in the pursuit of valued goals while also protecting their emotional resources, thereby contributing to psychological well-being (Wrosch, 2011).

1.9.1.1 Motivational theory of life-span development

According to the motivational theory of life-span development (Heckhausen et al., 2010), which evolved from the earlier life-span theory of control (Heckhausen & Schulz, 1995), humans strive throughout their lives to exert control over their environment. This theory distinguishes between two types of control: primary and secondary. Primary control is externally directed and involves attempts to change the environment to fit one’s needs and desires. Selective primary control strategies involve the focused investment of resources into achieving a chosen goal. Compensatory primary control strategies are required when the physical or cognitive capacities of the individual are insufficient to attain a particular goal, and may involve the use of external resources such as assistance from others or technical aids such as prostheses or wheelchairs. Secondary control is directed inwardly and aims to bring about change within the self in order to maintain, minimise losses in, or expand existing levels of primary control. Selective secondary control strategies aim at strengthening motivation and commitment to achieving a certain goal, by, for example, enhancing its personal value. Compensatory secondary control strategies are the only aspect of the motivational theory of life-span development to represent goal disengagement processes. These strategies buffer the negative effects of failure or losses on the individual's motivation for primary control, and comprise cognitive strategies such as goal disengagement and self-protective attributions. The use of such strategies may become dysfunctional if it undermines the long-term primary control potential of the individual.

The motivational theory of lifespan development asserts that the motivational system is set up to maximise primary control across all life domains and throughout the life-span, with secondary control strategies serving as auxiliary motivational processes to support primary control. Anticipated or actual loss of primary control is thought to result in the experience of negative affect. Illness or disability may bring about sudden and substantial reductions in primary control, which are particularly distressing if the individual does not have time to adapt or compensate through secondary control strategies before significant loss occurs, with depressive symptoms often being the outcome of such events. However, control may be regained over time through the use of both primary and secondary control strategies, as observed in a range of different older adult and patient populations (Hall, Chipperfield, Heckhausen, & Perry, 2010; Mackay, Charles, Kemp, & Heckhausen, 2011; McQuillen, Licht, & Licht, 2003; Wahl, Becker, Burmedi, & Schilling, 2004; Wrosch, Schulz, Miller, Lupien, & Dunne, 2007).

Although the assumptions of the motivational theory of life-span development are supported by a large body of research (Heckhausen et al., 2010), this approach has been widely criticised on two fronts. Firstly, the primacy of primary control in this theory has been questioned, as this undermines the importance of being able to adjust or disengage from unattainable goals in a healthy and self-protective manner, which plays just as crucial a role in adaptive self-regulation as continued attempts to exert control over one’s environment (Leipold & Greve, 2009). Secondly, many argue that describing compensatory secondary control as a control-enhancing process is erroneous, as mechanisms such as goal disengagement and self-protective attributions are anathema to the concept of control as defined in the theory (i.e., the exertion of control over the external environment) (Leipold & Greve, 2009; Morling & Evered, 2006; Skinner, 2007). Indeed, it has been suggested that this construct should be omitted completely from the theory, as it falls outside the domain of control and is thus incompatible with its basic tenets (Leipold & Greve, 2009; Skinner, 2007). According to Skinner (2007), “people do not always strive for control, people can be passive without being helpless, discouraged, or withdrawn…the presumption that all coping processes can comprehensively be accounted for by theories of control is misguided and impedes the study of alternative ways of dealing with adversity and the basic processes that underlie them” (p. 914). Given the importance of goal disengagement processes in adjusting to amputation and the irrevocable losses that this experience entails, a theory which places greater emphasis on this vital aspect of adaptive self-regulation is required.

1.9.1.2 Model of selection, optimisation and compensation

The model of selection, optimisation and compensation (SOC) developed by Baltes and Baltes (1990) is a metatheory that offers a broad framework for understanding adaptive self-regulation across the life-span. According to this theory, selection refers to the principle giving direction to development, optimisation aims at achieving higher levels of functioning, and compensation focuses on using alternative means to maintain functioning in the face of developmental loss. These components are inter-related, and operate best dynamically as a unit. Although this model was originally designed as an explanatory framework for adaptation to aging, the processes it delineates can be observed at a micro or macro level, and are thus applicable to development from a cellular to a societal level. In the context of adaptive self-regulation, selection addresses the development of, and commitment to, goals, domains, or tasks. Elective selection is guided by personal preferences, whereas loss-based selection responds to expected or actual loss and limitation. Optimisation concerns the optimal application and coordination of resources, and their enhancement or refinement to maximise one’s capacities. Compensation relates to the anticipated or actual loss of goal-relevant means, and involves the acquisition or activation of substitutive internal or external resources. If compensatory means fail, goal disengagement and reorganisation may be more adaptive. Loss-based selection may thus be more effective in adapting to irreversible loss or limitation.

The use of SOC strategies has consistently been linked with greater subjective well-being (Freund & Baltes, 2002; Freund & Baltes, 1998) and lower incidence of depression (Chou & Chi, 2002). When resources are limited, as in the case of illness or disability, higher use of SOC strategies is related to positive changes in various indicators of life satisfaction (Jopp & Smith, 2006). These strategies appear to be protective, therefore, as they buffer the impact of low resources on well-being and life satisfaction. The SOC model has been applied to a number of health-related conditions, including macular degeneration (Ryan, Anas, Beamer, & Bajorek, 2003), multiple sclerosis (Wilhite, Keller, Hodges, & Caldwell, 2004), and osteoarthritis (Gignac, Cott, & Badley, 2002). The capacity of SOC strategies to predict successful adaptation to illness or disability longitudinally has only been examined in one study to date, however. In a study of 107 stroke patients, Donnellan, Hevey, Hickey, and O'Neill (2012) found that although SOC strategies were employed in response to the losses experienced following stroke, they failed to predict HRQL, functional ability or depressive symptoms one year later. The ability of this model to account for the dynamic process of adjustment to amputation may therefore be limited.

1.9.1.3 Dual-process model

The dual-process model (Brandstädter & Renner, 1990) is a well-established theoretical framework that has frequently been used to describe people’s responses to frustrated goal attainment. This model delineates two modes of adaptive self-regulation, assimilation and accommodation, which individuals use to manage discrepancies between their desired and perceived progress towards goal attainment across the life-span. The assimilative mode comprises efforts to modify one's life situation or behaviour to fit one's goals and preferences, such as the acquisition of relevant knowledge and skills, the use of compensatory means, or the implementation of lifestyle changes. Coping attempts in this mode are usually carried out intentionally and thus under conscious control. The accommodative mode, on the other hand, involves non-intentional processes by which a person adjusts his or her goals and preferences to situational constraints, such as disengagement from blocked goals, the reappraisal of an emerging loss or limitation, or downward social comparison.

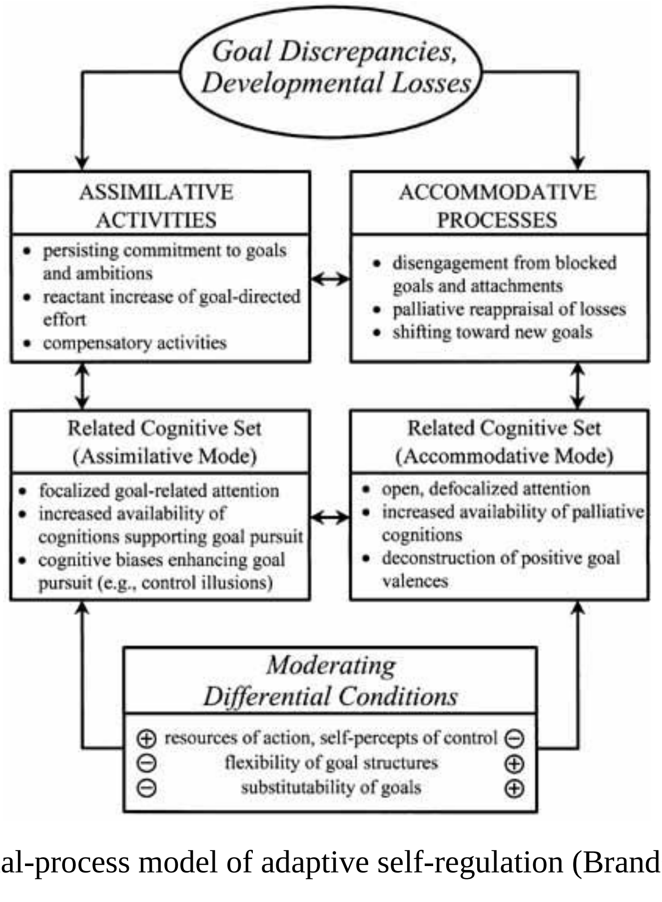

Figure 1.4. The dual-process model of adaptive self-regulation (Brandstädter, 2009)

Brandstädter and Renner (1990) constructed the Tenacious Goal Pursuit (TGP) and Flexible Goal Adjustment (FGA) scales to assess assimilative and accommodative tendencies on a dispositional level. The TGP scale measures assimilative strategies such as perseverance and enhancing the perceived attractiveness of one’s blocked goals. Higher TGP scores indicate a tendency to tenaciously pursue goals even in the face of obstacles and under high risk of failure, whereas lower scores reveal a tendency to give up on goals readily. The FGA scale, on the other hand, assesses accommodative processes related to goal disengagement, reorientation and acceptance, with higher scores reflecting a tendency to positively reinterpret initially aversive situations and to relinquish blocked goals easily, and lower scores being indicative of difficulty or reluctance to disengage from unattainable goals.

Although TGP and FGA are independent scales measuring two distinct modes of adaptive self-regulation, both show convergent positive associations with indicators of subjective well-being such as reduced depressive symptoms (Boerner, 2004; Rothermund & Brandtstädter, 2003; Schmitz, Saile, & Nilges, 1996; van Lankveld, van Diemen, & van Nes, 2011), greater life satisfaction (Brandstädter & Renner, 1990) and emotional stability (Boerner, 2004), and higher QoL (Boerner, 2004; Darlington et al., 2007; Darlington et al., 2009). Recent research indicates that TGP and FGA may operate via different mechanisms to enhance psychosocial outcomes. In a sample of 751 older adults with age-related visual decline living in the community, Heyl, Wahl, and Mollenkopf (2007) noted that higher TGP was a significant predictor of greater positive affect, whereas greater use of FGA independently predicted lower levels of negative affect. This finding suggests that while assimilative tenacity improves psychosocial outcomes by enhancing positive emotions, accommodative flexibility does so by buffering against emotional distress.

According to the dual-process model, the assimilative mode is useful in improving or maintaining function, and tends to dominate as long as a situation is perceived to be changeable. Assimilative tenacity is constrained by the availability of internal and external resources such as health, social support, and physical capabilities, however (Brandtstädter & Rothermund, 2002). If a person continues to pursue a goal that he or she is no longer able to achieve, feelings of helplessness and depression may ensue. In circumstances of permanent loss or constraint, therefore, the accommodative mode may be more adaptive. The erosion of attainability beliefs is thought to activate accommodative modes of coping such as downgrading the importance of blocked goals, which allow the individual to preserve a sense of continuity, efficacy and personal worth in the face of significant losses and constraints (Brandstädter, 2006). This is likely to aid the adjustment process and enable the person to maintain a positive outlook even as previously salient goals become less attainable (Brandtstädter & Rothermund, 2002; Csikszentmihalyi & Csikszentmihalyi, 2006).

As ageing leads to diminishing resources and a growing number of uncontrollable events such as limitations in physical and cognitive ability, people come to rely increasingly on accommodative coping strategies, which help maintain a sense of well-being and satisfaction in the face of such losses. This results in a gradual shift from assimilative to accommodative modes in middle and later adulthood (Brandstädter & Renner, 1990). The transition from assimilation to accommodation may occur earlier in persons who are confronted with significant adaptive challenges such as illness or disability, however (Brandstädter, 2009). Indeed, in a series of cross-sectional analyses of the relationship between assimilative tenacity and accommodative flexibility and QoL among 80 stroke patients, Darlington and colleagues (2007) observed that only TGP was predictive of QoL two months after discharge from medical care, whereas both TGP and FGA were significant predictors at five months and 9-12 months post-discharge, with the strength of the association between FGA and QoL increasing over time. Additionally, in a sample of 107 middle-aged and older adults with age-related vision loss, Boerner (2004) found that the ameliorative effect of FGA on the association between functional disability and mental health was particularly strong among younger individuals.

Assimilative and accommodative modes of adaptive self-regulation are not mutually exclusive, and may operate synergistically and complement each other during concrete episodes of coping (Brandstädter, 2009). Significant life events usually involve a number of adaptive tasks, some requiring assimilative persistence and others accommodative flexibility. When adjusting to impairment, for example, the individual may have to forego some personally valued goals in order to maintain others (Brandtstädter & Rothermund, 2002). The accommodative mode does not terminate assimilative processes altogether, therefore, but rather helps to redirect assimilative efforts into more promising areas of life (Brandstädter, 2006). It appears that TGP and FGA may interact in different ways to promote positive and negative outcomes. Heyl and colleagues (2007) explored the interactions between TGP and FGA in a sample of community-dwelling adults with age-related visual decline, and found that the beneficial effect of FGA on positive affect was more pronounced when TGP was also high, whereas its impact on negative affect was weaker at higher levels of TGP.

Both TGP and FGA have been found to predict positive psychological outcomes in various groups of patients with chronic and acute medical conditions (Boerner, 2004; Darlington et al., 2007; Heyl et al., 2007; Kranz, Bollinger, & Nilges, 2010; Schmitz et al., 1996; Smout, Koudstaal, Ribbers, Janssen, & Passchier, 2001; van Lankveld et al., 2011). This is demonstrated in a study by Van Lankweld and colleagues (2011) which examined the associations between assimilative and accommodative processes and a range of psychosocial outcomes in a sample of 130 persons who had previously completed a rehabilitation programme for spinal cord injury. After controlling for demographic, medical and social support variables, it was found that greater endorsement of both TGP and FGA was predictive of lower levels of helplessness and depressive symptoms, with higher FGA additionally predicting lower levels of anxiety and higher levels of acceptance. Several longitudinal studies have also demonstrated the important role that assimilation and accommodation play in adapting to disruptions in goal attainment (Darlington et al., 2009; Luszczynska, Mohamed, & Schwarzer, 2005; Rothermund & Brandtstädter, 2003). For example, Darlington and colleagues (2009) found that higher levels of both TGP and FGA shortly before discharge from medical care were predictive of QoL 9-12 months later in a sample of 80 patients with a stroke, although the association with FGA was stronger.

Brandstädter and Renner (Brandstädter & Renner, 1990) propose that assimilation and accommodation may promote adjustment to life changes by mitigating the impact of perceived distance from personally valued goals on subjective well-being. On assessing perceived distance from 17 different personally valued developmental goals, the authors found that individuals scoring high on both TGP and FGA reported significantly lower perceived goal distance overall, with accommodative flexibility having a stronger association than assimilative tenacity with some of the goals assessed. FGA was also found to moderate the association between perceived distance from seven of the goal dimensions they assessed and life satisfaction, indicating that the buffering effect of accommodative modes of adaptive self-regulation in particular may help to maintain a positive and optimistic attitude towards life despite adverse changes in one's life circumstances. Indeed, a number of studies have demonstrated that accommodative flexibility moderates the negative impact of disruptions in goal attainment on psychosocial outcomes (Bailly, Joulain, Hervé, & Alaphilippe, 2012; Boerner, 2004; Goossens et al., 2010; Heyl et al., 2007; Kranz et al., 2010; Schmitz et al., 1996). For example, a study of 670 elderly community-dwelling adults conducted by Bailly and associates (2012) found that FGA moderated the association between negative life events and depression, with the buffering effect of FGA on symptoms of depression becoming increasingly pronounced as the number of negative life events reported grew. Similarly, in a cross-sectional study of 120 chronic pain patients, Schmitz and colleagues (1996) noted the moderating influence of FGA on the relationship between depression and both pain intensity and disability, with greater use of FGA lessening the impact of chronic pain on emotional well-being.

Both cross-sectional and longitudinal studies indicate that TGP and FGA are predictive of enhanced psychosocial outcomes among patients adjusting to life-altering medical conditions such as stroke (Darlington et al., 2007; Darlington et al., 2009; Smout et al., 2001) and spinal cord injury (van Lankveld et al., 2011). Assimilation and accommodation may thus prove useful as a means of operationalizing the goal engagement and disengagement processes underlying adjustment to amputation. These constructs appear to fit well into the self-regulation framework delineated by Carver and Scheier (1998), who define adaptive self-regulatory processes as “efforts to create conditions that permit one to continue moving toward desired goals…or efforts to disengage from goals that are no longer seen as attainable” (Carver & Scheier, 1999, p. 562). Indeed, a number of other theorists have chosen to operationalize adaptive self-regulation in their models using the modes delineated in the dual-process model (Brands et al., in press; Frazier et al., 2007; Leipold & Greve, 2009; Skinner, 2007). For example, Leipold and Greve (2009) selected assimilative tenacity and accommodative flexibility to represent regulatory processes in their integrative model of coping, resilience, and development, as did Brands and colleagues (in press) in their model of adaptation following acquired brain injury.

Further support for the operationalization of goal engagement and disengagement processes as assimilation and accommodation comes from the finding that TGP and FGA appear to be more effective than the constructs outlined by competing theories in accounting for psychosocial outcomes among persons who have experienced irreversible changes in their lives. For example, whereas two separate studies have demonstrated the importance of both assimilative tenacity and accommodative flexibility in psychosocial adaptation to age-related vision loss (Boerner, 2004; Heyl et al., 2007), Wahl, Schilling, and Becker (2005) failed to observe a significant relationship between compensatory secondary control, which represents goal disengagement in this model, and affective outcomes in this population. Assimilation and accommodation may therefore provide a more comprehensive description of the mechanisms underlying psychosocial adjustment to amputation.

1.10 Relevance of self-regulation theory in the rehabilitation setting

As mentioned in Section 1.2, the main aim of rehabilitation following lower limb amputation is to ensure that an acceptable level of functioning is reached (van Velzen et al., 2006). The achievement of this aim is clearly dependent on the motivation of the client within the rehabilitation setting (Sivaraman Nair, 2003). Research suggests that patients are more likely to engage in the rehabilitation process if its goals are meaningful and relevant to them. Indeed, it has been found that greater involvement of patients in the goal setting process leads to increased motivation, decreased anxiety, and greater maintenance of therapeutic gains (Alexy, 1985; McGrath & Adams, 1999; Oldridge, Guyatt, Crowe, Feeny, & Jones, 1999; Stuifbergen, Becker, Timmerman, & Kullberg, 2003; Webb & Glueckauf, 1994). The patient is often not formally involved in the goal selection process (Holliday, Antoun, & Playford, 2005; Joyce, Rockwood, & Mate-Kole, 1994; Rockwood, Joyce, & Stolee, 1997), however, which may be problematic, as the goals that patients value have been found to differ significantly from those deemed important by the rehabilitation team (Boerner & Cimarolli, 2005; McNamara et al., 2006; Sivaraman Nair & Wade, 2003). For example, a study examining the concordance between patients with multiple sclerosis and their clinical team members on the identification of goals for rehabilitation found that team members' ratings were in agreement with patients' ratings on only 1.7 of their five most valued goals on average (Bloom et al., 2006).

Even though goal setting is often a major part of the rehabilitation process following lower limb amputation (Rushton & Miller, 2002), the types of goals that are valued by individuals in this population have never been examined empirically. Given the wide variation among persons with lower limb amputations in terms of age, cause of amputation, and general health, it is likely that valued goals will differ significantly within this population. For example, whereas an older patient with an amputation secondary to vascular causes may have goals primarily directed toward self-care activities and mobility indoors, a younger patient with a traumatic amputation may have goals focused on recreational activities and return to work (Rushton & Miller, 2002). It is thus vitally important that the rehabilitation team collaborates with the patient in developing goals for treatment, and makes sure that the patient understands and agrees that these goals coincide with his or her own life goals (Wade, 1999).

By assessing the importance that individuals with amputations afford different higher order goals, it may be possible to identify particular areas that are highly valued in this population yet not usually addressed in rehabilitation. Such information may help to identify ways in which to improve the effectiveness of post-amputation rehabilitation programmes.

A number of researchers have suggested that self-regulation theory may provide a useful framework for understanding motivation and goal-directed activity in the context of rehabilitation and goal-setting (Brands et al., in press; Hart & Evans, 2006; McPherson, Kayes, & Weatherall, 2009; Siegert et al., 2004; Ylvisaker, Mcpherson, Kayes, & Pellett, 2008). For example, Siegert and colleagues (2004) believe that a self-regulation approach would offer rehabilitation researchers a model that integrates three concepts essential to the rehabilitation process, namely goals, motivation, and affect. The authors also point out the compatibility of self-regulation theory with a client-centred approach to rehabilitation, due to its emphasis on self-control, self-awareness, and self-management. In one of the few studies to directly apply the principles of self-regulation theory in a rehabilitation setting, McGrath and Adams (1999) employed Carver and Scheier’s cybernetic model of self-regulation to examine the impact of neurological disorders on higher-order goals and associated emotional consequences using structured interviews in a sample of 82 persons with brain injury attending rehabilitation. The results were consistent with Carver and Scheier’s self-regulation model in terms of the relationships observed between goals, goal attainment and negative affect, suggesting the potential value of incorporating this perspective into rehabilitation (Siegert et al., 2004). By finding out more about the processes through which people with amputations regulate their goal-related behaviours and how this relates to psychosocial adjustment, it may be possible to gain an insight into how this patient group could be helped to continue striving towards valued goals, and supported in adapting goals to current abilities and/or disengaging from those that are no longer attainable.

According to McPherson and colleagues (2009), goal setting which fails to take into account self-regulatory processes may be less effective as a result, and might exacerbate negative outcomes such as goal failure, low mood, and low motivation. Sivaraman Nair (2003) similarly argues that coping with the loss of valued goals and refocusing on more attainable goals are essential for rehabilitation to be a success, and proposes that the rehabilitation process should begin with the identification of the patient's goals, followed by the step of distinguishing achievable from unachievable goals. Rehabilitation goals can then be set so that the patient is enabled to work on achievable goals and attempt to restructure or deal with the loss of goals that no longer seem to be attainable.

McPherson and colleagues (2009) piloted two rehabilitation interventions reflecting this proposal that drew specifically on self-regulation theory in a sample of patients with moderate to severe traumatic brain injury. Goal management training (Levine et al., 2000) is a 'bottom-up' approach that aims to prevent goal failure by identifying activities the client finds challenging and developing detailed step-by-step programmes for carrying them out. Metaphoric identity mapping (MIM: Ylvisaker et al., 2008) is a 'top-down' approach that aims to facilitate goal engagement by asking clients to select a person they aspire towards being like, and using this 'role model' as a means of stimulating thought about their own personally valued goals. Both interventions were found to be acceptable to both clients and practitioners alike, and gave rise to both improved mood and a sense of achievement. These preliminary findings signal the potential utility of self-regulation theory as a basis for the development of individualised rehabilitation interventions to ensure greater correspondence between the patient's goals and those of the rehabilitation programme. The application of self-regulation theory to limb loss may prove valuable in informing the development of such innovative, theory-driven rehabilitation interventions for persons with amputations.

1.11 Conclusion

As outlined in Section 1.6, the literature on adjustment to amputation to date has been limited by its strong emphasis on negative psychosocial sequelae and neglect of positive outcomes, its over-reliance on cross-sectional designs and unfamiliarity with the dynamic character of this process, and its failure to use theories to inform and guide research. The present study aims to address each of these issues through the application of self-regulation theory to the experience of limb loss. The assumptions of self-regulation theory are particularly germane to the study of psychosocial adjustment to amputation, as the physical, social and psychological changes that occur as a result of limb loss are likely to disrupt a person’s usual means of attaining important goals, requiring the individual to either pursue his or her goals more rigorously or disengage from goals that are no longer feasible in order to maintain subjective well-being. Self-regulation theory offers a useful framework for examining this adjustment process, and one which accounts for the experience of both positive and negative affect. By examining the relationships between goal disturbance, goal engagement and disengagement processes (operationalized as assimilation and accommodation), personal resources (optimism and perceived social support), and both positive and negative indicators of adjustment longitudinally, it may be possible to identify variables predictive of better psychosocial outcomes following amputation, which could aid the rehabilitation team in the early identification of those at risk for poor adjustment and form the basis of interventions to enhance adjustment in this population.

CHAPTER 2

STUDY AIM, OBJECTIVES, AND HYPOTHESES

This chapter will state the purpose of the present study, and outline the aim, objectives and specific hypotheses to be examined.

2.1 Statement of purpose

The purpose of the present study was threefold:

1) To examine psychosocial adjustment to amputation using a framework based on self-regulation theory, in order to broaden our understanding of the mechanisms underlying adjustment and explore the role that individuals' goals play in this process.

2) To examine psychosocial adjustment to amputation longitudinally, in order to learn more about the temporal characteristics of this process and to identify factors that predict long-term psychosocial outcomes following amputation, which could facilitate the early detection of individuals at risk for adjustment difficulties and guide the development of targeted interventions to enhance adjustment in this patient group.

3) To examine both positive and negative indicators of psychosocial adjustment to amputation, in order to investigate whether these different dimensions of well-being diverge in their trajectories and underlying mechanisms.

2.2 Study aim

The aim of the present study was to examine the relationships between self-regulatory variables (goal disturbance, TGP, and FGA) and psychosocial outcomes (participation, positive and negative affect, QoL, psychosocial adjustment to amputation, depressive symptomatology) among individuals with lower limb amputations, both cross-sectionally (on admission to an inpatient rehabilitation programme) and longitudinally (from admission to 6 weeks post-discharge, from admission to 6 months post-discharge), and to investigate whether these variables accounted for additional variance in outcomes after controlling for sociodemographic and clinical factors, optimism, and perceived social support.

2.3 Study framework

Following a review of the literature on psychosocial adjustment to lower limb amputation and self-regulation theory, a framework was devised to represent the hypothesised relationships between the variables to be examined (see Figure 2.1). In order to investigate these relationships longitudinally, study variables were measured at three time points: 1-3 weeks after admission to an inpatient rehabilitation programme (Time 1 - T1); 6 weeks after discharge from the programme (Time 2 - T2); and 6 months after discharge (Time 3 - T3).

2.4 Study objectives and hypotheses

Based on the assumptions of self-regulation theory and the findings of previous research on psychosocial adjustment to amputation, the following objectives and hypotheses were devised. They are organised into three categories, according to the level of analysis involved: cross-sectional, longitudinal, and predictive.

2.4.1 Objectives and hypotheses for cross-sectional analyses

Objective 1: To investigate whether psychosocial outcomes are associated with goal disturbance, TGP, and FGA at Time 1.

Rationale for Objective 1:

According to the cybernetic model of self-regulation (Carver & Scheier, 1998), negative affect is experienced when the rate of progress towards valued goals is slower than desired, whereas positive affect is experienced when it is faster than expected. The dual-process model (Brandstädter & Renner, 1990) posits that greater use of assimilative tenacity and accommodative flexibility as adaptive self-regulatory modes protects against the negative impact of such goal discrepancies on emotional well-being, with TGP promoting positive affect and FGA buffering against negative affect (Heyl et al., 2007). The first objective of the present study was to investigate whether similar associations would be observed between these self-regulatory constructs and psychosocial outcomes among persons with lower limb amputations.

Hypotheses for Objective 1:

1(a) Goal disturbance will be positively associated with negative affect and depressive symptoms, and negatively associated with positive affect, participation, QoL and psychosocial adjustment to limb loss, but its relationship with positive affect will be non-significant.

1(b) TGP will be positively associated with participation, positive affect, QoL, and psychosocial adjustment to limb loss, but its relationship with negative affect and depressive symptoms will be non-significant.

1(c) FGA will be negatively associated with negative affect and depressive symptoms, and positively associated with participation, positive affect, QoL, and psychosocial adjustment to limb loss.

1(d) Goal disturbance, TGP, and FGA will explain additional variance in psychosocial outcomes, controlling for sociodemographic and clinical variables, optimism, and perceived social support.

Objective 2: To investigate the effects of interactions between TGP/FGA and goal disturbance, pain intensity, and age on psychosocial outcomes at Time 1.

Rationale for Objective 2:

Brandstädter and Renner (1990) propose that assimilation and accommodation may promote adjustment to life changes by mitigating the impact of perceived distance from personally valued goals on subjective well-being. Previous research has found that FGA in particular moderates the negative influence of goal disturbance (Bailly et al., 2012; Brandstädter & Renner, 1990) and pain intensity (Kranz et al., 2010; Schmitz et al., 1996) on psychosocial outcomes. The moderating effect of FGA on the relationship between goal discrepancies and psychosocial outcomes appears to be particularly beneficial among younger individuals with functional impairments (Boerner, 2004). According to the dual-process model, assimilative and accommodative modes may operate synergistically and complement each other during concrete episodes of coping. Heyl and colleagues (2007) explored the interactions between TGP and FGA, and found that for positive affect, the ameliorative effect of FGA was more pronounced when TGP was also high, whereas the relationship between FGA and negative affect was weaker at higher levels of TGP. The second objective of the present study was to investigate the moderating influence of TGP and FGA on the relationship between psychosocial outcomes and each of goal disturbance, pain intensity, and age among persons with lower limb amputations, and to explore how TGP and FGA interact to enhance adjustment in this population.

Hypotheses for Objective 2:

2(a) The negative impact of goal disturbance on psychosocial outcomes at Time 1 will be buffered by FGA.

2(b) The negative impact of pain intensity on psychosocial outcomes at Time 1 will be buffered by FGA.

2(c) The buffering effect of FGA on psychosocial outcomes will be stronger for younger participants.

2(d) The buffering effect of FGA on negative psychosocial outcomes (negative affect, depression) will be stronger when TGP is lower.

2(e) The buffering effect of FGA on positive psychosocial outcomes (participation, positive affect, QoL, psychosocial adjustment) will be stronger when TGP is higher.

2.4.2 Objectives and hypotheses for longitudinal analyses

Objective 3: To explore which goals are most important to persons with lower limb amputations, and which goals they are most hindered in attaining as a result of their limb loss.

Rationale for Objective 3:

Research suggests that the motivation of patients to engage in rehabilitation is higher when its goals are meaningful and relevant to them (Alexy, 1985; McGrath & Adams, 1999; Oldridge et al., 1999; Stuifbergen et al., 2003; Webb & Glueckauf, 1994). The goals that patients consider important are often not taken into consideration by the rehabilitation team, however (Bloom et al., 2006; Boerner & Cimarolli, 2005; McNamara et al., 2006; Sivaraman Nair & Wade, 2003). Little is currently known about the types of goals that are valued by individuals among persons with amputations, or those that are significantly impacted by their limb loss. Such information could help to improve the effectiveness of post-amputation rehabilitation programmes by identifying important areas that are not currently addressed in this patient group. The third objective of the present study was thus to explore goal importance and hindrance among persons with lower limb amputations.

Objective 4: To ascertain if there are any significant changes in self-regulatory constructs and psychosocial outcomes from Time 1 to Time 3.

Rationale for Objective 4:

Current conceptualisations of psychosocial adjustment to chronic illness and disability emphasise the dynamic and fluid nature of this process. Only a handful of studies have explored changes in psychosocial outcomes over time among individuals with amputations, however (Kratz et al., 2010; Singh et al., 2009; Williams et al., 2004). The fourth objective of the present study was thus to examine the trajectory of psychosocial adjustment in this population, and identify any significant changes in predictors or outcomes across the study period. The few studies that have examined psychosocial adjustment over time in this population either report on variables that are not examined in the present study (Williams et al., 2004; Kratz et al., 2010), examine changes over longer time period than the present study (Singh et al., 2009), or report findings for subgroups of this population rather than the sample as a whole (Kratz et al., 2010), and do not usefully inform the development of assumptions regarding trajectories of change in the present study. As a result, no specific hypotheses have been formulated for Objective 4.

2.4.3 Objectives and hypotheses for predictive analyses

Objective 5: To investigate whether psychosocial outcomes at Time 2 are predicted by goal disturbance, flexible goal adjustment and tenacious goal pursuit at Time 1.

Objective 6: To investigate whether psychosocial outcomes at Time 3 are predicted by goal disturbance, TGP, and FGA at Time 1.

Rationale for Objectives 5 and 6:

A major limitation of the literature on psychosocial adjustment to amputation is the dearth of longitudinal research that has been conducted. Identifying factors on admission to rehabilitation that predict long-term adjustment could enable the early detection of individuals at risk for poor outcomes and inform the development of interventions to enhance psychosocial adjustment in this population. Previous research in chronic illness and disability populations has identified goal disturbance as a significant predictor of poorer psychosocial outcomes in the long-term (Boersma, Maes, & van Elderen, 2005; Echteld et al., 2003). Conversely, greater use of TGP and FGA as adaptive self-regulatory modes has been found to predict enhanced adjustment over time (Darlington et al., 2009; Rothermund & Brandtstädter, 2003). The fifth and sixth objectives of the present study were thus to investigate whether goal disturbance, TGP, and FGA on admission to rehabilitation were predictive of psychosocial outcomes at six weeks (Objective 5) or six months (Objective 6) after discharge.

Hypothesis for Objective 5:

5(a) Goal disturbance, TGP, and FGA at Time 1 will explain additional variance in psychosocial outcomes at Time 2, controlling for sociodemographic and clinical variables, optimism, and perceived social support.

Hypothesis for Objective 6:

6(a) Goal disturbance, TGP, and FGA at Time 1 will explain additional variance in psychosocial outcomes at Time 3, controlling for sociodemographic and clinical variables, optimism, and perceived social support.

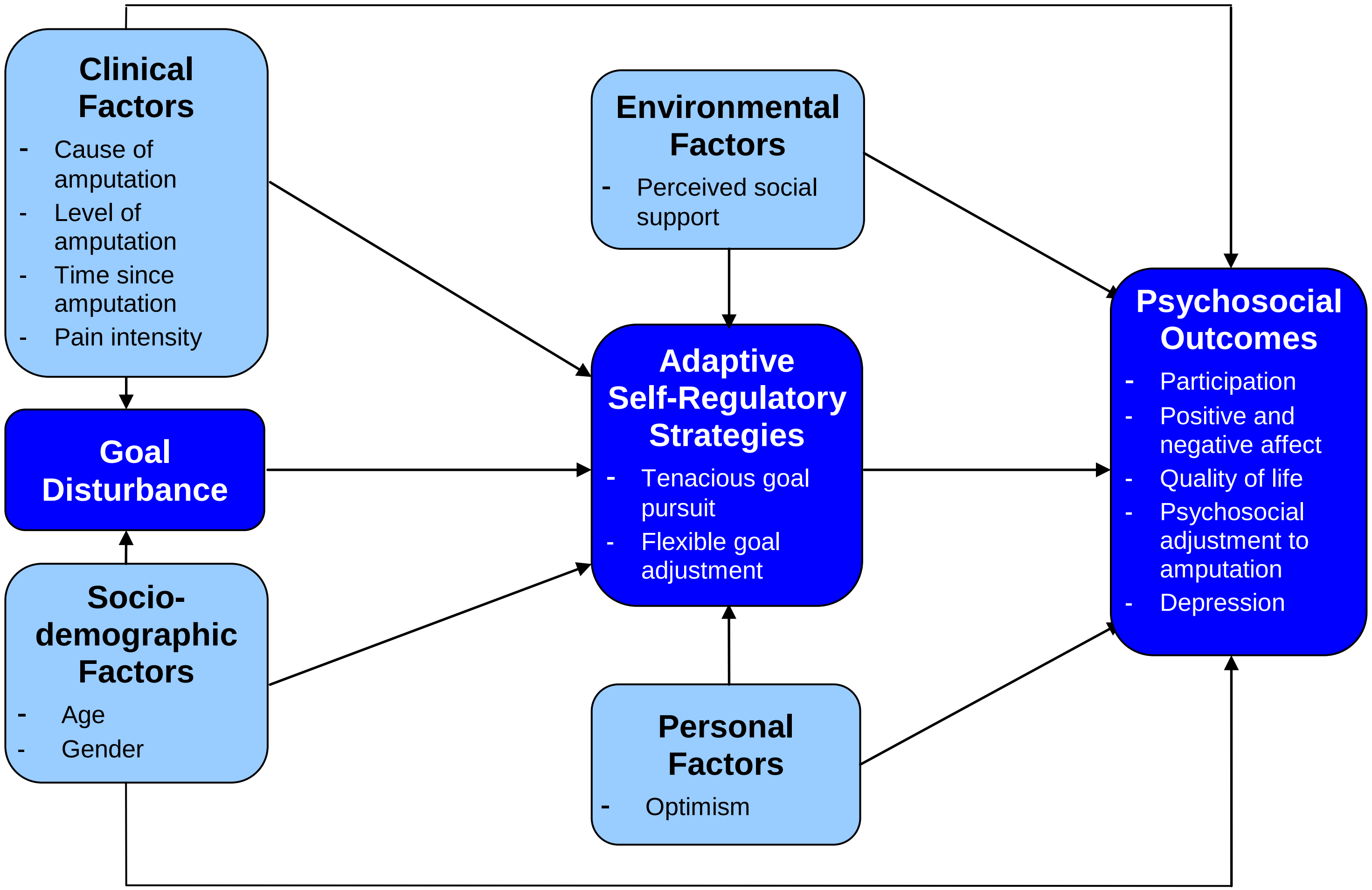

Figure 2.1. Research framework for the present study.

CHAPTER 3

METHODOLOGY

This chapter outlines the research design, participants, measures, procedures, and statistical analyses used in the present study.

3.1 Research design

This study employed a quantitative, longitudinal research design, with data being collected using self-report questionnaires on three separate occasions: shortly after admission to an inpatient rehabilitation programme (T1); six weeks after discharge from the programme (T2); and six months after discharge (T3).

3.2 Participants

Participants were recruited from two urban hospitals located in the Republic of Ireland. Hospital 1 was a major teaching hospital serving a large urban catchment area, which offered a range of services including acute medical, surgical and psychiatric services, long stay care, day care, outpatient, diagnostic and support services. Hospital 2 was a rehabilitation hospital providing specialist adult and paediatric rehabilitation services at a national level for individuals with acquired physical or cognitive disability following accident, illness or injury. Both hospitals offered specialised, interdisciplinary rehabilitation programmes for individuals with lower limb amputations on an inpatient basis. These programmes aimed to address any issues patients were experiencing in their physical, psychological, social or vocational activities, and to assist them in relearning skills, acquiring new skills, and developing strategies to compensate and manage their limb loss, either with or without the use of a prosthetic limb. All persons admitted to these programmes between February 2010 and July 2011 were considered for participation in the study.

3.2.1 Inclusion and exclusion criteria

The following inclusion and exclusion criteria were employed in order to determine the eligibility of patients to participate in the study:

Inclusion criteria

- Confirmed case of major lower limb amputation (for which inpatient rehabilitation services had not previously been provided)
- Aged 18 years or over
- Sufficient spoken English for the demands of the study
- Mini-Mental State Examination (MMSE: Folstein, Folstein, & McHugh, 1975) score of 18 or higher (if aged 65 years or over)

Exclusion criteria

- Deemed unsuitable to participate due to a previous or current history of psychiatric morbidity (determined on a case-by case basis by the rehabilitation team’s clinical psychologist)

3.2.2 Sample size considerations

A medium effect size was assumed for the present study, based on previous longitudinal studies of psychosocial adjustment in persons with amputations (Phelps et al., 2008;

Unwin et al., 2009; Williams et al., 2004). Using the G*Power 3 programme (Faul, Erdfelder, Lang, & Buchner, 2007), it was estimated that a sample of 98 individuals would be required to conduct multiple regression analyses with six predictor variables (one sociodemographic/clinical factor, goal disturbance, optimism, perceived social support, tenacious goal pursuit, flexible goal adjustment), given a power of 0.80, a significance level of 0.05, and a medium effect size ($f^2 = 0.15$).

3.2.3 Patient recruitment outcomes

Recruitment took place in Hospitals 1 and 2 from February 2010 to July 2011. A total of 113 patients were deemed eligible to take part in the study during this time, based on the inclusion and exclusion criteria outlined previously. Twelve patients declined to participate in the study, and a further three patients were discharged early from the rehabilitation programme prior to meeting with the researcher. The remaining 98 patients (8 from Hospital 1, 90 from Hospital 2) agreed to take part and completed Time 1 questionnaires. Analyses were carried out to investigate whether there were any differences in sociodemographic (age, gender) and clinical (level of amputation, cause of amputation) characteristics between patients who agreed to participate in the study and those who declined to take part. The results of a t-test showed that the two groups did not differ significantly in age. A chi-squared test revealed no significant differences between the two groups in level of amputation, and Fisher’s exact probability test found no significant differences in cause of amputation. Fisher’s test was significant for gender ($p = .033$), however, and examination of cell counts indicated that there was a significantly smaller proportion of females among those who participated (20.4%) than among non-participants (50%).

Of the original 98 individuals who participated at Time 1, 75 (77%) completed questionnaires at Time 2, and 62 (63%) contributed data at Time 3. These attrition rates are consistent with previous longitudinal research in this patient group (Phelps et al., 2008; Williams et al., 2004). The main reasons for attrition from the study were ongoing health problems, refusal to participate, difficulties in contacting participants, and mortality (see Figure 3.1). Analyses were conducted to compare participants who remained in the study with those who dropped out on sociodemographic characteristics, clinical factors, and scores on Time 1 study variables. It was found that participants who dropped out had significantly lower scores on FGA ($t_{(96)} = -2.77$, $p = .007$), positive affect ($t_{(96)} = -2.38$, $p = .019$), and the psychological domain of QoL ($t_{(96)} = -2.01$, $p = .047$), suggesting that those who continued to participate were more well-adjusted.

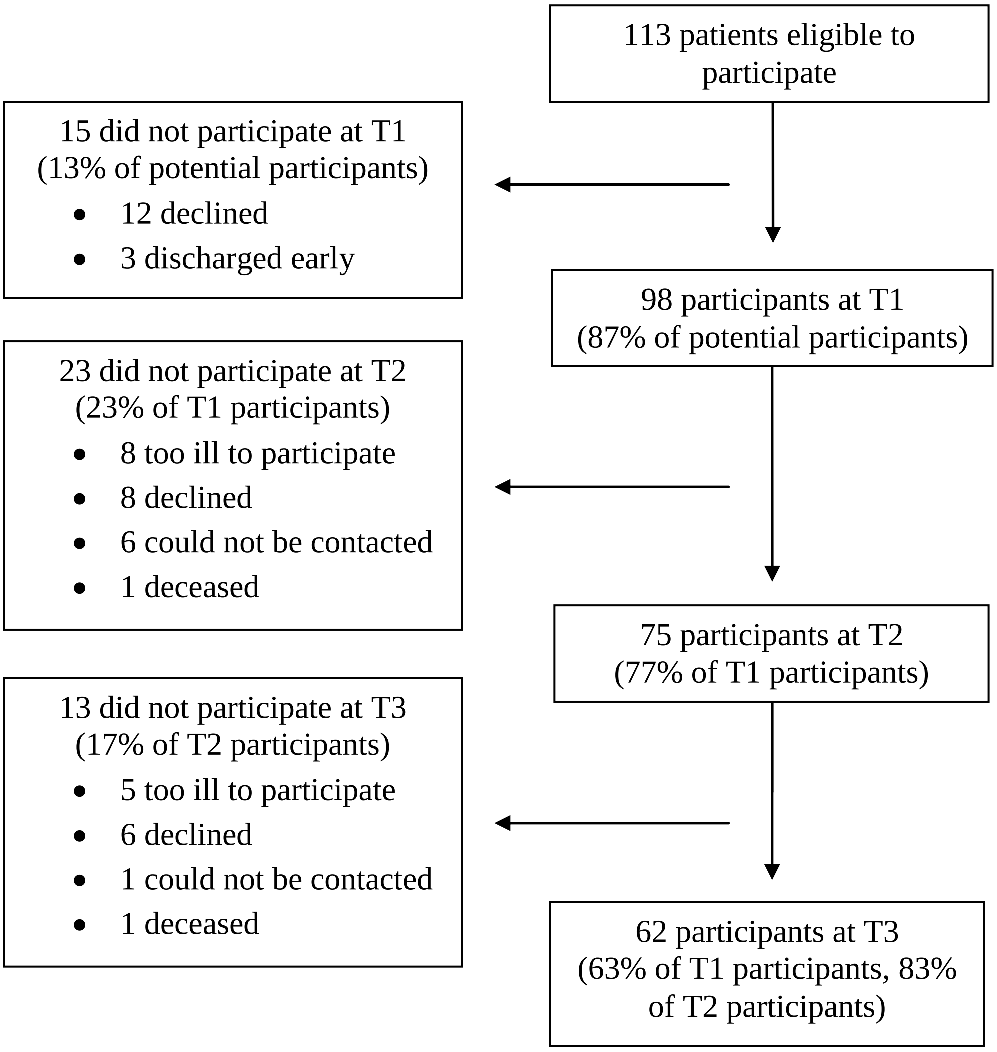

Figure 3.1. Flow diagram of recruitment process and participation rates.

3.2.4 Sample characteristics

The sociodemographic characteristics of the sample at each time point are summarised in Table 3.1. For the complete sample, ages ranged from 25 to 89 years, with a mean age of 62.59 years (*SD* = 13.20). The majority of participants were male, had primary level education only, were married, and lived with their partner.

Table 3.1. Sociodemographic characteristics of the sample at each time point†

Variable	Time 1 (*N* = 98) *n* (%)	Time 2 (*N* = 75) *n* (%)	Time 3 (*N* = 62) *n* (%)
Gender			
Male	78 (80)	59 (79)	52 (84)
Female	20 (20)	16 (21)	10 (16)
Education			
Primary school	44 (45)	31 (41)	27 (43)
Secondary school	38 (39)	29 (39)	21 (34)
Third level	16 (16)	15 (20)	14 (23)
Marital status			
Single	21 (21)	13 (17)	12 (19)
Married	45 (46)	36 (48)	32 (52)
Separated	8 (8)	4 (5)	4 (6)
Divorced	10 (10)	8 (11)	6 (10)
Widowed	14 (14)	14 (19)	8 (13)
Living situation‡			
Alone	39 (40)	23 (31)	21 (34)
With partner	22 (22)	14 (19)	16 (26)
With partner and children	22 (22)	13 (17)	10 (17)
With family	12 (12)	17 (23)	9 (15)
With others (nursing home)	3 (3)	6 (8)	5 (8)
Age			
Range	25-89	28-89	28-89
Mean (*SD*)	62.59 (13.20)	63.51 (12.67)	63.31 (11.91)

† Data collected at T1 only, except for living situation, which was recorded at each time point; ‡ Data missing for 2 participants at T2, and 1 participant at T3

Table 3.2 presents the clinical characteristics of the sample at each time point. For the complete sample, 47 participants (48%) had undergone unilateral below-knee amputation, and 43 participants (44%) had above-knee amputations. An additional eight participants (8%) had bilateral amputations. For the majority of participants, the cause of their amputation was chronic (i.e., PVD, diabetes, or cancer) in nature (79%). The remaining participants (22%) underwent amputation secondary to trauma (8%) or other causes such as deep vein thrombosis or necrotising fasciitis resulting from intravenous drug use (13%). The amount of time that had elapsed since amputation ranged from 6 to 260 weeks, with an average of 30.32 weeks having passed since the procedure. Over 80% of participants suffered from at least one comorbid health condition, with the most common comorbidities being cardiac problems (60%) and diabetes (50%). At Time 1, 78% of participants were experiencing phantom limb pain, and 31% suffered from pain in the residual limb. On a scale ranging from 0 (‘no pain’) to 10 (‘pain as bad as you can imagine’), the average intensity of amputation-related pain experienced was 2.59 (*SD* = 2.34). The majority of individuals had been fitted with a prosthetic limb by the time they were discharged from rehabilitation. On average, participants wore their prosthesis for 8.5 hours per day at Time 2, and for over 9 hours per day at Time 3.

Table 3.2. Clinical characteristics of the sample at each time point†

Variable	Time 1 (*N* = 98) *n* (%)	Time 2 (*N* = 75) *n* (%)	Time 3 (*N* = 62) *n* (%)
Level of amputation			
Below-knee	47 (48)	37 (49)	30 (48)
Above-knee	43 (44)	31 (41)	27 (44)
Bilateral	8 (8)	7 (9)	5 (8)
Cause of amputation			
Peripheral vascular disease	52 (53)	39 (52)	33 (53)
Diabetes	24 (25)	20 (27)	14 (23)
Cancer	1 (1)	1 (1)	1 (1)
Accident	8 (8)	7 (9)	6 (10)
Other	13 (13)	8 (11)	8 (13)
Presence of comorbidities			
Yes	79 (81)	62 (83)	52 (84)
No	19 (19)	13 (17)	10 (16)
Residual limb pain			
Yes	30 (31)	29 (39)	27 (44)
No	68 (69)	46 (61)	35 (56)
Phantom limb pain			
Yes	76 (78)	56 (75)	43 (69)
No	22 (22)	19 (25)	19 (31)
Fitted with prosthesis			
Yes	52 (53)	65 (87)	54 (87)
No	46 (47)	10 (13)	8 (13)
Number of weeks since amputation			
Range	6-260	6-260	6-260
Mean (*SD*)	30.32 (36.97)	29.79 (39.82)	31.92 (43.47)
Average pain intensity‡			
Range	0-10	0-10	0-10
Mean (*SD*)	2.59 (2.00)	2.69 (2.07)	2.71 (2.58)
Hours per day prosthesis worn§			
Range	3-15	0-18	0-17
Mean (*SD*)	7.48 (3.77)	8.56 (4.62)	9.28 (4.73)

† Data collected at each time point, except for level of amputation, cause of amputation, and presence of comorbidities, which were recorded at T1 only; ‡ Data missing for one participant at T2; § Data missing for 73 participants at T1, 11 participants at T2, and 8 participants at T3

3.3 Measures

3.3.1 Cognitive screening assessment

In accordance with the present study's inclusion criteria and the cognitive screening policy for newly admitted patients in Hospital 2, potential participants aged 65 years and over were screened for cognitive impairment using the Mini-Mental State Examination (MMSE: Folstein et al., 1975), which was administered by either the researcher or the rehabilitation team's occupational therapist. The MMSE is a brief, objective measure of global cognitive status consisting of eleven simple questions that examine the following areas of cognitive ability: orientation, registration, attention and calculation, recall, and language. The number of correct items is added together to yield a total score ranging from 0 to 30, with higher scores indicating better cognitive functioning. In the present study, individuals who obtained a score of 18 or higher on the MMSE were considered to be eligible for participation. This cut-off was selected, as a score of less than 18 is thought to indicate the presence of severe cognitive impairment (Tombaugh & McIntyre, 1992). In the present study, three potential participants obtained scores of less than 18 on the MMSE, and were excluded from taking part as a result. The MMSE has established reliability and validity (Folstein et al., 1975; Hopp, Dixon, Grut, & Bäckman, 1997).

3.3.2 Sociodemographic and clinical data

Sociodemographic and clinical information was gathered from participants at the first time point (see Appendix F), and updated as necessary on subsequent occasions. Sociodemographic data on participants' age, gender, education level, marital status, and living situation were recorded. Clinical information regarding when the amputation was carried out, the cause and level of the amputation, presence of co-morbidities, whether or not a prosthetic limb has been fitted, the number of hours per day the prosthetic limb was worn, and the presence of residual and phantom limb pain was also documented.

3.3.3 Study instruments

The following measures were administered to participants at each time point (see Appendices F, H, and J). These measures were piloted with two individuals who met the study's inclusion criteria before the main administration, in order to identify any completion and comprehension difficulties and modify the questionnaire accordingly.

3.3.3.1 Predictor variables

Pain intensity was assessed using a single item from the Brief Pain Inventory (BPI: Cleeland, 1989). The BPI is a brief self-administered questionnaire for evaluating clinical pain, which addresses the severity of pain and the extent to which pain interferes with common dimensions of feeling and function. The item included in the present study asks participants to rate their average experience of pain on a numeric rating scale ranging from 0 ('no pain') to 10 ('pain as bad as you can imagine'). This single item has been used as a measure of pain intensity in a number of clinical trials (Cleeland, 2009). The use of BPI items singly to represent pain intensity is supported by the recommendations of the Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT) for assessing pain (Turk et al., 2006) and the US Food and Drug Administration's (FDA) guidance on patient-reported outcome measures (FDA, 2006).

Goal disturbance was assessed using the Goal Facilitation Inventory (GFI: Maes, ter Doest, & Gebhardt, 2002) (see Section 1, Appendix F). This instrument was developed using a taxonomy of human goals formulated by Ford and Nichols (1987), and consists of 26 higher-order goals that people may strive towards attaining. Participants were firstly required to evaluate the importance of each goal to them in their everyday lives on a 5-point Likert scale ranging from ‘not at all important’ (1) to ‘very important’ (5). Scores on these items were summed to obtain a total goal importance score. Participants were then asked to report on a scale ranging from 1 (‘not at all hindered’) to 5 (‘completely hindered’) the extent to which they were currently hindered in attaining each goal. The instructions for this scale were adapted to specify the hindrance respondents experienced *due to their amputation*. In order to calculate goal disturbance, the goal importance score for each item was multiplied by its goal hindrance score. The 26 product scores calculated were then summed to attain an overall goal disturbance score, with higher scores indicating greater disturbance in goal attainment. This instrument has demonstrated good internal consistency in a number of different patient groups (Boersma, Maes, & Joekes, 2005; Offerman et al., 2010; van der Veek et al., 2007).

Assimilative tenacity and accommodative flexibility were measured using the English version of the Tenacious Goal Pursuit (TGP) and Flexible Goal Adjustment (FGA) scales (Brandstädter & Renner, 1990) (see Section 5, Appendix F). The TGP scale assesses the tendency to persist in pursuing goals even in the face of setbacks and obstacles, while the FGA scale measures readiness to disengage from blocked goals and focus on positive aspects of adverse situations. Both scales consist of 15 direct- and reverse-keyed items that were rated by participants on a 5-point Likert scale ranging from ‘strongly agree’ (0) to ‘strongly disagree’ (4). Reverse-keyed items were recoded and scores were summed to obtain total scores for both scales, with higher scores signifying a greater tendency to engage in these adaptive self-regulatory modes. The TGP and FGA scales have been used in various patient populations (Boerner, 2004; Darlington et al., 2009; van Lankveld et al., 2011) and have proven satisfactory in terms of their reliability and validity (Brandstädter & Renner, 1990).

Optimism was measured using the Life Orientation Test-Revised (LOT-R: Scheier, Carver, & Bridges, 1994), which consists of ten items assessing generalised expectancies for positive versus negative outcomes (see Section 2, Appendix F). Three of these items are worded positively (optimism subscale), three are worded negatively (pessimism subscale), and the remaining four are filler items that are not used in scoring. Participants were asked to rate each item on a 5-point Likert scale ranging from ‘strongly disagree’ (0) to ‘strongly agree’ (4). An overall dispositional optimism score was calculated by reverse coding scores on the three negatively worded items and adding them to the ratings given for the positively worded items, with higher scores indicating a more optimistic disposition. The LOT-R has previously been found to demonstrate acceptable reliability and validity (Scheier et al., 1994).

The Multidimensional Scale of Perceived Social Support (MSPSS: Zimet, Dahlem, Zimet, & Farley, 1988) consists of 12 items measuring *perceived social support* from three specific sources: family; friends; and a significant other (see Section 3, Appendix F). Each item is rated on a 7-point Likert scale, ranging from ‘very strongly disagree’ (1) to ‘very strongly agree’ (7). A mean perceived social support score was obtained for each participant by adding together their scores on each item and dividing by 12, with higher scores denoting greater perceived social support. The MSPSS has proven reliability and validity across a number of different samples (Eker, Arkar, & Yaldiz, 2000; Stanley, Beck, & Zebb, 1998; Zimet, Powell, Farley, Werkman, & Berkoff, 1990), including individuals with amputations (Hanley et al., 2004; Jensen et al., 2002; Unwin et al., 2009; Williams et al., 2004).

3.3.3.2 Outcome variables

Participation was measured using the 12-item self-administered version of the World Health Organisation Disability Assessment Schedule 2.0 (WHODAS 2.0: Üstün, Kostanjsek, & Chatterji, 2010), which assesses day-to-day functioning in the following six activity domains: understanding and communication; getting around; self-care; getting along with people; life activities; and participation in society (see Section 4, Appendix F). Participants were asked to indicate on a scale ranging from 1 (‘none’) to 5 (‘extreme/cannot do’) the amount of difficulty they experienced in carrying out each activity over the previous 30 days. An overall disability score was calculated, with higher scores indicating lower participation. The WHO-DAS 2.0 has shown good reliability and validity in many different types of samples (Chisolm, Abrams, McArdle, Wilson, & Doyle, 2005; Sousa et al., 2010), including rehabilitation patients (Pösl, Cieza, & Stucki, 2007). This measure has previously been administered to individuals with amputations in a study by Gallagher and colleagues (2011).

Positive and negative affect were assessed using the Positive and Negative Affect Schedule (PANAS: Watson et al., 1988) (see Section 6, Appendix F). This measure consists of 20 words, ten of which describe positive emotions and ten expressing negative emotions. Participants were asked to indicate on a scale ranging from ‘very slightly or not at all’ (1) to ‘extremely’ (5) the extent to which they had experienced each emotion in the previous four weeks. Positive and negative items were scored separately to give total positive affect and negative affect scores, with higher scores being indicative of greater affect experienced. The PANAS demonstrates good reliability and validity as a measure of positive and negative affect (Crawford & Henry, 2004; Watson et al., 1988), and has been successfully employed in previous research on persons with amputations (Unwin et al., 2009).

Quality of life was assessed using the brief version of the WHO Quality of Life Questionnaire (WHOQOL-BREF: WHOQOL Group, 1998) (see Section 7, Appendix F). This measure consists of 24 items that are rated on 5-point Likert scales assessing either intensity, capacity, frequency, or satisfaction, and produces scores in four QoL-related domains: physical health (7 items); psychological (6 items); social relations (3 items); and environmental (8 items). Participants were asked to base their responses on their experiences over the previous four weeks. For each domain, negative items were reversed and mean scores were calculated and multiplied by 4 to obtain an overall domain score, with higher scores denoting better QoL. The WHOQOL-BREF has demonstrated good validity and reliability in previous research (Skevington, Lotfy, & O'Connell, 2004; WHO, 2000), and has been successfully administered to persons with amputations (Gallagher & MacLachlan, 2004).

Psychosocial adjustment to amputation was evaluated using the Trinity Amputation and Prosthesis Experience Scale-Revised (TAPES-R: Gallagher, Franchignoni, Giordano, & MacLachlan, 2010), a 64-item multidimensional self-measurement instrument composed of four sections assessing different aspects of adjustment to amputation and prosthesis use (see Section 8, Appendix F). The first three sections consist of scales measuring psychosocial adjustment, activity restriction, and satisfaction with the prosthesis, while the fourth section explores the experience of residual and phantom limb pain, as well as other medical conditions not related to the amputation. The psychosocial adjustment scale was employed in the present study, which contains three 5-item subscales measuring *general adjustment, social adjustment*, and *adjustment to limitations*. The wording of items was adapted to refer to ‘limb loss’ rather than ‘artificial limb use’, as some participants were never fitted with a prosthesis (see Appendix F). All items were rated on a 4-point scale ranging from ‘strongly disagree’ (1) to ‘strongly agree’ (4). For each subscale, the mean of the five item scores was calculated in order to obtain an overall subscale score, with higher scores indicating greater adjustment. Item scores for the adjustment to limitations subscale were reversed before a mean score was calculated. The TAPES-R appears to have adequate psychometric properties (Gallagher et al., 2010).

Depressive symptomatology was assessed using the Beck Depression Inventory-II (BDI-II: Beck, Steer, & Brown, 1996), a widely used 21-item self-report measure of depressive symptoms in adolescents and adults (see Section 9, Appendix F). Each item consists of four statements describing increasing intensity of depressive symptoms, and is rated on a scale of 0-3 according to how the respondent has been feeling over the past two weeks. The BDI-II provides a total score that can range from 0 to 63, with higher scores denoting greater depressive symptomatology. Clinical interpretation of total scores uses the following cut score guidelines: 0–13 = minimal depressive symptoms; 14–19 = mild depressive symptoms; 20–28 = moderate depressive symptoms; 29–63 = severe depressive symptoms. This scale has well-established psychometric properties (Arnau, Meagher, Norris, & Bramson, 2001; Dozois, Dobson, & Ahnberg, 1998).

3.3.3.3 Internal reliability of measures

Table 3.3 displays the Cronbach’s alpha values at each time point for the measures included in the study. The internal consistency of these measures was satisfactory, with Cronbach’s alphas of 0.7 and above being reported for the most part. Lower values were observed for the social relationships subscale of the WHOQOL-BREF at the first time point and the LOT-R at all three time points. Similar Cronbach’s alpha values have been observed in previous research employing these measures (Creed, Patton, & Bartrum, 2002; Skevington et al., 2004).

Table 3.3. Description of measures and Cronbach's alpha values at each time point

Variable	Number of items	Time 1 Cronbach's α	Time 2 Cronbach's α	Time 3 Cronbach's α
Goal disturbance	26	0.93	0.97	0.97
Optimism	6	0.58	0.63	0.66
Perceived social support	12	0.89	0.91	0.94
TGP	15	0.81	0.83	0.84
FGA	15	0.64	0.72	0.78
Participation	12	0.75	0.87	0.82
Positive affect	10	0.83	0.87	0.91
Negative affect	10	0.85	0.86	0.91
QoL-physical	7	0.61	0.77	0.73
QoL-psychological	6	0.80	0.83	0.83
QoL-social	3	0.46	0.74	0.69
QoL-environmental	8	0.65	0.86	0.80
General adjustment	5	0.84	0.94	0.91
Social adjustment	5	0.93	0.96	0.96
Adjustment to limitations	5	0.80	0.90	0.80
Depression	21	0.89	0.92	0.91

3.4 Procedure

Potential participants were identified by the consultant in charge of the programme in each hospital based on the study's inclusion and exclusion criteria. These patients were initially approached by the researcher on the ward or during one of their occupational therapy sessions. The researcher informed them briefly about the study and gave them an information sheet (see Appendix C) that described the research in more detail. Patients who indicated that they might be interested in participating were met with again once they had read the information sheet. The researcher discussed the study with them further and answered any questions before they decided whether or not to take part. Patients who agreed to participate were asked to sign a consent form (see Appendix D).

A time and place were then arranged to complete the first study questionnaire, which was administered by the researcher in a structured interview format. At subsequent time points, participants chose to have the study questionnaire either sent by post for self-completion or administered by the researcher during a home visit. Twenty-two (29%) Time 2 participants and 17 (27%) Time 3 participants received a home visit from the researcher in order to administer the questionnaire.

3.5 Ethical issues

Ethical approval for this study was obtained from the Ethics Committees of both participating hospitals (see Appendices A and B). All participants were asked to sign a consent form before they began their involvement in the study (see Appendix D). It was anticipated that the study's inclusion and exclusion criteria would eliminate any persons deemed unable to provide their own consent. Participants were assured of confidentiality at all times throughout the study. No person other than hospital staff was permitted access to participants' medical charts. The only personal data requested from participants were their names and contact details for the distribution of follow-up questionnaires (see Appendix E). In order to ensure the confidentiality of the data, participants were issued unique codes to connect to this information to their questionnaires. All personal details were stored separately from the questionnaires in a locked filing cabinet. Questionnaire data was entered directly onto the researcher's computer and encrypted to ensure confidentiality of all electronic records. Only members of the research team had access to hard copies of the data, which were stored in a locked filing cabinet designated for project use only. Answering questionnaire items about sensitive issues such as the impact of losing a limb on valued goals may have caused emotional distress in some participants. Any individuals who became upset as a result of participating in the study and/or obtained clinically significant scores on the BDI-II were provided with psychological input from appropriate members of the rehabilitation team.

3.6 Statistical analysis

Analysis of the data was conducted using SPSS Version 20 (IBM, 2010). The significance level was set at .05 for all statistical analyses, unless otherwise specified.

3.6.1 Data preparation

Initial exploration of the data was carried out prior to analysis in order to check for accuracy of data input, the amount and distribution of missing values, the presence of univariate outliers, and goodness of fit between the distributions of study variables and the assumptions of multiple regression, following guidelines set out by Tabachnick and Fidell (2007). In cases where less than 20% of the data were omitted on a particular scale, missing values were substituted with the mean of the remaining item scores before an overall scale score was calculated. Where more than 20% of the data were missing on a scale, overall scores were not calculated and these cases were excluded from any analyses involving the scale in question. Potential outliers for each study variable were identified by looking for standardized scores in excess of ± 3.29. Frequency histograms were examined to identify any variables that deviated from normality. Skewness, kurtosis, and Kolmogorov-Smirnov values were also examined as a further indication of non-normal distribution. Variables that were not normally distributed in the sample and/or had outliers that exceeded the ± 3.29 cut-off score were transformed to better meet the assumptions of multiple regression (see Table 3.4). Positively skewed variables were reflected before undergoing transformation.

Table 3.4. Transformations performed on non-normally distributed variables at each time point

Variable	Time 1	Time 2	Time 3
Goal disturbance	logarithmic	logarithmic	square root
Perceived social support	reflect and square root	reflect and square root	reflect and square root
Negative affect	square root	-	logarithmic
Quality of life – social	-	reflect and square root	reflect and square root
Social adjustment	-	-	reflect and square root
Depression	square root	square root	square root

Multiple regression output was also examined for normality, linearity, multicollinearity and homoscedasticity. An inspection of the residual histograms and scatterplots for each regression analysis revealed that none of these assumptions appeared to be violated. All variance inflation factors (VIF) were less than 10 and tolerance values were greater than .50, indicating that there was no multicollinearity in the data (Tabachnick & Fidell, 2007). Durbin-Watson scores were between 1 and 3 in value, suggesting that the assumption of independent errors was met (Field, 2009). Using a $p < .001$ criterion for Mahalanobis distance, any multivariate outliers identified in the data were only marginally outside the associated critical value, and all Cook's distances were less than 1, suggesting that no individual cases were influencing the models being tested (Stevens, 2002). As a result, no cases were removed from the analyses.

3.6.2 Preliminary analyses

Data were summarised as means and standard deviations for continuous variables, or frequencies and percentages for categorical variables. The means and standard deviations that are reported for transformed variables were calculated prior to transformation. One-way ANOVAs and Pearson correlations were employed to examine the associations between psychosocial outcomes and both sociodemographic and clinical factors. Marital status (‘with partner’ = 0, ‘without partner’ = 1), living situation (‘living alone’ = 0, ‘living with others’ = 1), and cause of amputation (‘chronic’ = 0, ‘acute’ = 1) were recoded into dichotomous dummy variables prior to analysis.

3.6.3 Cross-sectional analyses

Objective 1: To investigate whether psychosocial outcomes are associated with goal disturbance, TGP, and FGA at Time 1.

Bivariate relationships between predictor and outcome variables were examined firstly using Pearson correlations. Hierarchical multiple regression analyses were then employed to examine the multivariate relationships between goal-related constructs and each of the psychosocial outcomes at Time 1. Sociodemographic (gender, age) and clinical (level of amputation, cause of amputation, time since amputation, average pain intensity) factors previously linked with psychosocial adjustment to lower limb amputation were controlled for in the first step. Given the limited sample size and the inconsistencies observed in the relationships between psychosocial outcomes and both sociodemographic and clinical factors in the literature on adjustment to amputation, only those significantly associated with the outcome variable being examined ($p < .05$) were controlled for. In order to avoid multicollinearity among predictor variables, living situation and marital status (correlated with perceived social support), RLP and PLP (correlated with pain intensity), and presence of comorbidities (correlated with cause of amputation) were omitted from the analyses (Jaccard, Guilamo-Ramos, Johansson, & Bouris, 2006). Optimism and perceived social support were entered in the second step of the regression model, followed by goal disturbance, TGP, and FGA in the third and final step. Post-hoc estimates of statistical power for these analyses were computed using an online calculator (http://www.danielsoper.com/statcalc3/calc.aspx?id=17).

Objective 2: To investigate the effects of interactions between TGP/FGA and goal disturbance, pain intensity, and age on psychosocial outcomes at Time 1

Moderated regression analyses were performed to examine whether TGP or FGA influenced the relationships between psychosocial outcomes and goal disturbance, age or pain intensity (Aiken & West, 1991). The interaction between TGP and FGA was also examined for each outcome. The predictor and moderator variables were standardized firstly in order to avoid multicollinearity (Frazier, Tix, & Barron, 2004), and then multiplied together to form the interaction term. In each analysis, the standardized predictor and moderator variables were entered in the first step, followed by the interaction term in the second step. All significant interaction effects were plotted at values of 1 standard deviation above and below the mean for the predictor and moderator variables using Microsoft Excel worksheets downloaded from the following website: www.jeremydawson.co.uk/slopes.htm.

3.6.4 Longitudinal analyses

Objective 3: To explore which goals are most important to persons with lower limb amputations, and which goals they are most hindered in attaining as a result of their limb loss.

A rank order was calculated for both goal importance and goal hindrance at each time point based on the mean scores for individual items of the GFI.

Objective 4: To ascertain if there are any significant changes in goal-related constructs and psychosocial outcomes from Time 1 to Time 3.

Repeated measures ANOVAs were conducted to test for significant changes in goal-related constructs and psychosocial outcomes across the three study time points. For variables in which significant changes were observed, post-hoc repeated measures t-tests were carried out to identify group differences, and mean scores at each time point were plotted to visually display the average trajectory of change over time for the whole sample.

3.6.5 Predictive analyses

Objectives 5 and 6: To investigate whether psychosocial outcomes at Times 2 and 3 are predicted by goal disturbance, TGP, and FGA at Time 1.

The predictive value of goal disturbance, TGP, and FGA at Time 1 on psychosocial outcomes at Times 2 and 3 was examined by means of hierarchical multiple regression analyses. Baseline assessments of the outcome being examined were entered in the first step to control for their influence, along with any sociodemographic and/or clinical variables significantly associated with the outcome variable at the follow-up time point ($p < .05$). Optimism and perceived social support at Time 1 were added to the model in the second step, followed by Time 1 scores on goal disturbance, TGP, and FGA in the third step. Post-hoc estimates of statistical power for these analyses were computed using an online calculator (http://www.danielsoper.com/statcalc3/calc.aspx?id=17).

CHAPTER 4

RESULTS OF CROSS-SECTIONAL ANALYSES

This chapter presents the results of the analyses for Objectives 1 and 2, and provides a summary and discussion of the findings.

4.1 Results for Objective 1

Objective 1: To investigate whether psychosocial outcomes are associated with goal disturbance, TGP, and FGA at Time 1.

4.1.1 Preliminary analyses

Descriptive statistics were calculated for all predictor and outcome variables at Time 1, and are displayed in Table 4.1. The mean score on the BDI-II was within the minimal range for depressive symptomatology (see Section 3.3.3.2). A series of statistical analyses were performed to examine the influence of sociodemographic characteristics on psychosocial outcomes at the first study time point (see Table 4.2). One-way ANOVAs showed that education level did not have a significant influence on any of the outcome variables assessed at Time 1. Pearson correlations indicated that younger age was significantly associated with greater negative affect and depressive symptoms. Females tended to have poorer psychosocial outcomes at Time 1 than males, including lower psychological QoL, poorer general and social adjustment, higher negative affect, and greater symptoms of depression. Living alone was significantly related to lower negative affect and poorer social adjustment at Time 1, whereas having a partner was associated with greater social adjustment at this time point.

Table 4.1. Descriptive statistics for predictor and outcome variables at Time 1

Variable	Possible range	Valid *N*	Minimum	Maximum	Mean	*SD*
Predictor variables						
Goal disturbance	26-650	98	90	393	173.07	71.51
Optimism	0-24	98	7	23	14.42	3.06
Perceived social support	1-7	98	3.42	7	5.90	0.91
TGP	0-60	98	18	59	33.23	7.51
FGA	0-60	98	22	51	38.88	5.05
Outcome variables						
Participation	0-100	98	0	75	36.51	14.06
Positive affect	10-50	98	18	50	35.87	7.68
Negative affect	10-50	98	10	40	16.54	6.84
QoL-physical	4-20	98	8.57	19.43	14.60	2.30
QoL-psychological	4-20	98	9.33	20	15.58	2.56
QoL-social	4-20	98	8	20	15.54	2.44
QoL-environmental	4-20	98	8.5	20	14.93	2.27
General adjustment	1-4	98	1.8	4	2.99	0.47
Social adjustment	1-4	97	1.2	4	3.11	0.50
Adjustment to limitations	1-4	97	1	4	2.11	0.49
Depression	0-63	96	0	36	8.10	8.70

Note: The means and standard deviations reported for goal disturbance, perceived social support, negative affect, and depression were calculated prior to transformation.

Analyses were also carried out to examine the associations between clinical characteristics and psychosocial outcomes at Time 1 (see Table 4.3). One-way ANOVAs revealed no significant differences in outcomes for different levels of amputation. Pearson correlations indicated that the amount of time that had elapsed since amputation was not significantly associated with any psychosocial outcomes for the present sample at Time 1. Cause of amputation was linked with several outcomes, however. Individuals with acute amputation etiologies had significantly higher levels of negative affect and depressive symptomatology, lower levels of participation and QoL in each of the domains assessed, as well as poorer general adjustment and adjustment to limitations at Time 1. Individuals who experienced RLP at Time 1 had greater negative affect, lower psychological and social QoL, and poorer general and social adjustment than those in whom RLP was absent. Presence of PLP at Time 1was also associated with greater negative affect, as well as a lower QoL in the physical domain and poorer adjustment to limitations. Higher average pain intensity was associated with greater negative affect, lower physical QoL, and poorer social adjustment. Counter to expectations, presence of comorbidities was associated with lower negative affect.

Table 4.2. Associations between sociodemographic characteristics and outcome variables at Time 1

Variable	Education	Age	Gender	Marital status	Living situation
	F (*df*)	*r*	*r*	*r*	*r*
Participation	0.98 (2, 95)	-.12	.04	-.16	.06
Positive affect	0.38 (2, 95)	-.09	.01	-.17	.16
Negative affect	0.16 (2, 95)	-.23*	.28**	-.08	.21*
QoL-physical	1.61 (2, 95)	.19	-.15	.16	-.09
QoL-psychological	0.25 (2, 95)	.09	-.27**	-.08	.10
QoL-social relationships	0.81 (2, 95)	.18	-.18	-.15	.15
QoL-environment	1.372 (2, 50.63)†	.09	-.12	.01	.10
General adjustment	0.11 (2, 94)	-.03	-.27**	-.04	.10
Social adjustment	0.67 (2, 56.21)†	-.12	-.38**	-.22*	.23*
Adjustment to limitations	1.48 (2, 94)	.05	-.02	.04	.01
Depression	0.37 (2, 93)	-.25*	.23*	.01	-.01

† Brown-Forsythe statistic presented, as the assumption of homogeneity of variance was violated; * $p \leq .05$; ** $p \leq .01$

Table 4.3. Relationships between clinical characteristics and outcome variables at Time 1

Variable	Level of amputation	Cause of amputation	Time since amputation	Presence of comorbidities	Residual limb pain	Phantom limb pain	Pain intensity
	F (*df*)	*r*	*r*	*r*	*r*	*r*	*r*
Participation	0.06 (2, 95)	.28**	-.10	-.22	.08	.23	.18
Positive affect	0.19 (2, 95)	.06	-.14	.10	-.07	-.02	-.08
Negative affect	0.56 (2, 95)	.26*	-.06	-.32**	.30**	.30**	.30**
QoL-physical	2.06 (2, 95)	-.35**	.12	.09	-.20	-.23*	-.22*
QoL-psychological	1.95 (2, 95)	-.26*	.03	.12	-.24*	-.13	-.12
QoL-social relationships	0.86 (2, 95)	-.31**	.16	.09	-.20*	-.12	-.11
QoL-environment	0.88 (2, 95)	-.30**	-.10	.04	-.17	-.16	-.25
General adjustment	1.26 (2, 94)	-.25*	.01	.08	-.22*	-.19	-.16
Social adjustment	1.18 (2, 94)	-.14	-.09	.05	-.22*	-.16	-.24*
Adjustment to limitations	0.40 (2, 94)	-.23*	-.04	.01	-.12	-.26*	-.20
Depression	1.36 (2, 93)	.23*	-.13	-.17	.15	.14	.17

* $p \leq .05$; ** $p \leq .01$

4.1.2 *Bivariate analyses at Time 1*

Pearson correlations were calculated to examine the bivariate relationships between predictor and outcome variables at Time 1, and are presented in Table 4.4. The results of the analyses fully supported the assumptions of Hypothesis 1(a), with goal disturbance being positively associated with greater negative affect and depressive symptomatology, and negatively associated with participation, QoL in each domain, and all three psychosocial adjustment subscales of the TAPES-R. In addition, the relationship between goal disturbance and positive affect was non-significant, as predicted. Overall, these findings suggest that individuals with greater disturbance in the attainment of valued goals experience more difficulties in psychosocial adjustment following lower limb amputation.

In support of Hypothesis 1(b), TGP was positively associated with positive affect, the psychological domain of the WHOQOL-BREF, and all three psychosocial adjustment subscales of the TAPES-R, and its relationship with negative affect was non-significant. Contrary to Hypothesis 1(b), however, TGP was negatively associated with depressive symptomatology, while correlations with participation and the physical, social and environment domains of QoL were non-significant. As predicted in Hypothesis 1(c), FGA was positively correlated with participation, positive affect, QoL in all four domains, and the three psychosocial adjustment subscales, and negatively correlated with negative affect and symptoms of depression. These findings offer support for the majority of assumptions made in Hypotheses 1(b) and 1(c), with greater use of assimilative tenacity and accommodative flexibility generally appearing to enhance positive adjustment outcomes and buffer against negative outcomes, with the influence of FGA being particularly strong (see Table 4.4).

Table 4.4. Correlations between predictor and outcome variables at Time 1

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	Goal disturbance	-														
2.	TGP	-0.01	-													
3.	FGA	-0.28**	0.34**	-												
4.	Optimism	-0.02	0.31**	0.39**	-											
5.	Perceived social support	0.16	-0.03	-0.14	0.02	-										
6.	Participation	0.45**†	-0.14†	-0.24**†	-0.20*†	0.14†	-									
7.	Positive affect	-0.01†	0.36**†	0.28**†	0.24**†	-0.05†	-0.26**	-								
8.	Negative affect	0.39**†	-0.09†	-0.40**†	-0.24**†	0.05†	0.41**	0.02	-							
9.	QoL-physical	-0.49**†	0.10†	0.34**†	0.23*†	-0.12†	-0.52**	0.17	-0.39**	-						
10.	QoL-psychological	-0.40**†	0.32**†	0.5**†	0.35**†	-0.26**†	-0.47**	0.52**	-0.42**	0.53**	-					
11.	QoL-social relationships	-0.37**†	0.11†	0.41**†	0.25**†	-0.46**†	-0.26**	0.12	-0.32**	0.47**	0.54**	-				
12.	QoL-environment	-0.27**†	0.15†	0.26**†	0.35**†	-0.28**†	-0.31**	0.23*	-0.22*	0.5**	0.4**	0.51**	-			
13.	General adjustment	-0.38**†	0.28**†	0.49**†	0.34**†	-0.12†	-0.35**	0.29**	0.29**	0.49**	0.52**	0.44**	0.45**	-		
14.	Social adjustment	-0.28**†	0.34**†	0.42**†	0.34**†	-0.16†	-0.10	0.27**	-0.18*	0.23*	0.44**	0.41**	0.32**	0.66**	-	
15.	Adjustment to limitations	-0.33**†	0.35**†	0.21*†	0.25**†	0.03†	-0.43**	0.28**	-0.13	0.43**	0.38**	0.24*	0.42**	0.44**	0.22*	-
16.	Depression	0.42**†	-0.22*†	-0.48**†	-0.34**†	0.19*†	0.49**	-0.25*	0.47**	-0.58**	-0.65**	-0.44**	-0.30**	-0.53**	-0.26*	-0.28**

Note: An inverse transformation was performed on perceived social support at Time 1, and correlation coefficients for this variable should be reversed prior to interpretation.
* *p* ≤ .05; ** *p* ≤ .01; † one-tailed test

4.1.3 Multivariate analyses at Time 1

In order to test Hypothesis 1(d), hierarchical multiple regression analyses were conducted for each of the psychosocial outcomes. Any sociodemographic (gender, age) and/or clinical (level of amputation, cause of amputation, time since amputation, average pain intensity) variables that were significantly associated with the outcome variable being examined ($p = .05$) were controlled for in the first step, followed by optimism and perceived social support in Step 2. Goal disturbance, TGP, and FGA were then added in the third and final step. The results of the hierarchical regression analyses are summarised in Tables 4.5 to 4.9. In each case, the unstandardized and standardized beta values presented were taken from the final regression model with all three steps entered.

4.1.3.1 Participation

Table 4.5 provides a summary of findings from the hierarchical regression analysis predicting participation at Time 1 (please note that higher scores on this variable indicate greater restrictions in participation). Cause of amputation was significantly associated with this outcome (see Table 4.3), and was controlled for in Step 1. The overall model accounted for 21% of the variance in participation. Each step contributed significantly to the model, with the addition of the self-regulatory constructs in the final step accounting for 12% of the variance, providing support for Hypothesis 1(d). Goal disturbance was the only significant predictor in the final model. In accordance with Hypothesis 1(a), experiencing greater disturbance in the attainment of valued goals was predictive of greater restrictions in participation on admission to rehabilitation following lower limb loss.

Table 4.5. Summary of hierarchical regression analysis explaining participation at Time 1

	B	*SE B*	β	ΔR^2
Step 1				.077**
Cause of amputation	3.52	3.99	0.10	
Step 2				.061*
Optimism	-0.80	0.47	-0.18	
Perceived social support	3.29	4.37	0.07	
Step 3				.120**
Goal disturbance	33.49	9.72	0.38***	
TGP	-0.20	0.20	-0.11	
FGA	0.01	0.31	0.01	
				R^2 = .257, Adj. R^2 = .208
				$F(6, 91)$ = 5.26***

Note: An inverse transformation was performed on perceived social support at Time 1, and scores on this variable should be reversed prior to interpretation.
* $p \leq .05$; ** $p \leq .01$; ** * $p \leq .001$

4.1.3.2 Positive and negative affect

Table 4.6 summarises the findings of the regression analyses predicting positive and negative affect at Time 1. Positive affect was not significantly associated with any sociodemographic or clinical variables assessed in the study. Optimism and perceived social support were entered into the model firstly, followed by goal disturbance, TGP, and FGA in the next step. The final model accounted for 12% of the variance in positive affect. In support of Hypothesis 1(d), both steps added significantly to the prediction of this outcome. TGP was the only significant predictor in the final regression model. In keeping with Hypothesis 1(b), individuals with lower limb amputations who used TGP to a greater extent as an adaptive self-regulatory mode experienced greater positive affect.

Significant correlations were observed between negative affect at Time 1 and age, gender, cause of amputation, and average pain intensity (see Tables 4.2 and 4.3). These variables were controlled for in the first step of the model predicting this outcome. All steps contributed significantly to the prediction of negative affect, with the exception of Step 2, again providing support for Hypothesis 1(d). The overall model explained 23% of the variance in negative affect at Time 1. Goal disturbance and FGA were the only significant predictors to emerge. In accordance with Hypotheses 1(a) and 1(c), persons with lower limb amputations who were less disturbed in goal attainment and had a greater tendency to use FGA as an adaptive self-regulatory mode experienced lower negative affect on admission to rehabilitation.

Table 4.6. Summary of hierarchical regression analyses predicting positive and negative affect at Time 1

Variable	Positive affect				Negative affect			
	B	*SE B*	*β*	*ΔR²*	*B*	*SE B*	*β*	*ΔR²*
Step 1				-				.177***
Age	-	-	-		-0.01	0.01	-0.09	
Gender	-	-	-		0.23	0.19	0.12	
Cause of amputation	-	-	-		-0.09	0.26	-0.05	
Pain intensity	-	-	-		0.05	0.03	0.16	
Step 2				.061*				.038
Optimism	0.23	0.27	0.09		-0.03	0.03	-0.12	
Perceived social support	-0.82	2.51	-0.03		-0.05	0.25	-0.02	
Step 3				.108**				.088*
Goal disturbance	2.55	4.86	0.05		1.33	0.56	0.26*	
TGP	0.28	0.11	0.28**		0.01	0.01	0.04	
FGA	0.25	0.17	0.17		-0.04	0.02	-0.23*	
		R^2 = .170, Adj. R^2 = .124				R^2 =.303, Adj. R^2 = .232		
		F(5, 92) = 3.76**				*F*(9, 88) = 4.26***		

Note: An inverse transformation was performed on perceived social support at Time 1, and scores on this variable should be reversed prior to interpretation.
* $p \leq .05$; ** $p \leq .01$; ** * $p \leq .001$

4.1.3.3 Quality of life

The results of the hierarchical regression analyses predicting the four domains of the WHOQOL-BREF are shown in Table 4.7. Cause of amputation was significantly associated with each domain, and was controlled for in Step 1, along with average pain intensity for physical QoL and gender for psychological QoL (see Tables 4.2 and 4.3). The final models successfully accounted for between 26% and 38% of the variance in the different domains of QoL. All steps contributed significantly to the prediction of each outcome, with the exception of Step 3 for environmental QoL, providing partial support for Hypothesis 1(d).

Goal disturbance emerged as a significant predictor in the model predicting physical QoL. In accordance with the assumptions of Hypothesis 1(a), higher levels of goal disturbance were predictive of poorer QoL in this domain at Time 1. Five significant predictors emerged for psychological QoL. Having a chronic amputation etiology, higher levels of optimism, greater perceived social support, lower goal disturbance, and engaging in greater use of FGA were all predictive of a more favourable outcome in this domain, providing support for Hypotheses 1(a) and 1(c). . Higher scores on the social relations domain of the WHOQOL-BREF were significantly predicted by higher levels of optimism, greater perceived social support, and greater use of FGA, supporting Hypothesis 1(c). Finally, higher environmental QoL was significantly predicted by having a chronic amputation etiology, a more optimistic disposition, and greater perceived social support.

Table 4.7. Summary of hierarchical regression analyses predicting QoL at Time 1

Variable	Physical				Psychological				Social relations				Environment			
	B	*SE B*	*β*	ΔR^2	*B*	*SE B*	*β*	ΔR^2	*B*	*SE B*	*β*	ΔR^2	*B*	*SE B*	*β*	ΔR^2
Step 1				.141***				.129***				.097**				.088**
Gender	-	-	-		-0.61	0.54	-0.10		-	-	-		-	-	-	
Cause of amputation	-0.69	0.64	-0.12		-0.70	0.64	-0.11*		-0.69	0.62	-0.12		-1.55	0.63	-0.28*	
Pain intensity	-0.06	0.09	-0.07		-	-	-		-	-	-		-	-	-	
Step 2				.062*				.165***				.250***				.195***
Optimism	0.13	0.07	0.17		0.16	0.08	0.20*		0.14	0.07	0.18*		0.26	0.07	0.35***	
Perceived social support	-0.21	0.69	-0.03		-1.57	0.71	-0.18*		-3.19	0.68	-0.39***		-1.76	0.69	-0.23*	
Step 3				.123**				.134***				.064*				.018
Goal disturbance	-5.42	1.52	-0.37***		-3.44	1.60	-0.21*		-2.80	1.50	-0.18		-1.25	1.53	-0.09	
TGP	0.01	0.03	0.04		0.06	0.03	0.19†		0.00	0.03	0.00		0.04	0.03	0.12	
FGA	0.05	0.05	0.11		0.11	0.05	0.23*		0.10	0.05	0.20*		-0.02	0.05	-0.04	
				R^2 = .326, Adj. R^2 = .273				R^2 = .428, Adj. R^2 = .383				R^2 = .411, Adj. R^2 = .372				R^2 = .302, Adj. R^2 = .255
				F(7, 90) = 6.21***				*F*(7, 90) = 9.61***				*F*(6, 91) = 10.57***				*F*(6, 91) = 6.55***

Note: An inverse transformation was performed on perceived social support at Time 1, and scores on this variable should be reversed prior to interpretation.
* $p \leq .05$; ** $p \leq .01$; ** * $p \leq .001$; † $p = .051$

4.1.3.4 Psychosocial adjustment to amputation

Table 4.8 presents the results of the hierarchical regression analyses for the psychosocial subscales of the TAPES-R. Gender and amputation cause were controlled for in the first step of the regression model predicting general adjustment (see Tables 4.2 and 4.3), which successfully explained 31% of the variance in this outcome. Each step made a significant contribution, thus providing support for Hypothesis 1(d). In accordance with Hypotheses 1(a) and 1(c), both goal disturbance and FGA were significant predictors of general adjustment, with fewer disturbances in goal attainment and endorsing FGA to a greater extent being predictive of greater general adjustment to limb loss.

Gender and average pain intensity were significantly correlated with social adjustment (see Tables 4.2 and 4.3), and were controlled for in the first step of the regression model, which accounted for 31% of the variance in this outcome overall. In support of Hypothesis 1(d), each step of the model was significant. Gender was the only significant predictor to emerge, with males tending to experience higher levels of social adjustment to amputation at Time 1.

The influence of amputation etiology was controlled for in the first step of the regression model predicting adjustment to limitations at Time 1 (see Table 4.3). The final model accounted for 26% of the variance in this outcome overall, with all steps contributing significantly, in accordance with Hypothesis 1(d). Cause of amputation, goal disturbance, and TGP emerged as significant predictors. In support of Hypotheses 1(a) and 1(c), having an amputation secondary to chronic illness, experiencing fewer disturbances in goal attainment, and using TGP to a greater extent were predictive of better adjustment to the limitations associated with lower limb loss at Time 1.

Table 4.8. Summary of hierarchical regression analyses predicting psychosocial adjustment to amputation at Time 1

Variable	General adjustment				Social Adjustment				Adjustment to limitations			
	B	*SE B*	*β*	*ΔR²*	*B*	*SE B*	*β*	*ΔR²*	*B*	*SE B*	*β*	*ΔR²*
Step 1				.119**				.172***				.052*
Gender	-0.10	0.11	-0.08		-0.29	0.11	-0.23*		-	-	-	
Cause of amputation	-0.12	0.13	-0.10		-	-	-		-0.31	0.13	-0.26*	
Pain intensity	-	-	-		-0.02	0.02	-0.11		-	-	-	
Step 2				.110**				.102**				.075*
Optimism	0.03	0.02	0.18†		0.03	0.02	0.17		0.03	0.02	0.18	
Perceived social support	-0.06	0.14	-0.04		-0.22	0.15	-0.13		0.17	0.15	0.10	
Step 3				.134***				.082*				.175***
Goal disturbance	-0.65	0.31	-0.22*		-0.41	0.30	-0.13		-0.72	0.33	-0.24*	
TGP	0.01	0.01	0.14		0.01	0.01	0.18‡		0.03	0.01	0.40***	
FGA	0.03	0.01	0.26*		0.02	0.01	0.17		-0.01	0.01	-0.11	
				R^2 = .364, Adj. R^2 = .314				R^2 = .356, Adj. R^2 = .305				R^2 = .302, Adj. R^2 = .255
				F(7, 89) = 7.27***				*F*(7, 89) = 7.03***				*F*(6, 90) = 6.48***

Note: An inverse transformation was performed on perceived social support at Time 1, and scores on this variable should be reversed prior to interpretation.

* $p \leq .05$; ** $p \leq .01$; ** * $p \leq .001$; † $p = .057$; ‡ $p = .058$

4.1.3.5 Depressive symptomatology

A summary of findings from the regression analysis predicting depressive symptoms is provided in Table 4.9. Age, gender, and cause of amputation were significantly associated with this outcome (see Tables 4.2 and 4.3), and were controlled for in Step 1 of the analysis. The full model successfully accounted for 34% of the variance in depression, with all three steps contributing significantly to the prediction of depressive symptoms, providing support for Hypothesis 1(d). Optimism, goal disturbance, and FGA were significant predictors of depressive symptomatology. In keeping with Hypotheses 1(a) and 1(c), having a more optimistic disposition, experiencing lower levels of goal disturbance, and endorsing FGA as a self-regulatory strategy to a greater extent were all predictive of experiencing fewer depressive symptoms at Time 1.

Table 4.9. Summary of hierarchical regression analysis predicting depressive symptomatology at Time 1

Variable	*B*	*SE B*	*β*	*ΔR²*
Step 1				.119**
Age	-0.02	0.01	-0.19	
Gender	0.21	0.33	0.06	
Cause of amputation	-0.39	0.46	-0.11	
Step 2				.132***
Optimism	-0.11	0.05	-0.21*	
Perceived social support	0.54	0.43	0.11	
Step 3				.143***
Goal disturbance	3.03	0.98	0.32**	
TGP	-0.02	0.02	-0.08	
FGA	-0.07	0.03	-0.24*	
			R^2 = .394, Adj. R^2 = .339	
			$F(8, 87)$ = 7.08***	

Note: An inverse transformation was performed on perceived social support at Time 1, and scores on this variable should be reversed prior to interpretation.
* $p \leq .05$; ** $p \leq .01$; ** * $p \leq .001$

4.2 Results for Objective 2

Objective 2: To investigate the effects of interactions between TGP/FGA and goal disturbance, pain intensity, and age on psychosocial outcomes at Time 1

A series of hierarchical regression analyses were conducted to examine whether TGP or FGA moderated the influence of goal disturbance, pain intensity, or age on psychosocial outcomes. The significant interaction effects that were observed are detailed in the following sections.

4.2.1 Interactions between goal disturbance and TGP/FGA

The effect of the two-way interaction between goal disturbance and TGP was non-significant for all outcomes except adjustment to limitations (see Table 4.10). The interaction term explained an additional 4% of the variance in this outcome, over and above the 23% accounted for by the first-order effects of goal disturbance and TGP.

Table 4.10. Summary of moderated regression analysis predicting interactive effects of goal disturbance and TGP on adjustment to limitations at Time 1

	B	*SE B*	*β*	*ΔR²*
Step 1				.230***
Goal disturbance	-0.14	0.04	-0.30***	
TGP	0.17	0.04	0.35***	
Step 2				.043*
Goal disturbance x TGP	-0.09	0.04	-0.21*	
				R^2 = .273, Adj. R^2 = .249
				F(3, 93) = 11.62***

* $p \leq .05$; ** $p \leq .01$; ** * $p \leq .001$

The moderating effects of TGP on the relationship between goal disturbance and adjustment to limitations were plotted, as shown in Figure 4.1. The interaction plot suggests that greater use of TGP as an adaptive self-regulatory mode had a beneficial impact on adjustment to limitations at Time 1, although this effect diminished at higher levels of goal disturbance.

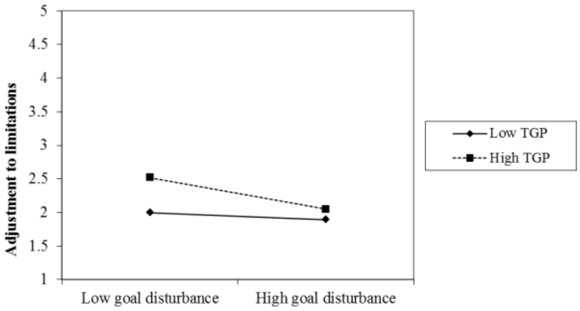

Figure 4.1. Plot of the effects of the interaction between goal disturbance (± 1 *SD*) and TGP (± 1 *SD*) on adjustment to limitations at Time 1

The effect of the interaction between goal disturbance and FGA was non-significant for all psychosocial outcomes examined at Time 1, contrary to Hypothesis 2(a). Overall, these findings suggest that the use of TGP and FGA as adaptive self-regulatory strategies does not significantly mitigate the impact of goal disturbance on psychosocial outcomes among persons with lower limb amputations on admission to rehabilitation.

4.2.2 Interactions between pain intensity and TGP, FGA

The effect of the interaction between pain intensity and TGP was only significant in the case of adjustment to limitations (see Table 4.11). The interaction term accounted for

9% of the variance in this outcome, in addition to the 15% explained by the first-order effects of pain intensity and TGP.

Table 4.11. Summary of moderated regression analysis predicting interactive effects of pain intensity and TGP on adjustment to limitations at Time 1

	B	*SE B*	*β*	*ΔR²*
Step 1				.151***
Pain intensity	-0.11	0.05	-0.22*	
TGP	0.13	0.05	0.27**	
Step 2				.089***
Pain intensity x TGP	-0.16	0.05	-0.31***	
				R^2 = .239, Adj. R^2 = .215
				F(3, 93) = 9.76

* $p \leq .05$; ** $p \leq .01$; ** * $p \leq .001$

A plot of the interaction effect revealed that higher levels of TGP enhanced adjustment to the limitations associated with limb loss at Time 1, but only at lower levels of pain intensity (see Figure 4.2).

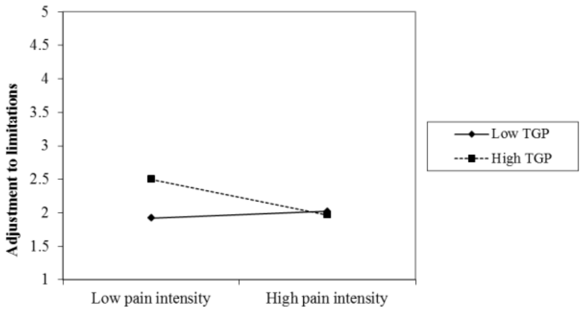

Figure 4.2. Plot of the effects of the interaction between pain intensity (± 1 *SD*) and TGP (± 1 *SD*) on adjustment to limitations at Time 1

The effect of the two-way interaction between pain intensity and FGA was significant for both negative affect and adjustment to limitations at Time 1. The interaction term accounted for 7% of the variance in negative affect, in addition to the 21% explained by the conditional effects of pain intensity and FGA (see Table 4.12). Figure 4.3 displays a plot of the interaction, which shows that lower levels of FGA were associated with higher negative affect, particularly at higher levels of pain intensity.

Table 4.12. Summary of moderated regression analysis predicting interactive effects of pain intensity and FGA on psychosocial outcomes at Time 1

Variable	Negative affect				Adjustment to limitations			
	B	*SE B*	*β*	*ΔR²*	*B*	*SE B*	*β*	*ΔR²*
Step 1				.206***				.068*
Pain intensity	0.17	0.07	0.22*		-0.08	0.05	-0.16	
FGA	-0.26	0.07	-0.33***		0.10	0.05	0.20	
Step 2				.071**				.071**
Pain intensity x FGA	-0.24	0.08	-0.27**		-0.15	0.05	-0.27**	
			R^2 = .277, Adj. R^2 = .254				R^2 = .138, Adj. R^2 = .110	
			F(3, 94) = 11.99***				*F*(3, 93) = 4.97	

* $p \leq .05$; ** $p \leq .01$; ** * $p \leq .001$

The pain intensity x FGA interaction term accounted for 7% of the variance in adjustment to limitations at Time 1 (see Table 4.12). A plot of the interaction revealed that greater accommodative flexibility enhanced adjustment to the limitations associated with limb loss, but only at lower levels of pain intensity, providing partial support for Hypothesis 2(b) (see Figure 4.3).

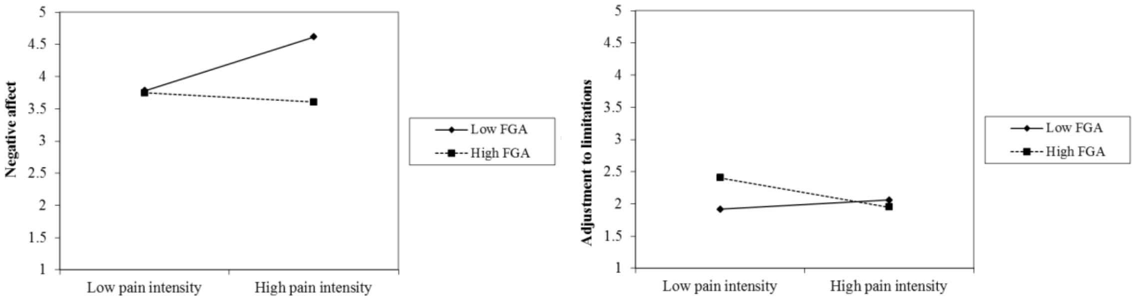

Figure 4.3. Plot of the effects of the interaction between pain intensity (± 1 *SD*) and FGA (± 1 *SD*) on negative affect and adjustment to limitations at Time 1

4.2.3 Interactions between age and TGP/FGA

The moderating effect of TGP on the relationship between age and psychosocial outcomes at Time 1 was non-significant. The effect of the interaction between FGA and age was significant for participation, general adjustment, and social adjustment, however (see Table 4.13). Five percent of the variance in participation was accounted for by the age x FGA interaction term, with the conditional effects of age and FGA explaining a further 6% of the variance. Plots of the interaction revealed that, in accordance with Hypothesis 2(c), greater use of FGA as an adaptive self-regulatory mode was predictive of greater participation at a younger age (see Figure 4.4).

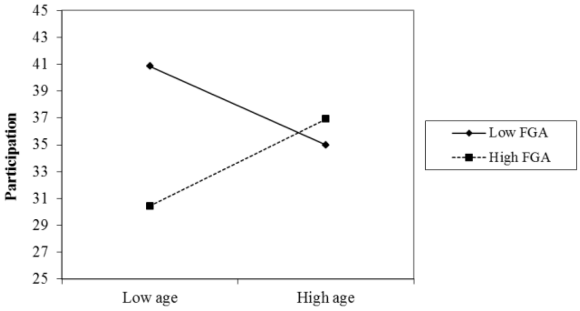

Figure 4.4. Plot of the effects of the interaction between age (± 1 *SD*) and FGA (± 1 *SD*) on participation at Time 1

The interaction between age and FGA was also significant for general and social adjustment, accounting for an additional 3% and 6% of the variance in these outcomes, respectively (see Table 4.13). Figure 4.5 displays the plots of these interactions, and shows that greater accommodative flexibility was protective against poorer general and social adjustment to amputation, particularly among younger participants, in keeping with the assumptions of Hypothesis 2(c).

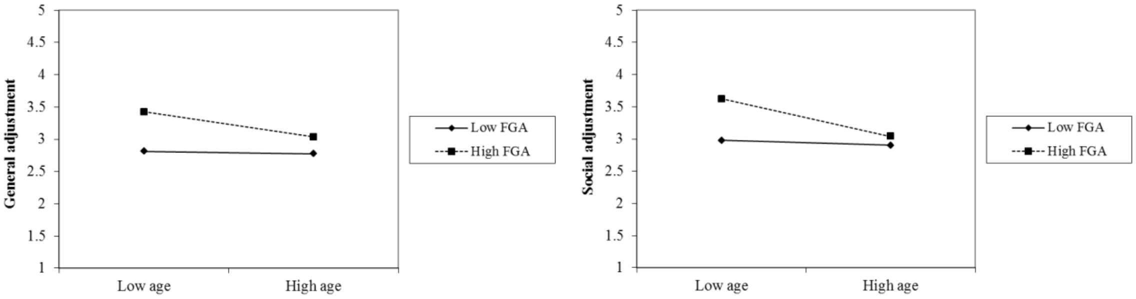

Figure 4.5. Plot of the effects of the interaction between age (± 1 *SD*) and FGA (± 1 *SD*) on general and social adjustment at Time 1

Table 4.13. Summary of moderated regression analyses predicting interactive effects of age and FGA on participation, general adjustment, and social adjustment at Time 1

Variable	Participation				General adjustment				Social adjustment			
	B	*SE B*	β	ΔR^2	*B*	*SE B*	β	ΔR^2	*B*	*SE B*	β	ΔR^2
Step 1				.064*				0.264***				.230***
Age	0.16	1.50	0.01		-0.11	0.05	-0.22*		-0.17	0.05	-0.33***	
FGA	-2.13	1.48	-0.15		0.22	0.05	0.46***		0.20	0.05	0.39***	
Step 2				.047*				.034*				.061**
Age x FGA	3.09	1.38	0.25*		-0.09	0.04	-0.21*		-0.13	0.04	-0.29**	
				$R^2 = .112$, Adj. $R^2 = .083$				$R^2 = .298$, Adj. $R^2 = .275$				$R^2 = .291$, Adj. $R^2 = .268$
				$F(3, 94) = 3.94$*				$F(3, 93) = 13.14$***				$F(3, 93) = 12.73$***

* $p \leq .05$; ** $p \leq .01$; ** * $p \leq .001$

4.2.4 Interactions between TGP and FGA

The effect of the interaction between TGP and FGA on psychosocial outcomes at Time 1 was explored, and was found to be significant for both negative affect and adjustment to limitations, accounting for 3% and 8% of the variance in these outcomes, respectively (see Table 4.14).

Table 4.14. Summary of moderated regression analyses predicting interactive effects of TGP and FGA on negative affect and adjustment to limitations at Time 1

Variable	Negative affect				Adjustment to limitations			
	B	*SE B*	*β*	*ΔR²*	*B*	*SE B*	*β*	*ΔR²*
Step 1				.161***				.130***
TGP	0.01	0.08	0.01		0.13	0.05	0.26**	
FGA	-0.32	0.08	-0.40***		0.06	0.05	0.12	
Step 2				.034*				.080**
TGP x FGA	0.11	0.06	0.19*		0.10	0.03	0.29**	
				R^2 = .195, Adj. R^2 = .169				R^2 = .210, Adj. R^2 = .184
				F(3, 94) = 7.60				*F*(3, 93) = 8.24

* $p \leq .05$; ** $p \leq .01$; ** * $p \leq .001$

Plots of the interactions revealed that lower levels of TGP combined with higher levels of FGA had the greatest protective influence against negative affect among individuals with lower limb amputations at Time 1, as predicted in Hypothesis 2(d) (see Figure 4.6). In support of Hypothesis 2(e), higher levels of both TGP and FGA were associated with better adjustment to limitations at this time point (see Figure 4.6).

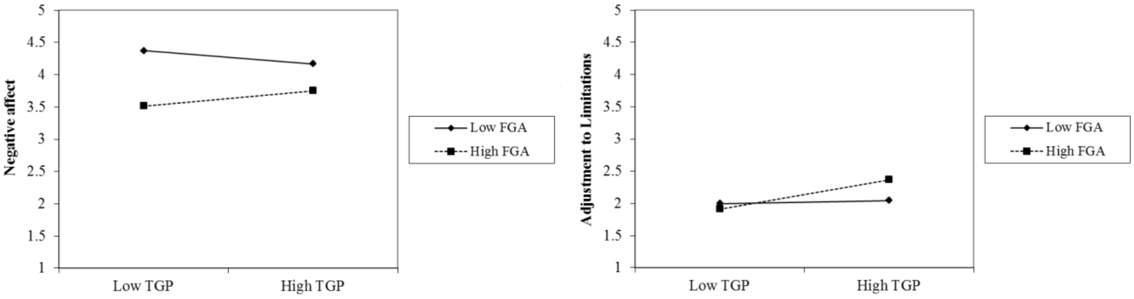

Figure 4.6. Plot of the effects of the interaction between TGP (± 1 *SD*) and FGA (± 1 *SD*) on negative affect and adjustment to limitations at Time 1

4.2.5 Three-way interaction between pain intensity, TGP, and FGA

Exploratory moderated regression analyses were conducted to examine the effects of a three-way interaction between pain intensity, TGP, and FGA on negative affect and adjustment to limitations at Time 1. The conditional effects of pain intensity, TGP and FGA were entered in the first step, followed by the three two-way interactions between these variables in the second step. The three-way interaction term was then entered in the third step. The effect of the three-way interaction on negative affect was non-significant. Its effect on adjustment to limitations approached significance (p = .053), however, accounting for an additional 3% of the variance along with the 15% explained by the conditional effects and the 13% accounted for by the two-way interactions (see Table 4.15).

Table 4.15. Summary of moderated regression analyses predicting interactive effects of pain intensity, TGP, and FGA on adjustment to limitations at Time 1

	B	*SE B*	*β*	*ΔR²*
Step 1				.154***
Pain intensity	-0.07	0.05	-0.15	
TGP	0.08	0.05	0.16	
FGA	0.03	0.05	0.07	
Step 2				.131**
Pain intensity x TGP	-0.08	0.05	-0.16	
Pain intensity x FGA	-0.09	0.05	-0.16	
TGP x FGA	0.04	0.04	0.11	
Step 3				.029†
Pain intensity x TGP x FGA	-0.08	0.04	-0.22†	
				R^2 = .315, Adj. R^2 = .261
				F(7, 89) = 5.85***

* *p* ≤ .05; ** *p* ≤ .01; ** * *p* ≤ .001; † = .053

A plot of the three-way interaction effect revealed that at lower levels of pain intensity, adjustment to limitations was highest when both TGP and FGA were used to a greater extent (see Figure 4.7).

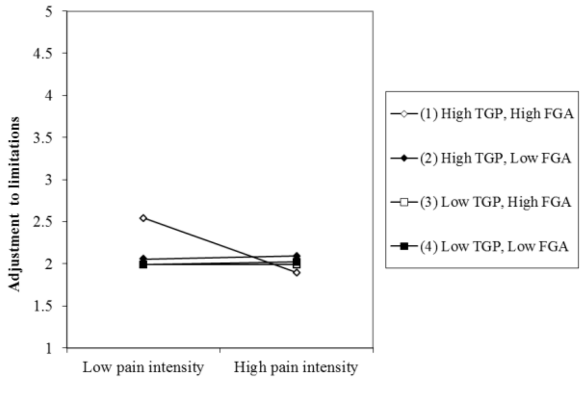

Figure 4.7. Plot of the effects of the three-way interaction between pain intensity (+/- 1 *SD*), TGP (± 1 *SD*) and FGA (± 1 *SD*) on adjustment to limitations at Time 1

4.3 Summary of findings

The first objective of the study was to investigate whether psychosocial outcomes were associated with goal disturbance, TGP, and FGA cross-sectionally on admission to rehabilitation. These relationships were firstly examined at a bivariate level using Pearson correlations. In support of Hypothesis 1(a), disturbance in the attainment of valued goals was related to poorer psychosocial outcomes at Time 1, showing positive associations with restrictions in participation, negative affect and depressive symptoms, and negative associations with QoL in each domain and all three psychosocial subscales of the TAPES-R. Goal disturbance was not related to positive affect at this time point, as predicted in Hypothesis 1(a).

TGP and FGA were also significantly correlated with many of the psychosocial outcomes assessed at Time 1. In accordance with Hypothesis 1(b), greater use of assimilative tenacity as a self-regulatory mode on admission to rehabilitation was associated with greater positive affect, higher psychological QoL, better psychosocial adjustment to lower limb amputation, and fewer symptoms of depression, although its relationships with participation and QoL in the physical, social, and environmental domains were non-significant. Greater accommodative flexibility was also significantly associated with enhanced psychosocial outcomes on admission to rehabilitation, including fewer restrictions in participation, higher positive affect, lower negative affect, greater QoL in all four domains assessed, better psychosocial adjustment to limb loss, and fewer symptoms of depression, providing support for Hypothesis 1(c).

A series of hierarchical regression analyses were carried out to examine the influence of self-regulatory constructs on psychosocial outcomes at Time 1. Any sociodemographic and/or clinical factors that were significantly associated with the psychosocial outcome being examined were controlled for in the first step. Their addition contributed between 5% (adjustment to limitations) and 18% (negative affect) to the variance accounted for in the psychosocial outcomes assessed. Cause of amputation emerged as a significant predictor of adjustment to limitations and QoL in the psychological and environment domains, with acute causes of amputation being associated with poorer outcomes. Gender was a significant predictor of psychological QoL and social adjustment, with females having poorer outcomes than males.

Optimism and perceived social support, which are both established psychosocial predictors of psychosocial outcomes following lower limb amputation, were entered in the second step of the regression. Step 2 contributed significantly to the explanation of all psychosocial outcomes except negative affect, with optimism and perceived social support together accounting for between 6% (participation, positive affect) and 25% (social relationships domain of QoL) of the variance accounted for. Optimism was a significant predictor of depressive symptoms and QoL in the psychological, social relationships and environment domains, with greater optimism being associated with more positive outcomes. Higher levels of perceived social support independently predicted enhanced QoL in the psychological, social relationships and environment domains.

Goal disturbance, TGP, and FGA were entered in the third and final step, and contributed significantly to the explanation of all psychosocial outcomes assessed at Time 1, as predicted in Hypothesis 1(d), with the exception of environmental QoL. Together, the goal-related constructs explained between 6% (social relations domain of quality of life) and 18% (adjustment to limitations) of unique variance in psychosocial outcomes once sociodemographic/clinical factors, optimism, and perceived social support had been controlled for. Goal disturbance was an independent predictor of participation, negative affect, the physical and psychological domains of QoL, general adjustment to amputation, adjustment to limitations, and depressive symptomatology, providing further evidence in support of Hypothesis 1(a). In addition, TGP emerged as an independent predictor of positive affect and adjustment to limitations, while FGA was a significant predictor of negative affect, psychological and social QoL, general adjustment to amputation, and symptoms of depression, offering strong support for Hypotheses 1(b) and 1(c).

The second objective of the study was to investigate the moderating effects of TGP and FGA on the relationships between psychosocial outcomes and goal disturbance, pain intensity, and age at Time 1. A series of moderated regression analyses revealed that contrary to Hypothesis 2(a), FGA did not buffer against the negative impact of goal disturbance on psychosocial outcomes on admission to rehabilitation. The moderating effect of TGP on the relationship between goal disturbance and adjustment to limitations was significant, however. Greater assimilative tenacity appeared to enhance adjustment to limitations, with this effect diminishing at higher levels of goal disturbance. TGP also had a moderating effect on the relationship between pain intensity and adjustment to limitations, with greater use of this adaptive self-regulatory mode enhancing adjustment to limitations at lower levels of pain intensity.

In accordance with Hypothesis 2(b), FGA moderated the effect of pain intensity on both negative affect and adjustment to limitations at the first study time point. Greater accommodative flexibility buffered against negative affect, particularly at higher levels of pain intensity, and had a beneficial impact on adjustment to limitations at lower levels of pain intensity. FGA also acted as a moderator in the relationship between age and participation. In keeping with Hypothesis 2(c), higher levels of FGA buffered against restrictions in participation and had an enhancing influence on both general and social adjustment to amputation among younger participants.

Further moderated regression analyses were carried out to explore how TGP and FGA interacted with each other in their associations with psychosocial outcomes at Time 1. A significant interaction was observed between the two adaptive self-regulatory modes for negative affect. As predicted in Hypothesis 2(d), the buffering effect of FGA on negative affect was strongest when assimilative tenacity was lower. The effect of the interaction between TGP and FGA was also significant for adjustment to limitations. In accordance with Hypothesis 2(e), it appeared that the beneficial impact of accommodative flexibility on adjustment to limitations was highest when levels of TGP were also high.

Given the significant interactions observed for adjustment to limitations, an exploratory examination of the three-way interaction between pain intensity, TGP, and FGA was conducted for this outcome. It was found that adjustment to limitations was greatest when the use of both self-regulatory modes was high, but only at lower levels of pain intensity.

4.4 Discussion

4.4.1 Goal disturbance

The significant physical, social and psychological upheaval experienced following amputation is likely to cause significant disruptions in the attainment of valued goals. According to various theories of self-regulation, discrepancies between perceived and desired goal attainment have a detrimental impact on emotional well-being (Brandstädter & Renner, 1990; Carver & Scheier, 1999). In keeping with this assumption, the present study found that higher goal disturbance had a negative influence on indicators of psychosocial adjustment among persons with lower limb amputations on admission to rehabilitation. Indeed, greater disturbance in goal attainment has consistently been associated with poorer psychosocial outcomes among persons with chronic illness and disability (Boersma, Maes, & Joekes, 2005; Boersma, Maes, & van Elderen, 2005; Echteld et al., 2003; Joekes et al., 2005; Kuijer & De Ridder, 2003; Offerman et al., 2010; Rapkin et al., 1994; Schwartz & Drotar, 2009; van der Veek et al., 2007). This is an important finding that highlights the potential value of assessing patients’ goals during rehabilitation, which may help to identify any areas they are experiencing difficulties in that may not have been considered by the rehabilitation team. In addition, the implementation of interventions such as MIM (Ylvisaker et al., 2008), which are targeted towards reducing such discrepancies between perceived and desired goal attainment, may serve to enhance psychosocial adjustment in this patient group.

The non-significant relationship observed between goal disturbance and positive affect in the present study is also in line with previous research (Echteld et al., 2001; Van Der Veek et al., 2009). In contrast, Affleck and colleagues (1998) found that greater perceived progress towards goal attainment was significantly associated with positive mood but unrelated to negative mood among 50 women with fibromyalgia. These observations are in keeping with the cybernetic model of self-regulation theory, which posits that negative affect is experienced when progress towards goal attainment is slower than desired, whereas positive affect results when goal progress is faster than anticipated (Carver & Scheier, 1998). This suggests that positive and negative affect result from two separate processes, with positive affect relating to goal attainment and negative affect relating to goal non-attainment (Affleck et al., 1998; Echteld et al., 2003). The lack of association consistently observed between goal disturbance and positive outcomes may thus be due to the use of negatively valenced measures that focus exclusively on difficulties experienced in goal attainment. In future research, assessments of both goal progress and goal disturbance should be included so as to clarify their relationships with positive and negative affect.

4.4.2 TGP and FGA

Both TGP and FGA were significantly related to enhanced psychosocial outcomes among persons with lower limb amputations on admission to rehabilitation. This finding is in keeping with previous studies of adjustment to acquired physical impairment, in which both adaptive self-regulatory modes have been implicated (Boerner, 2004; Darlington et al., 2007; Darlington et al., 2009; Heyl et al., 2007; van Lankveld et al., 2011). According to the dual-process model, although TGP and FGA stand in antagonistic relation, they can synergistically complement each other during concrete coping episodes in which multiple adaptive problems are faced that require different responses (Brandstädter, 2009). The results of the present study appear to demonstrate this complementary relationship. Further evidence for the synergistic nature of their relationship was provided by the observation that the two modes were positively correlated at Time 1 (see Table 4.4), indicating that individuals who were tenacious in their pursuit of goals were also more inclined to flexibly adjust their goals where appropriate.

Contrasting patterns of associations were observed for the two modes of adaptive self-regulation, however, with both predicting different psychosocial outcomes at Time 1, as was most apparent in the case of positive and negative affect. Whereas assimilative tenacity was the only significant predictor of positive affect to emerge, accommodative flexibility was predictive of both negative affect and depressive symptoms. Heyl and colleagues (2007) observed a similar pattern of relationships in their study of adaptive self-regulation among 751 older adults with age-related visual decline. Together, these findings suggest that TGP and FGA operate through diverse yet complementary mechanisms to enhance psychosocial adjustment to lower limb amputation, with assimilative tenacity bolstering positive affect and accommodative flexibility protecting against negative affect.

According to the dual-process model, accommodative flexibility becomes of increasing importance in situations of irreversible loss (Brandstädter, 2009). This assumption is reflected in the finding that FGA was significantly predictive of a greater number of psychosocial outcomes at Time 1 than TGP. Indeed, this mode of adaptive self-regulation has consistently been found to offer greater explanatory power in predicting psychosocial outcomes among individuals with acquired physical impairment (Boerner, 2004; Darlington et al., 2007; Darlington et al., 2009; van Lankveld et al., 2011), with the exception of positive affect (Heyl et al., 2007).

4.4.3 Sociodemographic and clinical factors

The only sociodemographic and clinical factors significantly associated with psychosocial outcomes at Time 1 were age, gender, cause of amputation, and pain intensity, with individuals who were older, male, had an amputation secondary to chronic causes, and experienced a lower average intensity of amputation-related pain tending to have more positive outcomes.

Younger age was significantly associated with the experience of greater negative affect and depressive symptoms on admission to rehabilitation at a bivariate level, but did not emerge as a significant predictor of these outcomes. Where age effects have been observed in the literature on psychosocial adjustment to amputation, they tend to favour older individuals, with younger persons experiencing greater difficulty in coming to terms with the loss of a limb (Asano et al., 2008; Dunn, 1996; Horgan & MacLachlan, 2004; Phelps et al., 2008; Williamson et al., 1994). Some authors contend that older adults may not react as strongly to the impact of amputation, as they view changes in mobility and independence as normative for their age (Horgan & MacLachlan, 2004; Rybarczyk et al., 1997), a position which corresponds with the assumptions of the dual-process model and other life-span theories of development (Baltes & Baltes, 1990; Brandstädter & Renner, 1990; Heckhausen & Schulz, 1995).

Gender emerged as a significant predictor of psychological QoL and social adjustment, with women having significantly poorer outcomes on this variable. This is consistent with the literature on psychosocial adjustment to amputation, where any gender differences observed have tended to favour males (Horgan & MacLachlan, 2004; Kashani, 1983; Pezzin et al., 2000; Phelps et al., 2008; Pucher et al., 1999). With regard to social adjustment, this variable taps into aspects of body image and public self-consciousness, which appear to be of greater significance to females (Furst & Humphrey, 1983; Murray & Fox, 2002; Murray, 2010).

Cause of amputation has not been a consistent predictor of psychosocial adjustment in the literature (Horgan & MacLachlan, 2004; Kratz et al., 2010). In the present study, however, having an acute amputation etiology independently predicted lower QoL in the psychological and environment domains, and poorer adjustment to limitations. This finding may be explained by the fact that individuals with chronic causes are likely to have experienced greater disability prior to their amputation and may thus have had more time to adapt to the physical limitations associated with limb loss. The average intensity of amputation-related pain experienced has been related to poorer psychosocial outcomes in previous research on individuals with amputations (Jensen et al., 2002; A. Whyte & Carroll, 2004). In the present study, although higher average pain intensity was associated with greater negative affect as well as poorer physical QoL and social adjustment at Time 1, it did not emerge as an independent predictor in the hierarchical regression analyses.

4.4.4 Optimism and perceived social support

Optimism and perceived social support together accounted for a significant amount of the variance in psychosocial outcomes among individuals with lower limb amputation on admission to rehabilitation, with the exception of negative affect. Optimism was a significant predictor of the psychological, social and environmental domains of QoL, as well as depressive symptomatology. These findings are consistent with a study of 138 individuals with amputations carried out by Dunn (1996), which also found that higher levels of dispositional optimism were predictive of fewer symptoms of depression in this population, as well as research carried out in other patient groups (Bjorck, Hopp, & Jones, 1999; Carver & Gaines, 1987; Ironson et al., 2005). Optimism has previously been associated with QoL in a variety of patient populations (Allison et al., 2000; Fitzgerald, Tennen, Affleck, & Pransky, 1993; Schou, Ekeberg, & Ruland, 2005). Perceived social support was also independently predictive of QoL in the psychological, social relationships and environment domains. Asano and colleagues (2008) similarly found that perceived social support was a significant predictor of QoL in a sample of 415 persons with lower limb amputations.

Optimism was positively correlated with both TGP and FGA at Time 1, which is in line with previous research on the dual-process model (Brandstädter & Renner, 1990). This finding suggests that individuals who are optimistic by disposition are more likely to engage in both assimilative and accommodative modes of self-regulation, which may serve a particular advantage following a significant life event such as amputation, where both changeable and unchangeable stressors are encountered. This interpretation is supported by the findings of an experimental study carried out by Aspinwall and Richter (1999), in which participants with higher dispositional optimism were quicker to disengage from unsolvable tasks and engage in alternative solvable tasks, and to allocate more effort in solving these tasks than their less optimistic counterparts. Furthermore, a recent meta-analysis found that optimism predicted greater use of problem-focused coping in situations involving controllable stressors, and greater emotion-focused coping in response to uncontrollable stressors (Nes & Segerstrom, 2006). Optimism, therefore, appears to predict active attempts to both change and accommodate to stressful situations, in ways that reflect TGP and FGA (Carver et al., 2010).

4.4.5 Moderating effects of TGP and FGA on psychosocial outcomes

Moderated regression analyses were conducted to explore how TGP and FGA interacted with other variables to enhance psychosocial adjustment among persons with lower limb amputations on admission to rehabilitation. TGP and FGA appeared to operate independently of goal disturbance in their influence on psychosocial outcomes for the most part. These findings contrast with an earlier study of 890 participants from the general population, in which negative associations between perceived distance from a range of different life goals and life satisfaction were significantly less pronounced at higher levels of accommodative flexibility (Brandstädter & Renner, 1990). A significant interaction was observed between goal disturbance and TGP for adjustment to limitations, however, with greater use of TGP mitigating the impact of goal disturbance on adjustment to limitations, particularly at lower levels of goal disturbance. Given that higher TGP was a strong independent predictor of better adjustment to limitations, perhaps being more disposed towards overcoming obstacles and continuing to strive towards valued goals gave individuals more confidence that they would be able to overcome the limitations associated with limb loss, particularly when they were not currently experiencing significant disruptions in goal attainment.

The lack of significant interactions observed may be due to the operationalization of goal disturbance in the present study. The GFI (Maes et al., 2002) presents respondents with a list of 26 pre-selected higher-order goals, which although broad in scope, may not align completely with patients' own aspirations. In future research, it would be interesting to explore whether the moderating effects of TGP and FGA on psychosocial outcomes in this population are stronger when an idiographic measure of goals such as personal projects analysis (PPA: Little, 1983) is used, which allows respondents to elicit their own valued goals. Alternatively, the lack of interaction may be due to the negative valence of GFI items, which focus on goal failure rather than goal attainment. Indeed, previous research has observed significant associations between goal disturbance assessed using this measure and maladaptive coping strategies such as self-blame, rumination, and catastrophising (Schroevers, Kraaij, & Garnefski, 2007; Van Der Veek et al., 2009), which indicate a continued commitment towards barren goals without efforts to move forward. Perhaps as TGP and FGA are adaptive responses, they may interact more closely with positively valenced measures of goal progress. These observations highlight a significant limitation of the dual-process model, which fails to integrate goals into its framework, even though the negative impact of goal discrepancies on subjective well-being is recognised in this approach. Without a sufficient description of goals and how they are connected to TGP and FGA, it is difficult to examine their inter-relationships and associations with psychosocial outcomes (Steverink, Lindenberg, & Ormel, 1998).

Previous studies of individuals with chronic pain found that FGA, but not TGP, moderated the relationship between pain intensity and psychosocial outcomes (Kranz et al., 2010; Schmitz et al., 1996). For example, Schmitz and colleagues (1996) found that FGA moderated the relationship between pain intensity and depressive symptomatology in a sample of 120 chronic pain patients. In keeping with these findings, the interaction between pain intensity and FGA was significant for negative affect, such that individuals with lower pain intensity and higher FGA experienced the least negative affect following amputation. The negative impact of pain intensity on adjustment to limitations was moderated by both TGP and FGA in the present study, however, with greater use of each mode being associated with better adjustment to limitations, although only at lower levels of pain intensity. The effect of the three-way interaction between pain intensity, TGP, and FGA on this outcome, which approached significance ($p = .053$), appeared to corroborate this association, with adjustment to limitations being highest at lower levels of pain intensity when both TGP and FGA were used to a greater extent. Previous research on chronic pain and adaptive self-regulation focused exclusively on negative indicators of adjustment such as depressive symptomatology, with FGA playing a more significant moderating role (Schmitz et al., 1996). The findings of the present study suggest that TGP may also be important in mitigating the negative influence of pain on psychosocial outcomes when taking positive indicators of adjustment into consideration.

The dual-process model contends that as people age, they rely increasingly on accommodative flexibility to cope with their growing limitations in resources and employ assimilative tenacity to a lesser extent (Brandstädter & Renner, 1990; Brandstädter, 2006). This transition may occur at an earlier age in situations of severe and irreversible loss, however, as individuals must adapt to permanent changes in resources similar to those encountered normatively in old age (Brandstädter, 2009). This assumption was supported in the present study by the finding that the beneficial impact of FGA on participation, general adjustment, and social adjustment was strongest for younger participants. These results suggest that the accommodative mode of adaptive self-regulation may have a particularly important role to play in enhancing adjustment outcomes among younger individuals facing chronic impairment, as previously observed in a sample of adults with age-related vision loss (Boerner, 2004).

Significant interaction effects were also observed between TGP and FGA for negative affect and adjustment to limitations. In the case of negative affect, accommodative flexibility was a stronger buffer against this outcome when levels of assimilative tenacity were lower, whereas adjustment to limitations was highest when both adaptive self-regulatory modes were used to a greater extent. These finding are in keeping with previous research (Heyl et al., 2007), and provide further evidence that TGP and FGA operate in synchronicity to enhance psychosocial outcomes in episodes of concrete coping, with assimilative tenacity promoting positive adjustment and accommodative flexibility buffering against negative outcomes.

4.4.6 Limitations of findings

There are certain limitations that should be taken into consideration when interpreting the results for Objectives 1 and 2. Firstly, the findings were cross-sectional in nature, which precludes the inference of causality. Longitudinal associations between self-regulatory constructs and psychosocial outcomes will be examined in Chapter 6, which may shed more light on the causal direction of these relationships. Secondly, as noted in Section 3.2.3, the proportion of females who participated in the present study was significantly lower than observed among non-participants, which suggests that women may have been under-represented in the present analyses. The ratio of males to females in the present sample is comparable to previous studies of individuals with lower limb amputations, however (Atherton & Robertson, 2006; Phelps et al., 2008; J. Unwin et al., 2009), which suggests that the findings of the present study are generalizable to the wider patient population. Finally, the moderated regression analyses conducted may have been substantially underpowered, as a sample size of at least 150-200 is generally recommended for the detection of significant interaction effects (Hoyt, Leierer, &

Millington, 2006). This may explain why TGP and FGA did not appear to moderate the impact of goal disturbance, pain intensity, or age on the majority of psychosocial outcomes at Time 1 in the present study. The significant interaction effects that were observed must therefore have been quite robust, given that they were strong enough to be detected in a sample of 98 individuals. Further research is required to examine the moderating effects of TGP and FGA in a larger sample of persons with amputations. Please note that the limitations discussed in this section are specific to Objectives 1 and 2. The broader limitations of the study will be discussed in Chapter 7.

4.4.7 Conclusion

Overall, the results for Objectives 1 and 2 offer convincing evidence for the utility of the framework adopted in the present study as a means of examining the process of psychosocial adjustment to lower limb amputation. As hypothesised, goal disturbance, TGP and FGA together accounted for a significant amount of the variance in psychosocial outcomes at Time 1, even after controlling for significantly associated sociodemographic and clinical variables, optimism, and perceived social support. Differences in goal disturbance and the use of assimilative tenacity and accommodative flexibility may help to account for the diversity observed in psychosocial outcomes in this population. The broader implications of these findings will be discussed in Chapter 7.

CHAPTER 5

RESULTS OF LONGITUDINAL ANALYSES

This chapter presents the results of the analyses for Objectives 3 and 4, and provides a summary and discussion of the findings.

5.1 Results for Objective 3

Objective 3: To explore which goals are most important to persons with lower limb amputations, and which goals they are most hindered in attaining as a result of their limb loss.

Tables 5.1 and 5.2 display the mean ratings given by participants to the 26 higher-order goals that make up the GFI in terms of their importance and the amount of hindrance experienced in their attainment. A rank order for both goal importance and goal hindrance was calculated for each time point based on these mean ratings, with the top five presented in bold font.

5.1.1 Inspection of goal importance ratings

As shown in Table 5.1, *being healthy*, *keeping up my self-confidence, making my own decisions in life*, *treating others fairly*, *supporting others,* and *ensuring my own safety* were among the top five most important goals for the sample at each time point. A visual inspection of the rankings showed that although the importance of most goals remained relatively stable across the three time points, decreases in the rankings of physically-oriented goals such as *experiencing bodily pleasures*, *fulfilling my duties to others*, and *meeting a challenging standard of performance* were observed, which suggests that these goals became less important to participants across the study period. Conversely, participants appeared to attach increasing importance to self- and socially-oriented goals such as *receiving support from others, understanding the world around me*, *feeling unique* and *ensuring my safety,* which showed an increase in rankings over time.

5.1.2 Inspection of goal hindrance ratings

With regard to goal hindrance, participants rated *discovering new things* and *having daily activities run smoothly* among the top five goals they were the most hindered in attaining as a result of their limb loss at each time point (see Table 5.2). Other items that appeared in the top five at more than one time point included *experiencing bodily pleasures*, *doing things better than others*, *fulfilling my duties to others,* and *doing creative things*. An examination of the rankings from Time 1 to Time 3 indicated that goal hindrance ratings fluctuated over time for most items. Participants seemed to become increasingly hindered in the attainment of self-oriented goals such as *obtaining more money or possessions*, *doing things better than others*, *feeling like I belong here*, and *receiving support from others*. Goals that appeared to become less difficult for participants to attain over time included *making my own decisions in life, having daily activities run smoothly*, *fulfilling my duties to others*, and *supporting others*, which implies that some restoration of independence and social identity may have taken place over the study period.

Table 5.1. Mean scores and rankings for goal importance at each time point

	Time 1 (*N* = 98)		Time 2 (*N* = 74)		Time 3 (*N* = 62)	
Goal	Mean	Rank	Mean	Rank	Mean	Rank
Feeling relaxed	4.27	8	4.31	6	4.26	8
Experiencing excitement	3.47	23	3.49	22=	3.47	23
Having fun	4.04	15=	4.01	16	3.95	15
Experiencing bodily pleasures	3.52	21	3.49	22=	3.42	24
Being healthy	**4.65**	**1**	**4.64**	**1**	**4.50**	**2**
Discovering new things	3.76	17	3.86	17	3.89	17
Understanding the world around me	4.04	15=	4.18	12=	4.16	10
Coming up with new ideas	3.58	20	3.70	20	3.74	20
Keeping up my self-confidence	**4.50**	**2**	**4.43**	**4**	**4.45**	**3**
Feeling like I belong here	4.28	7	4.24	9	4.27	7
Reaching a higher level of consciousness	3.68	19	3.59	21	3.87	18
Feeling unique	3.00	25	3.47	24	3.56	22
Discovering who I truly am	3.71	18	3.76	18	3.81	19
Making my own decisions in life	**4.45**	**4**	**4.36**	**5**	**4.35**	**5**
Doing things better than others	3.11	24	3.35	25	3.37	25
Receiving support from others	4.06	14	4.14	14	4.23	9
Feeling connected to the people around me	4.20	10=	4.30	7	4.15	11
Fulfilling my duties to others	4.23	9	4.23	10	4.08	13
Respecting rules	4.11	13	4.18	12=	4.13	12
Treating others fairly	**4.47**	**3**	**4.47**	**2**	4.32	6
Supporting others	4.29	6	4.28	8	**4.35**	**4**
Meeting a challenging standard of performance	4.20	10=	4.09	15	3.94	16
Doing creative things	3.49	22	3.73	19	3.63	21
Having daily activities run smoothly	4.15	12	4.22	11	3.98	14
Obtaining more money or possessions	2.84	26	2.91	26	2.94	26
Ensuring my safety	**4.37**	**5**	**4.46**	**3**	**4.56**	**1**

Table 5.2. Mean scores and rankings for goal hindrance at each time point

	Time 1 (*N* = 98)		Time 2 (*N* = 74)		Time 3 (*N* = 62)	
Goal	Mean	Rank	Mean	Rank	Mean	Rank
Feeling relaxed	1.90	8	2.15	12	1.84	14
Experiencing excitement	**2.00**	**5**	2.28	8	2.10	7
Having fun	1.79	12	2.21	10	2.03	11
Experiencing bodily pleasures	**2.07**	**3**	**2.44**	**2**	2.13	6
Being healthy	1.86	9	2.09	14	2.05	10
Discovering new things	**2.06**	**4**	**2.41**	**3**	**2.18**	**3**
Understanding the world around me	1.54	18	1.72	22	1.81	16=
Coming up with new ideas	1.56	17	1.87	17=	1.82	15
Keeping up my self-confidence	1.67	13	2.12	13	1.92	13
Feeling like I belong here	1.51	19	1.75	20=	1.81	16=
Reaching a higher level of consciousness	1.41	22	1.91	15=	1.74	21
Feeling unique	1.50	20	1.75	20=	1.79	18
Discovering who I truly am	1.45	21	1.72	23	1.69	22=
Making my own decisions in life	1.59	15=	1.91	15=	1.69	22=
Doing things better than others	1.80	11	**2.49**	**1**	**2.37**	**2**
Receiving support from others	1.35	23	1.85	19	1.74	19
Feeling connected to the people around me	1.34	24	1.72	24	1.65	24
Fulfilling my duties to others	**2.08**	**1=**	**2.35**	**5=**	2.00	12
Respecting rules	1.20	25	1.56	25	1.55	25
Treating others fairly	1.17	26	1.43	26	1.45	26
Supporting others	1.59	15=	1.87	17=	1.74	20
Meeting a challenging standard of performance	1.96	6	**2.35**	**5=**	2.06	8=
Doing creative things	1.91	7	**2.39**	**4**	**2.16**	**4=**
Having daily activities run smoothly	**2.08**	**1=**	**2.35**	**5=**	**2.16**	**4=**
Obtaining more money or possessions	1.66	14	2.25	9	**2.42**	**1**
Ensuring my safety	1.84	10	2.17	11	2.06	8=

5.2 Results for Objective 4

Objective 4: To ascertain if there are any significant changes in self-regulatory constructs and psychosocial outcomes over the course of the study.

A series of one-way repeated measures ANOVAs were conducted to establish whether any of the predictor or outcome variables examined in the present study changed significantly over the three time points. The means and standard deviations for these variables at each time point are presented in Table 5.3.

Table 5.3. Means and standard deviations for study variables at each time point

Variable	Time 1 (*N* = 98)	Time 2 (*N* = 75)	Time 3 (*N* = 62)
	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)
Predictor variables			
Optimism	14.42 (3.06)	14.27 (3.52)	14.87 (3.43)
Perceived social support	70.80 (10.88)	70.04 (11.48)	69.37 (12.91)
Goal disturbance	173.07 (71.51)	211.24 (100.54)	198.35 (95.66)
TGP	33.23 (7.51)	32.09 (7.98)	31.79 (8.10)
FGA	38.88 (5.05)	37.93 (6.02)	39.31 (6.16)
Outcome variables			
Participation	36.51 (14.06)	35.37 (18.61)	32.92 (16.34)
Positive affect	35.87 (7.68)	33.11 (7.89)	32.73 (8.99)
Negative affect	16.54 (6.84)	16.38 (6.49)	15.82 (7.17)
QoL-physical	14.60 (2.30)	14.28 (2.82)	14.64 (2.43)
QoL-psychological	15.58 (2.56)	15.32 (2.77)	15.51 (2.47)
QoL-social	15.54 (2.44)	15.00 (3.29)	15.01 (3.21)
QoL-environment	14.93 (2.27)	14.06 (3.30)	14.57 (2.84)
General adjustment	2.99 (0.47)	3.09 (0.67)	3.21 (0.56)
Social adjustment	3.11 (0.50)	3.25 (0.56)	3.38 (0.63)
Adjustment to limitations	2.11 (0.49)	1.89 (0.58)	1.90 (0.54)
Depression	8.1 (8.7)	8.53 (9.09)	8.77 (8.84)

Note: The means and standard deviations reported for transformed variables were calculated prior to transformation.

5.2.1 Examination of changes in predictor variables over time

A one-way repeated measures ANOVA showed that changes in goal disturbance over time approached significance ($F_{(2,\ 120)} = 2.87$, $p = .061$, partial $\eta^2 = .046$). Repeated measures t-tests (using a Bonferroni adjustment, $\alpha = .05/3 = .017$) indicated that goal disturbance was lower at Time 1 than at Time 2, although this finding was not significant ($t_{(60)} = -2.37$, $p = .021$). As shown in Figure 5.1, it appears that participants experienced a non-significant increase in goal disturbance following discharge from rehabilitation, with these elevated levels remaining stable until six months after discharge.

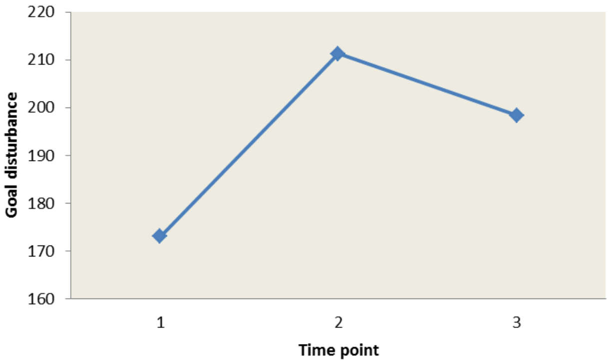

Figure 5.1. Mean levels of goal disturbance at each time point

For TGP, Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated ($\chi^2_{(2)} = 9.21$, $p = .01$), and a Greenhouse-Geisser correction was used. There was a significant effect of time on TGP ($F_{(1.75,\ 104.84)} = 3.59$, $p = .031$, partial $\eta^2 = .056$). Repeated measures t-tests indicated a non-significant difference between Time 1 and Time 3 scores at the $\alpha = .017$ level ($t_{(60)} = 2.31$, $p = .024$), suggesting that participants were using TGP as an adaptive self-regulatory mode less at six months post-discharge than they had been shortly after admission to rehabilitation. No significant changes were observed over time in FGA ($F_{(2,\ 120)} = 1.60$, $p = .206$), optimism ($F_{(2, 120)} = 0.08$, $p = .923$), or perceived social support ($F_{(1.71, 102.77)} = 0.88$, $p = .405$), which indicates that these variables remained stable across the three time points (see Figure 5.2).

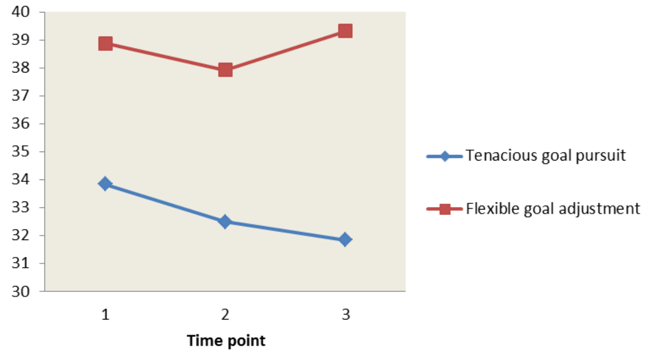

Figure 5.2. Mean levels of TGP and FGA at each time point

5.2.2 *Examination of changes in outcome variables over time*

A one-way repeated measures ANOVA revealed that participation, as assessed using the WHODAS 2.0, changed significantly over the study period ($F_{(2, 120)} = 3.50$, $p = .033$, partial $\eta^2 = .056$). Post-hoc repeated measures t-tests were carried out, and showed a significant difference between Time 1 and Time 3 scores ($t_{(59)} = 2.57$, $p = .013$). The mean participation scores at each time point were plotted (see Figure 5.3), and together with the findings of the post-hoc analyses indicated that participants experienced significantly fewer restrictions in participation six months after discharge from rehabilitation than they had on admission.

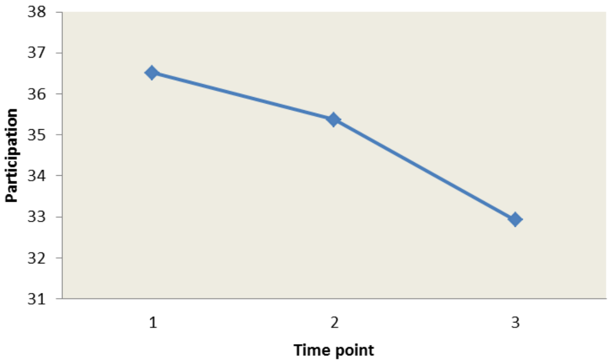

Figure 5.3. Mean levels of participation at each time point

The assumption of sphericity was violated for the repeated measures ANOVA examining positive affect ($\chi^2_{(2)} = 6.92$, $p = .031$), and a Greenhouse-Geisser correction was used. Positive affect changed significantly over time in the sample ($F_{(1.79,\ 102.12)} = 8.77$, $p = .001$, partial $\eta^2 = .133$), with repeated measures t-tests showing that Time 1 scores were significantly higher than scores at Time 2 ($t_{(57)} = 3.52$, $p = .001$) and Time 3 ($t_{(57)} = 3.44$, $p = .001$). Figure 5.4 indicates that on average, participants experienced a steady decrease in positive affect over the course of the study. Conversely, negative affect appeared to remain stable over the study period, as indicated by the non-significant results of the one-way repeated measures ANOVA conducted ($F_{(2,\ 120)} = 0.91$, $p = .407$).

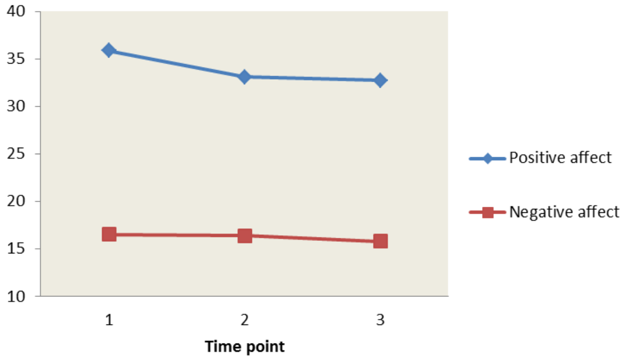

Figure 5.4. Mean levels of positive and negative affect at each time point

Repeated measures ANOVAs for QoL in the physical ($F_{(2, 120)} = 0.30$, $p = .744$), psychological ($F_{(2, 120)} = 2.15$, $p = .121$), and social relations ($F_{(2, 120)} = 2.687$, $p = .072$) domains were non-significant, indicating stability in these variables across the three study time points. Significant changes were observed in scores on the environment domain of the WHOQOL-BREF over time ($F_{(2, 120)} = 5.15$, $p = .007$, partial $\eta^2 = .079$), however. Repeated measures t-tests revealed significant differences between Time 1 and Time 2 scores ($t_{(60)} = 2.80$, $p = .007$), and also between Time 2 and Time 3 scores ($t_{(60)} = -2.79$, $p = .007$). The results of these post-hoc analyses and the plotted means (see Figure 5.5) together suggest that although participants initially experienced decreases in QoL relating to their environment following discharge from rehabilitation, baseline levels had been restored by six months post-discharge.

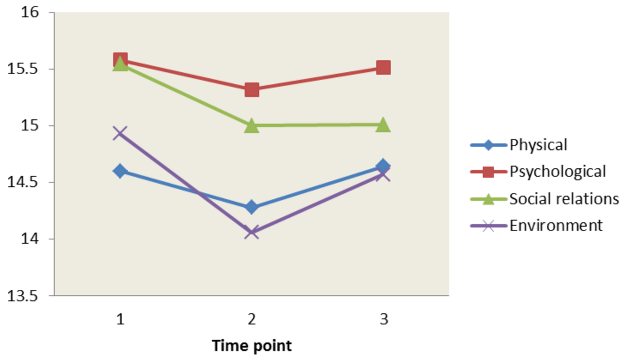

Figure 5.5. Mean levels of quality of life at each time point

Analyses indicated that general adjustment to limb loss changed significantly over the study period ($F_{(2, 120)} = 5.40$, $p = .006$, partial $\eta^2 = .083$). Repeated measures t-tests indicated that Time 1 scores were significantly lower than Time 3 scores ($t_{(60)} = -3.19$, $p = .002$), although differences between Time 1 and Time 2 scores were not significant at the $\alpha = .017$ level ($t_{(60)} = -2.38$, $p = .020$). These findings suggest that a steady increase in levels of general adjustment to limb loss occurred over time for the sample as a whole (see Figure 5.6). Social adjustment to limb loss also appeared to change significantly over time ($F_{(2, 120)} = 7.901$, $p = .001$, partial $\eta^2 = .116$), with repeated measures t-tests revealing significant differences between Time 1 scores and those at Time 2 ($t_{(60)} = -2.58$, $p = .012$) and Time 3 ($t_{(60)} = -3.46$, $p = .001$). Based on these findings and the plotted mean scores (see Figure 5.6), it appeared that social adjustment to limb loss increased steadily on average for participants across the three study time points. Scores on the adjustment to limitations subscale of the TAPES-R also changed significantly across the study period ($F_{(2, 120)} = 3.72$, $p = .027$, partial $\eta^2 = .059$). Post-hoc repeated measures t-tests showed that scores on this subscale at Time 1 were significantly greater than scores at Time 3 ($t_{(59)} = 2.74$, $p = .008$), suggesting that participants experienced a deterioration in their adjustment to the limitations associated with limb loss from rehabilitation admission to six months post-discharge (see Figure 5.6).

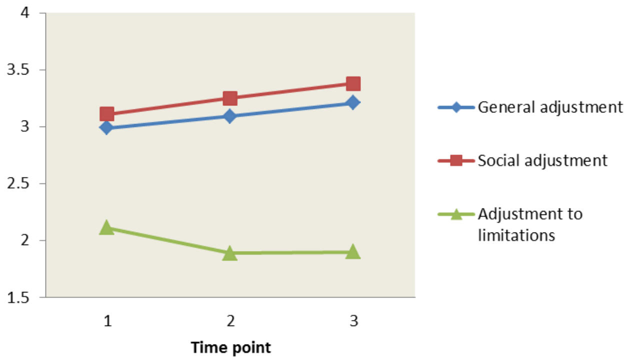

Figure 5.6. Mean levels of psychosocial adjustment for each time point

The non-significant results of the repeated measures ANOVA examining depressive symptomatology ($F_{(1.66, 96.27)} = 2.58$, $p = .091$) suggested stability in this outcome over the course of the study.

5.3 Summary of findings

To meet the third study objective, rankings were assigned to the 26 higher-order goals assessed using the GFI in terms of their importance and the degree of hindrance experienced in their attainment. It emerged that the most important goals to individuals with lower limb amputations across the study period were *being healthy*, *keeping up one's self-confidence*, *making my own decisions in life*, *treating others fairly,* and *ensuring my safety*. A visual inspection of the rankings suggested that most goals changed little in their importance to participants over the course of the study. It appeared, however, that some of the more physically-oriented goals diminished in their importance across the three time points, whereas self- and socially-oriented goals seemed to become more important to participants with the passage of time. Over the course of the study, the greatest hindrance was experienced in the attainment of goals such as *discovering new things*, *doing things better than others*, *experiencing bodily pleasures*, *doing creative things*, and *fulfilling one's duties to others*. The degree of hindrance experienced appeared to fluctuate over time for most items. Goals relating to the self seemed to become more difficult to attain, whereas goals related to independence and social relations became easier to achieve over the course of the study.

In order to meet the fourth study objective, a series of repeated measures ANOVAs were conducted to ascertain if there were any significant changes in self-regulatory constructs and psychosocial outcomes over the course of the study. With regard to the self-regulatory variables, significant changes in both goal disturbance and TGP were observed over the course of the study. Disturbance in the attainment of goals tended to increase from admission to six weeks post-discharge and then plateau off, whereas the use of assimilative tenacity as an adaptive self-regulatory mode decreased from admission to six months post-discharge. Although many of the psychosocial outcomes remained stable over time, participation, general adjustment, and social adjustment appeared to increase steadily across the three study time points, whereas positive affect and adjustment to limitations diminished over time. QoL in the environment domain also decreased significantly from admission to six weeks post-discharge, but pre-discharge levels had been restored by the final time point.

5.4 Discussion

5.4.1 Goal importance and goal hindrance

Little is currently known about the role of goals in the process of psychosocial adjustment to amputation. The present study explored which of the 26 goals that comprise the GFI (Maes et al., 2002) were most valued by individuals with lower limb amputations, and which of these goals they experienced the greatest hindrance in attaining as a result of their limb loss. The goals that were most highly valued in the sample were similar to those ranked highly by MI patients (Boersma, Maes, & van Elderen, 2005) and individuals with head and neck cancer (Offerman et al., 2010) using the GFI, with the importance of *being healthy*, *treating others fairly*, *making my own decisions in life*, *keeping up my self-confidence*, and *ensuring my safety* being rated highly in each of these patient groups. These similarities in goal importance suggest that individuals experiencing health-related losses and limitations tend to prioritise maintaining their independence and minimising the impact of health issues on their everyday lives.

Changes observed in the importance ratings of individual goals over time indicated a gradual distancing from goals that bear on physical functioning, such as *experiencing bodily pleasures* and *meeting a challenging standard of performance*, and a movement towards goals relating to the self, such as *feeling unique*, and social relationships, such as *receiving support from others*. These findings are in keeping with previous research on goal importance among individuals with chronic illness and disability, and may reflect the value changes that are thought to take place as a result of the downgrading of blocked goals and rescaling of self-evaluative standards associated with FGA and the accommodation process (Brandstädter, 2009). In a study by Montgomery and colleagues

(1996), for example, it was found that the goal of mobility was considered less important by individuals with chronic illness and disability than healthy controls, with the areas of greatest importance being communication, responsibility, harmony, and positive relations. Similarly, in research conducted by Conrad and associates (2010), the goals of intimacy, achievement and altruism were found to be of significantly greater importance among persons with non-progressive neurological disorders than observed in the general population. Additionally, Sivaraman Nair and Wade (2003) found that persons with progressive neurological disabilities reported significantly greater reductions in the importance of work and leisure goals over a four-year period in comparison with a group of healthy controls.

Previous research has found that patients often differ from rehabilitation team members in the goals they consider to be of greatest importance in their lives (Bloom et al., 2006; Boerner & Cimarolli, 2005). Given that patients are more likely to engage in the rehabilitation process if its goals are meaningful and relevant to them (Alexy, 1985; McGrath & Adams, 1999; Oldridge et al., 1999; Stuifbergen et al., 2003; Webb & Glueckauf, 1994), it may be advisable to consult patients on the goals that they value most so they can be effectively targeted in rehabilitation. The administration of a measure such as the GFI (Maes et al., 2002) may aid in this process, as it includes goals that are not usually focused on during rehabilitation, yet which may be considered important by the patients themselves. Alternatively, interventions that encourage patients to elicit their own valued goals could be implemented, such as PPA (Little, 1983) or MIM (Ylvisaker et al., 2008).

Goals that persons with lower limb amputations experienced the greatest hindrance in attaining, including *having daily activities run smoothly*, *meeting a challenging standard of performance*, *fulfilling my duties to others*, and *doing creative things*, overlapped with those of other patient groups who completed the GFI (Boersma, Maes, & van Elderen, 2005; Offerman et al., 2010), and appear to reflect the upheaval in everyday activities that often ensues following a significant health event such as amputation, cancer, or MI. These findings are in keeping with research carried out in other patient populations (Boerner & Cimarolli, 2005; McNamara et al., 2006). For example, McNamara and colleagues (2006), found that patients with Parkinson's disease experienced significantly greater hindrance in attaining financial, leisure, work and social goals than age-matched healthy controls. The implementation of interventions such as goal management training (Levine et al., 2000), which involves the development of step-by-step programmes for carrying out activities that patients find challenging, may help to reduce the hindrance experienced by persons with amputations in the attainment of such goals and thus promote positive adjustment.

Changes were observed in goal hindrance ratings over the course of the study for several items of the GFI (Maes et al., 2002). Decreases in the ranking of *making my own decisions in life* and *having daily activities run smoothly* from Time 1 to Time 3 suggest that participants slowly regained their independence over time. This may reflect underlying assimilative processes such as learning new skills or compensating for functional losses through the use of technical aids, as well as accommodative processes, such as positive reappraisal or the rescaling of ambitions. Of some concern is the observation that individuals with amputations experienced increasing hindrance in goals such as *obtaining more money and possessions*, *receiving support from others*, and *feeling like I belong here*, which suggests that they may continue to struggle with adapting to their new identity and finding their place in the world as a person with a disability. The provision of ongoing psychological support following discharge may thus be advisable in this population. Overall, there was little accordance between the goals rated as most important in the present sample and those in which the greatest hindrance was experienced. This may indicate accommodative processes at work, with individuals downgrading or disengaging from goals that are no longer attainable and reappraising what matters most in their lives.

5.4.2 Changes in predictor and outcome variables over time

Current conceptualisations of adjustment to chronic illness and disability call attention to the dynamic and fluid nature of this process (Elliott et al., 2002; Livneh, 2001). The present study is one of the first to assess psychosocial outcomes among persons with amputations at more than one time point (Kratz et al., 2010; Singh et al., 2009; Williams et al., 2004). Previous longitudinal research has indicated that the experience of negative psychological outcomes such as symptoms of depression (Singh et al., 2009) and PTSD (Kratz et al., 2010) may increase in this patient group over time, whereas social outcomes such as social integration (Williams et al., 2004), social constraints, and loneliness (Kratz et al., 2010) appear to remain stable. There has been little investigation of changes in goal disturbance or adaptive self-regulation over time in previous research. Exploring the trajectories of change in self-regulatory variables and psychosocial outcomes among persons with lower limb amputations may provide further insight into the dynamic processes involved in regulating one’s goals and adjusting to the loss of a limb.

Only a handful of studies to date have employed the GFI (Maes et al., 2002) to assess goal disturbance (Boersma, Maes, & Joekes, 2005; Van Der Veek et al., 2009). On comparing the mean goal disturbance scores obtained in the present study with those observed in previous research using this measure, it was found that at each time point, participants in the present study had lower average scores than found among MI patients (*M* = 236.25, *SD* = 91.95) (Boersma, Maes, & Joekes, 2005), but higher scores than observed in a sample of parents who had a child with Down syndrome (*M* = 190.74, *SD* = 65.10) (Van Der Veek et al., 2009). Goal disturbance was found to increase from Time 1 to Time 2 in the present study, albeit non-significantly, during which time participants returned home following completion of their rehabilitation programme. This may reflect a period of readjustment during which individuals must become accustomed to negotiating familiar environments with a newly acquired disability. Indeed, goal disturbance levels appeared to plateau from Time 2 to Time 3, which suggests that participants were already beginning to acclimatise to their new circumstances by six months post-discharge.

The mean scores for TGP and FGA in the present study were comparable with those observed by Boerner (2004) in a sample of persons with age-related vision loss (TGP: *M* =

32.1, *SD* = 7.8; FGA: *M* = 38.2, *SD* = 7.9). The use of TGP as an adaptive self-regulatory mode showed non-significant decreases over the course of the study, whereas scores on FGA remained stable. The findings of the present study provide support for the dual-process model's assumption that individuals who experience irreversible loss may come to rely more on accommodative flexibility as a means of adaptive self-regulation (Brandtstädter & Rothermund, 2002). As the goals and ambitions that participants once held may no longer match their personal capacities and resources, their continued pursuit may elicit feelings of helplessness and despair, and subjective well-being may better maintained through accommodative processes such as disengaging from blocked goals and reappraisal.

The mean scores observed at each time point for the WHODAS 2.0 place the present sample in the 90th percentile of the general population for this outcome, indicating that persons with amputations experience considerable limitations in their activities and restrictions in participation. A significant decrease in scores was observed over the study period, however, which suggests that participants were able to overcome at least some of the social and environmental barriers posed by their limb loss on returning home following discharge from rehabilitation.

Mean scores on positive and negative affect observed in the present study were compared with those of 1,003 persons sampled from the general population (Crawford & Henry, 2004). Interestingly, positive affect was higher among individuals with lower limb amputations at each time point than observed in the general population sample (*M* = 31.31, *SD* = 7.65), whereas levels of negative affect were comparable between the two groups (*M* = 16.00, *SD* = 5.90). The elevated levels of positive affect observed in the present sample are similar to those observed in a previous study of persons with lower limb amputations (*M* = 33.33, *SD* = 8.29) (Unwin et al., 2009), and may result from accommodative processes such as benefit finding and downward social comparison, with individuals gaining a new-found appreciation of life following their limb loss, as alluded to in qualitative studies of this population (Gallagher & Maclachlan, 2001; Oaksford et al., 2005; Saradjian et al., 2008). Positive affect declined over the course of the study, while negative affect remained stable, providing further evidence for the independence of positive and negative affect as constructs (Watson et al., 1988). This decrease in positive affect may be a consequence of the difficulties and limitations experienced on returning home following rehabilitation.

Domain scores on the WHOQOL-BREF were compared with those observed in a sample of UK citizens taken from the general population as well as various inpatient and outpatient health care facilities (Skevington et al., 2004). In keeping with previous research carried out in this patient group (Callaghan & Condie, 2003; De Godoy et al., 2002; Pezzin et al., 2000), although scores on the physical domain were lower for individuals with amputations (*M* = 15.8, *SD* = 3.8), they exceeded the comparison group in the remaining three domains (Psychological: *M* = 14.7, *SD* = 3.4; Social: *M* = 14.2, *SD* = 3.5; Environment: *M* = 14.1, *SD* = 2.7). Significant changes in the environment domain of the WHOQOL-BREF were observed over time, with scores on this variable decreasing initially following discharge, but returning to near-baseline levels by the third time point. The stability of the physical, psychological and social relations domains of QoL over the course of the study is in accordance with the literature on the ‘response shift’ (Sprangers & Schwartz, 1999), which proposes that such preservation of QoL despite significant health difficulties is due to changes in people’s values, their internal standards, or their definition of what constitutes a good QoL in response to their adverse experiences. These processes bear a striking resemblance to the accommodative mode of adaptive self-regulation described in the dual-process model. Indeed, Carver and Scheier (2000b) have speculated that self-regulatory processes may offer an alternative explanation for the ‘response shift’ phenomenon (see Section 1.9).

The TAPES-R is a recently developed instrument, and norms for the psychosocial subscales used in the present study are currently in development (Gallagher et al., 2010). Scores on all three psychosocial subscales of this measure changed significantly over the study period. Whereas general and social adjustment improved across the three time points, adjustment to limitations progressively worsened over time. These findings reflect the observations made regarding QoL in this sample, with psychosocial aspects of well-being being preserved despite growing physical and environmental limitations. Again, this may be indicative of accommodative processes at work, with individuals positively reappraising their circumstances and finding positive meaning in their experiences.

Mean scores on depressive symptomatology did not change significantly over time in the present study, and were comparable with those observed in a sample of 376 community-dwelling adults (M = 8.61, *SD* = 7.69) (Segal, Coolidge, Cahill, & O'Riley, 2008). Kratz and colleagues (2010) similarly failed to observe any significant changes in depressive symptoms over the 12 months following amputation surgery in a sample of 111 adults with newly acquired limb loss. The proportion of individuals with scores in the mild to severe range (i.e., scores ranging from 14 to 63) on the BDI-II increased from 16.7% at Time 1 to 23% at Time 3, however, compared with 18% of the comparison group. In a study of 68 individuals with lower limb amputations carried out by Singh and colleagues (2009), it was found that the incidence of depressive symptoms decreased from 23.5% to 2.9% over the rehabilitation period, then increased significantly to 19.1% at follow-up 2-3 years later. Together, these findings suggest that the risk of mild to severe depressive symptoms appears to increase over time in persons with lower limb amputations following discharge from rehabilitation, thus highlighting the importance of providing follow-up psychological care to members of this patient group.

5.4.3 Limitations of findings

Some limitations should be borne in mind when interpreting the findings for Objectives 3 and 4. Firstly, potential author bias/judgement may have influenced the interpretation of goal importance and hindrance scores, which was based on a visual inspection of their rankings. With regard to the repeated measures ANOVAs conducted, these analyses estimate an average growth model for the total sample combined, and do not permit the examination of participants' individual growth trajectories. Multilevel modelling is a robust statistical technique that allows the modelling of within-person and between-person variability in change over time, resulting in estimated growth curves for each individual as well as an average trajectory for the overall sample, and may prove valuable as a tool for exploring adjustment to illness and disability longitudinally (Kwok et al., 2008). Unfortunately, the small sample size and limited number of time points precluded the use of this analytic technique in the present study. Future longitudinal research in this population should avail of multilevel modelling to explore both individual- and group-level trajectories of change in psychosocial outcomes following lower limb amputation.

5.4.4 Conclusion

The results for Objective 3 suggest that the goals which individuals with lower limb amputations place the most value in, and experience the greatest hindrance in attaining, are often not taken into consideration in rehabilitation settings. This highlights the importance of consulting patients on the goals they wish to achieve prior to the setting of rehabilitation targets, and indicates the potential value of implementing interventions to assist patients in developing alternative strategies to attain blocked goals. The findings for Objective 4 suggest that adjustment to amputation is not necessarily a linear process, and any gains made during rehabilitation may diminish following discharge when individuals are confronted with their new reality and its inherent limitations. This highlights the vital role that longitudinal research has to play in identifying fluctuations in psychosocial outcomes that may not be apparent from examining cross-sectional data.

CHAPTER 6

RESULTS OF PREDICTIVE ANALYSES

This chapter presents the results of the analyses for Objectives 5 and 6, and provides a summary and discussion of the findings.

6.1 Results for Objective 5

Objective 5: To investigate whether psychosocial outcomes at Time 2 are predicted by goal disturbance, TGP, and FGA at Time 1.

6.1.1 Preliminary analyses

Table 6.1 provides the descriptive statistics for psychosocial outcomes at Time 2. The results of analyses examining the influence of sociodemographic characteristics on outcome variables at Time 2 are displayed in Table 6.2. One-way ANOVAs investigating the relationships between education level and psychosocial outcomes at Time 2 were all non-significant. Pearson correlations indicated that older age was significantly associated with better QoL in the physical and environment domains, but poorer QoL in terms of social relations. Gender, marital status and living situation were not significantly associated with any psychosocial outcomes at Time 2.

Table 6.1. Descriptive statistics for outcome variables at Time 2

Variable	Possible range	Valid *N*	Minimum	Maximum	Mean	*SD*
Participation	0-100	75	2.78	91.67	35.37	18.61
Positive affect	10-50	73	16	47	33.11	7.89
Negative affect	10-50	73	10	34	16.38	6.49
QoL-physical	4-20	75	8	20	14.28	2.82
QoL-psychological	4-20	75	8.67	20	15.32	2.77
QoL-social	4-20	75	4	20	15.00	3.29
QoL-environmental	4-20	75	7.5	20	14.06	3.30
General adjustment	1-4	75	1	4	3.09	0.67
Social adjustment	1-4	75	2	4	3.25	0.56
Adjustment to limitations	1-4	75	1	4	1.89	0.58
Depression	0-63	75	0	45	8.53	9.09

Note: The means and standard deviations reported for quality of life in the social relations domain and depressive symptomatology were calculated prior to transformation.

Table 6.2. Associations between sociodemographic characteristics and outcome variables at Time 2

Variable	Education	Age	Gender	Marital status	Living situation
	F (*df*)	*r*	*r*	*r*	*r*
Participation	0.35 (2, 72)	-.03	-.02	.02	-.17
Positive affect	0.56 (2, 70)	.07	.04	-.19	.20
Negative affect	0.22 (2, 70)	-.17	-.03	-.13	-.03
QoL-physical	0.66 (2, 72)	.24*	.03	.12	.10
QoL-psychological	0.14 (2, 72)	.17	-.01	-.09	.16
QoL-social relationships	0.32 (2, 72)	-.28*	-.02	-.16	-.22
QoL-environment	0.74 (2, 72)	.26*	-.14	.03	.21
General adjustment	0.55 (2, 72)	-.04	-.11	.01	.07
Social adjustment	2.30 (2, 72)	-.07	-.17	-.15	.07
Adjustment to limitations	0.63 (2, 72)	.15	-.15	.12	.00
Depression	0.11 (2, 71.13)‡	-.16	-.05	-.09	-.14

Note: An inverse transformation was performed on quality of life in the social relations domain at Time 2, and correlation coefficients for this variable should be reversed prior to interpretation.

† Brown-Forsythe statistic presented, as the assumption of homogeneity of variance was violated; * $p \le .05$; ** $p \le .01$

The associations between clinical characteristics and psychosocial outcomes at Time 2 were also examined (see Table 6.3). One-way ANOVAs conducted to investigate the influence of amputation level on outcome variables at Time 2 were all non-significant. Pearson correlations indicated that having an acute amputation etiology was significantly associated with poorer QoL in the domains of social relations and environment, as well as poorer adjustment to limitations at this time point. A longer amount of time elapsed since amputation was related to enhanced adjustment to limitations at Time 2. Significant correlations indicated that individuals who reported the presence of PLP at the second time point experienced greater negative affect and symptoms of depression, and poorer QoL in the physical and psychological domains. Higher average pain intensity was associated with higher levels of negative affect and depressive symptoms and lower levels of QoL in the physical, social and environment domains. The presence of comorbidities and RLP was not significantly associated with any psychosocial outcomes for the present sample at Time 2.

Table 6.3. Relationships between clinical characteristics and outcome variables at Time 2

Variable	Level of amputation	Cause of amputation	Time since amputation	Presence of comorbidities	Residual limb pain	Phantom limb pain	Pain intensity
	F (*df*)	*r*	*r*	*r*	*r*	*r*	*r*
Participation	9.71 (2, 72)	.12	-.02	-.16	.11	.26*	.22
Positive affect	0.06 (2, 70)	-.05	-.11	.17	-.01	-.01	.03
Negative affect	0.10 (2, 70)	.13	-.08	-.18	.08	.34**	.42**
QoL-physical	0.98 (2, 72)	-.22	.09	.10	-.09	-.29*	-.29*
QoL-psychological	0.76 (2, 72)	-.14	-.02	.20	.04	-.24*	-.13
QoL-social relationships	1.57 (2, 72)	.32**	.01	-.17	-.02	.23	.24*
QoL-environment	1.35 (2, 72)	-.23*	-.05	-.02	-.07	-.22	-.40**
General adjustment	0.13 (2, 72)	-.09	.03	.16	.14	-.20	-.09
Social adjustment	0.05 (2, 72)	.07	-.11	.10	.13	-.22	-.08
Adjustment to limitations	0.04 (2, 72)	-.23*	.26*	.18	-.11	-.04	-.06
Depression	1.03 (2, 72)	.10	.02	-.15	.06	.29*	.30**

Note: An inverse transformation was performed on the social relations domain of the WHOQOL-BREF, and scores on this variable should be reversed before interpretation.
* $p \leq .05$; ** $p \leq .01$

6.1.2 Bivariate analyses between T1 predictors and T2 outcomes

Table 6.4 presents the bivariate correlations between predictor variables at Time 1 and outcome variables at Time 2. Higher levels of goal disturbance at baseline were significantly associated with lower levels of participation, poorer QoL in the physical, psychological and environment domains, poorer general adjustment, social adjustment, and adjustment to limitations, and greater depressive symptoms at Time 2. Greater use of TGP as an adaptive self-regulatory mode at Time 1 was related to greater positive affect, psychological QoL, and social adjustment to amputation at the second time point. Significant associations were observed between using FGA to a greater extent on admission to rehabilitation and experiencing higher levels of participation, greater positive affect, lower negative affect and symptoms of depression, greater QoL in all four domains, enhanced general and social adjustment, and better adjustment to limitations six weeks after discharge. Greater dispositional optimism at baseline was associated with fewer restrictions in participation, higher positive affect, and better QoL in the environment domain at the second time point. Perceived social support at Time 1 was positively related to the psychological, social, and environment domains of QoL at Time 2.

Table 6.4. Correlations between Time 1 predictor variables and Time 2 outcome variables

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	Goal disturbance (T1)	-														
2.	TGP (T1)	-0.01	-													
3.	FGA (T1)	-0.28**	0.34**	-												
4.	Optimism (T1)	-0.02	0.31**	0.39**	-											
5.	Perceived social support (T1)	0.16	-0.03	-0.14	0.02	-										
6.	Participation (T2)	0.34**	-0.23	-0.37**	-0.28*	0.07	-									
7.	Positive affect (T2)	-0.19	0.34**	0.29*	0.24*	-0.23	-0.40**	-								
8.	Negative affect (T2)	0.16	-0.14	-0.43**	-0.19	0.11	0.51**	-0.28*	-							
9.	QoL-physical (T2)	-0.40**	0.21	0.37**	0.04	-0.04	-0.68**	0.41**	-0.44**	-						
10.	QoL-psychological (T2)	-0.40**	0.31**	0.49**	0.18	-0.29*	-0.64**	0.72**	-0.55**	0.64**	-					
11.	QoL-social relationships (T2)	0.18	-0.06	-0.23*	-0.07	0.27*	0.37**	-0.31**	0.27*	-0.47**	-0.42**	-				
12.	QoL-environment (T2)	-0.33**	0.14	0.30**	0.24*	-0.24*	-0.48**	0.29*	-0.49**	0.61**	0.54**	-0.46**	-			
13.	General adjustment (T2)	-0.41**	0.22	0.46**	0.20	-0.19	-0.64**	0.51**	-0.58**	0.63**	0.73**	-0.25*	0.50**	-		
14.	Social adjustment (T2)	-0.26*	0.40**	0.47**	0.00	-0.16	-0.35**	0.43**	-0.43**	0.43**	0.60**	-0.13	0.38**	0.70**	-	
15.	Adjustment to limitations (T2)	-0.26*	0.11	0.23*	0.16	-0.01	-0.63**	0.27*	-0.40**	0.60**	0.44**	-0.33**	0.37**	0.47**	0.17	-
16.	Depression (T2)	0.37**	-0.18	-0.42**	-0.18	-0.01	0.67**	-0.51**	0.57**	-0.71**	-0.71**	0.43**	-0.57**	-0.62**	-0.36**	-0.51**

Note: Inverse transformations were performed on perceived social support and quality of life in the social relations domain, and scores on these variables should be reversed before interpretation.

* $p \leq .05$; ** $p \leq .01$

6.1.3 Multivariate analyses between T1 predictors and T2 outcomes

Hierarchical regression analyses were performed in order to determine if goal disturbance, TGP, and FGA on admission to rehabilitation were predictive of psychosocial outcomes six weeks after discharge. Time 2 assessments of psychosocial outcomes acted as dependent variables in the analyses. In each case, baseline (Time 1) scores on the outcome variable and any sociodemographic (age, gender) or clinical (level of amputation, cause of amputation, time since amputation, average pain intensity at Time 2) variables significantly associated ($p < .05$) with the outcome at Time 2 (see Tables 6.2 and 6.3) were controlled for in the first step. Optimism and perceived social support at Time 1 were entered in the second step, followed by Time 1 assessments of goal disturbance, TGP, and FGA in the third and final step. Due to the large number of outcome variables examined, summary tables were only provided for hierarchical regression analyses in which the third step contributed significantly to their prediction. The results of these analyses are summarised in Tables 6.5 and 6.6, which present the unstandardized and standardized beta values from the final model.

6.1.3.1 Participation

No sociodemographic or clinical factors were associated with participation at Time 2, so participation at baseline was the only variable controlled for in the first step. The overall regression model was significant ($F_{(6, 68)} = 7.17$, $p < .0001$), accounting for 33% of the variance in this outcome at Time 2 ($R^2 = .387$, Adj. $R^2 = .333$). Only the first step of the model contributed significantly to the prediction of participation, however, and the Time 1 assessment of this variable was the only independent predictor that emerged in the final model ($\beta = 0.45$, $p < .0001$).

6.1.3.2 Positive and negative affect

For the hierarchical regression analysis predicting positive affect at Time 2, baseline scores on this variable were controlled for in the first step. Although the final model was significant ($F_{(6, 66)} = 5.68$, $p < .0001$) and accounted for 28% of the variance in this outcome ($R^2 = .341$, Adj. $R^2 = .281$), Steps 2 and 3 did not contribute to the prediction of positive affect at this time point, and the baseline assessment of this outcome was the only significant predictor ($\beta = 0.40$, $p = .001$). The first step of the hierarchical regression analysis predicting negative affect at Time 2 controlled for pain intensity along with negative affect at Time 1. The overall model ($F_{(7, 64)} = 5.93$, $p < .0001$) predicted 33% of the variance in this outcome ($R^2 = .393$, Adj. $R^2 = .327$). Step 1 was the only step to contribute significantly to the model, although Step 3 was significant at the $p = .075$ level. Negative affect at Time 1 ($\beta = 0.26$, $p = .035$), pain intensity at Time 2 ($\beta = 0.32$, $p = .004$), and FGA at Time 1 ($\beta = -0.31$, $p = .013$) were significant predictors of negative affect at Time 2, with greater pain intensity and lower FGA on admission to rehabilitation being predictive of greater negative affect six weeks after discharge.

6.1.3.3 Quality of life

Hierarchical regression analyses were conducted to examine the associations between Time 1 predictors and Time 2 assessments of the physical, psychological, social, and environment domains of QoL. For the physical domain, age and average pain intensity were significantly associated with this outcome and were controlled for in the first step. The overall model was significant, accounting for 36% of the variance in physical QoL at Time 2 (see Table 6.5). In support of Hypothesis 5(a), the addition of Time 1 self-regulatory constructs in Step 3 was significant, accounting for 10% of the variance in this outcome. The only significant predictor in the model was the outcome variable at baseline. Time 1 assessments of goal disturbance, TGP, and FGA contributed significantly towards the prediction of psychological QoL at Time 2 (see Table 6.5). Although the overall model accounted for 50% of the variance in this outcome, the majority of this variance was explained by baseline scores..

Table 6.5. Summary of hierarchical regression analyses predicting physical and psychological domains of quality of life at Time 2

	Physical				Psychological			
	B	*SE B*	*β*	*ΔR²*	*B*	*SE B*	*β*	*ΔR²*
Step 1				.325***				.466***
Outcome variable (T1)	0.43	0.15	0.35**		0.55	0.12	0.51***	
Age	0.02	0.03	0.08		-	-	-	
Pain intensity (T2)	-0.27	0.15	-0.20		-	-	-	
Step 2				.008				.016
Optimism (T1)	-0.19	0.10	-0.20†		-0.10	0.09	-0.11	
Perceived social support (T1)	0.43	0.93	0.05		-0.98	0.80	-0.11	
Step 3				.097*				.060*
Goal disturbance (T1)	-3.07	2.12	-0.17		-2.31	1.61	-0.13	
TGP (T1)	0.07	0.04	0.19		0.04	0.03	0.12	
FGA (T1)	0.10	0.07	0.18		0.10	0.06	0.19†	
		R^2 = .429, Adj. R^2 = .359				R^2 = .542, Adj. R^2 = .502		
			F(8, 65) = 6.12***				*F*(6, 68) = 13.41***	

Note: An inverse transformation was performed on perceived social support at Time 1, and scores on this variable should be reversed prior to interpretation.
* *p* ≤ .05; ** *p* ≤ .01; ** * *p* ≤ .001; † *p* = .064

Age, cause of amputation, and pain intensity were controlled for in the first step of the hierarchical regression analyses predicting the social relations and environment domains of QoL at Time 2, along with baseline scores on this variable. The overall model for the social relations domain was significant ($F_{(9, 64)}$ = 3.44, *p* = .002), accounting for 23% of the variance in this outcome ((R^2 = .326, Adj. R^2 = .231), with Step 1 being the only significant contributor. QoL in the social relations domain at Time 1 was the only significant predictor in this model (*β* = -0.39, *p* = .006). The final regression model for the environment domain at Time 2 was significant ($F_{(9, 64)} = 8.55$, $p < .0001$), and explained 48% of the variance in this outcome (($R^2 = .546$, Adj. $R^2 = .482$), with Step 1 contributing significantly to its prediction. In addition to baseline scores ($\beta = 0.51$, $p < .0001$), greater QoL in the environment domain at Time 2 was predicted by lower levels of pain intensity at Time 2 ($\beta = -0.28$, $p = .005$) and fewer disturbances in goal attainment at Time 1 ($\beta = -0.23$, $p = .031$).

6.1.3.4 Psychosocial adjustment to amputation

The final model predicting general adjustment at Time 2 was significant ($F_{(6, 67)} = 13.58$, $p < .0001$), accounting for 51% of the variance in this outcome (($R^2 = .549$, Adj. $R^2 = .508$), with Step 1 contributing significantly. General adjustment at Time 1 was the only independent predictor in the overall model ($\beta = 0.60$, $p < .0001$). As shown in Table 6.6, all three steps of the model predicting Time 2 levels of social adjustment were significant, accounting for 53% of the variance in this outcome in total. In accordance with Hypothesis 5(a), the entry of baseline assessments of goal disturbance, TGP, and FGA in Step 3 explained a unique 14% of this variance. In addition to baseline scores, lower levels of optimism and higher levels of both TGP and FGA at Time 1 were significant predictors of greater social adjustment at this time point.

Table 6.6. Summary of hierarchical regression analysis predicting social adjustment at Time 2

Variable	*B*	*SE B*	*β*	*ΔR²*
Step 1				.380***
Social adjustment (T1)	0.58	0.11	0.53***	
Step 2				.052*
Optimism (T1)	-0.07	0.02	-0.37***	
Perceived social support (T1)	-0.03	0.15	-0.01	
Step 3				.136***
Goal disturbance (T1)	-0.09	0.31	-0.03	
TGP (T1)	0.02	0.01	0.23*	
FGA (T1)	0.03	0.01	0.30**	
			R^2 = .568, Adj. R^2 = .529	
			F(6, 67) = 14.68***	

* $p \leq .05$; ** $p \leq .01$; ** * $p \leq .001$; Adj. = adjusted

Amputation etiology and time since amputation were significantly associated with adjustment to limitations at Time 2, and were controlled for along with baseline scores in Step 1 of the hierarchical regression analysis. The overall model was significant ($F_{(8, 65)}$ = 3.50, p = .002) and accounted for 22% of the variance in total ((R^2 = .301, Adj. R^2 = .215), with Step 1 contributing significantly. Baseline adjustment to limitations (β = 0.35, p = .006) and time since amputation (β = 0.29, p = .007) were independent predictors, with a longer time since amputation predicting better adjustment to limitations six weeks after discharge from rehabilitation.

6.1.3.5 Depressive symptomatology

Depressive symptomatology at Time 2 was significantly associated with average pain intensity, which was controlled for in the first step of the hierarchical regression analysis, along with baseline depression scores. The overall model successfully accounted for 42% of the variance in depressive symptoms at Time 2 ($F_{(7, 66)} = 8.50$, $p < .0001$, $R^2 = .474$, Adj. $R^2 = .418$), although only the first step contributed significantly. Baseline scores ($\beta = 0.48$, $p < .0001$) and pain intensity ($\beta = 0.19$, $p = .048$) were significant predictors, with higher pain intensity at Time 2 predicting greater symptoms of depression at this time point.

6.2 Results for Objective 6

Objective 6: To investigate whether psychosocial outcomes at Time 3 are predicted by goal disturbance, TGP, and FGA at Time 1.

6.2.1 Preliminary analyses

Table 6.7 presents descriptive statistics for psychosocial outcomes assessed at Time 3. The results of analyses examining the relationships between sociodemographic characteristics and psychosocial outcomes at Time 3 are displayed in Table 6.8. One-way ANOVAs conducted to examine the influence of education level on psychosocial outcomes at Time 3 were non-significant except for social adjustment. Post-hoc comparisons using the Tukey HSD test indicated that participants with primary education only experienced significantly poorer social adjustment at Time 3 than those with third level education. Examination of the correlations between age and psychosocial outcomes revealed that younger age was significantly associated with greater negative affect at Time 3. Gender and marital status were not significantly associated with any psychosocial outcomes at Time 3. However, living alone was related to poorer QoL in the physical, social and environment domains, and lower levels of adjustment to limitations at this time point.

Table 6.7. Descriptive statistics for outcome variables at Time 3

Variable	Possible range	Valid *N*	Minimum	Maximum	Mean	*SD*
Participation	0-100	61	0	83.33	32.92	16.34
Positive affect	10-50	60	10	50	32.73	8.99
Negative affect	10-50	60	10	37	15.82	7.17
QoL-physical	4-20	62	8.57	20	14.64	2.43
QoL-psychological	4-20	62	8	20	15.51	2.47
QoL-social	4-20	62	5.33	20	15.01	3.21
QoL-environmental	4-20	62	9.5	20	14.57	2.84
General adjustment	1-4	62	1.8	4	3.21	0.56
Social adjustment	1-4	62	1	4	3.38	0.63
Adjustment to limitations	1-4	62	1	3	1.90	0.54
Depression	0-63	60	0	37	8.77	8.84

Note: The means and standard deviations reported for negative affect, quality of life in the social relations domain, social adjustment, and depressive symptomatology were calculated prior to transformation.

Table 6.8. Relationships between sociodemographic characteristics and outcome variables at Time 3

Variable	Education	Age	Gender	Marital status	Living situation
	F (*df*)	*r*	*r*	*r*	*r*
Participation	1.75 (2, 58)	-.04	.01	-.08	-.22
Positive affect	0.27 (2, 57)	-.17	-.02	-.08	.24
Negative affect	0.07 (2, 57)	-.28*	.08	.01	-.13
QoL-physical	0.47 (2, 59)	.23	.12	.07	.28*
QoL-psychological	0.11 (2, 59)	.16	.08	-.21	.24
QoL-social relationships	1.67 (2, 59)	-.15	.01	-.01	-.26*
QoL-environment	1.35 (2, 59)	.23	.04	-.02	.25*
General adjustment	2.15 (2, 39.69)‡	.14	-.16	-.07	.18
Social adjustment	4.81 (2, 59)*	.05	.17	.24	-.14
Adjustment to limitations	0.65 (2, 58)	.10	-.07	.07	.27*
Depression	0.10 (2, 57)	-.24	-.08	-.04	-.10

Note: Inverse transformations were performed on quality of life in the social relations domain and social adjustment, and scores on these variables should be reversed prior to interpretation.

† Data collected at T1 only, except for living situation, which was recorded at each time point; ‡ Brown-Forsythe statistic presented, as the assumption of homogeneity of variance was violated; * $p \leq .05$; ** $p \leq .01$

Table 6.9 presents the associations between clinical characteristics and psychosocial outcomes at Time 3. One-way ANOVAs revealed that level of amputation was significantly associated with the physical domain of QoL. Post-hoc analyses using the Tukey HSD test indicated that participants with above-knee amputations had significantly higher QoL in the physical domain than those with either below-knee or bilateral amputations at Time 3. An examination of the correlations between amputation etiology and psychosocial outcomes at Time 3 indicated that having an acute cause of amputation was related to poorer psychological and social QoL at this time point. Individuals with higher pain intensity at Time 3 experienced greater restrictions in participation, higher negative affect, and poorer adjustment to limitations. Time since amputation and the presence of comorbidities, PLP and RLP were not associated with any outcome variables at Time 3.

Table 6.9. Relationships between clinical characteristics and outcome variables at Time 3

Variable	Level of amputation	Cause of amputation	Time since amputation	Presence of comorbidities	Residual limb pain	Phantom limb pain	Pain intensity
	F (*df*)	*r*	*r*	*r*	*r*	*r*	*r*
Participation	1.00 (2, 58)	.07	.04	.08	.11	-.05	.26*
Positive affect	0.11 (2, 57)	.03	-.01	-.03	-.13	.02	.12
Negative affect	3.35 (2, 26.60)‡	.22	-.07	.19	.02	-.18	.29*
QoL-physical	6.42 (2, 59)**	-.16	-.05	-.15	.11	-.01	-.18
QoL-psychological	2.59 (2, 59)	-.29*	.08	-.14	-.10	.08	-.02
QoL-social relationships	1.64 (2, 59)	.29*	-.15	-.03	.10	-.04	.06
QoL-environment	2.48 (2, 59)	-.14	-.01	-.06	.02	.14	-.20
General adjustment	0.49 (2, 59)	-.23	-.12	-.15	-.02	.07	-.15
Social adjustment	0.06 (2, 59)	-.01	.18	.16	-.01	-.05	.03
Adjustment to limitations	0.17 (2, 58)	.16	.04	.21	-.07	.10	-.27*
Depression	2.55 (2, 57)	.23	.04	.16	.10	-.05	.21

Note: Inverse transformations were performed on quality of life in the social relations domain and social adjustment, and scores on these variables should be reversed prior to interpretation.

† Data collected at each time point, except for level of amputation, cause of amputation, time since amputation, and presence of comorbidities, which were recorded at T1 only; ‡ Brown-Forsythe statistic presented, as the assumption of homogeneity of variance was violated; * $p \leq .05$; ** $p \leq .01$

6.2.2 Bivariate analyses between T1 predictors and T3 outcomes

Pearson correlations between Time 1 predictor variables and Time 3 psychosocial outcomes are shown in Table 6.10. Higher disturbance in the attainment of goals at Time 1 was significantly related to greater restrictions in participation, higher negative affect, poorer QoL in the physical, psychological and social domains, poorer general and social adjustment, and greater symptoms of depression at Time 3. Greater endorsement of TGP at baseline was associated with higher positive affect, better psychological and environmental QoL, and greater general and social adjustment to amputation at follow-up. Greater accommodative flexibility on admission to rehabilitation was significantly associated with higher levels of participation, lower negative affect and depressive symptoms, greater QoL in the physical, psychological and environment domains, as well as better general and social adjustment six months after discharge. The associations between Time 1 optimism and Time 3 psychosocial outcomes were all non-significant, while greater perceived social support at baseline was associated with better QoL in the psychological and environmental domains at follow-up.

Table 6.10. Correlations between Time 1 predictor variables and Time 3 outcome variables

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	Goal disturbance (T1)	-														
2.	TGP (T1)	-0.01	-													
3.	FGA (T1)	-0.28**	0.34**	-												
4.	Optimism (T1)	-0.02	0.31**	0.39**	-											
5.	Perceived social support (T1)	0.16	-0.03	-0.14	0.02	-										
6.	Participation (T3)	0.33**	-0.29*	-0.43**	-0.24	-0.10	-									
7.	Positive affect (T3)	-0.13	0.41**	0.16	0.01	-0.08	-0.41**	-								
8.	Negative affect (T3)	0.36**	-0.21	-0.46**	-0.16	0.15	0.47**	-0.12	-							
9.	QoL-physical (T3)	-0.32*	0.23	0.32*	0.04	0.14	-0.58**	0.27*	-0.57**	-						
10.	QoL-psychological (T3)	-0.39**	0.35**	0.46**	0.11	-0.35**	-0.43**	0.49**	-0.54**	0.62**	-					
11.	QoL-social relationships (T3)	0.26*	-0.08	-0.18	0.05	0.13	0.28*	-0.12	0.42**	-0.55**	-0.57**	-				
12.	QoL-environment (T3)	-0.23	0.25*	0.42**	0.20	-0.27*	-0.57**	0.35**	-0.67**	0.69**	0.68**	-0.45**	-			
13.	General adjustment (T3)	-0.38**	0.31*	0.53**	0.16	-0.14	-0.51**	0.35**	-0.62**	0.47**	0.68**	-0.34**	0.57**	-		
14.	Social adjustment (T3)	0.26*	-0.47**	-0.40**	-0.07	0.21	0.37**	-0.34**	0.42**	-0.28*	-0.58**	0.13	-0.44**	-0.81**	-	
15.	Adjustment to limitations (T3)	-0.22	0.20	0.24	0.10	0.18	-0.56**	0.26*	-0.42**	0.49**	0.29*	-0.35**	0.38**	0.40**	-0.13	-
16.	Depression (T3)	0.32*	-0.16	-0.40**	-0.23	-0.01	0.53**	-0.29*	0.65**	-0.73**	-0.68**	0.53**	-0.69**	-0.54**	0.33**	-0.41**

Note: Inverse transformations were performed on quality of life in the social relations domain and social adjustment, and scores on these variables should be reversed prior to interpretation.
* $p \le .05$; ** $p \le .01$

6.1.3 Multivariate analyses between T1 predictors and T3 outcomes

Hierarchical regression analyses were performed in order to determine if goal disturbance, TGP, and FGA on admission to rehabilitation were predictive of psychosocial outcomes six months after discharge, as predicted in Hypothesis 6(a). Time 3 assessments of psychosocial outcomes acted as dependent variables in the analyses. In each case, baseline (Time 1) scores on the outcome variable and any sociodemographic (age, gender) or clinical (level of amputation, cause of amputation, time since amputation, average pain intensity at Time 3) variables significantly associated ($p < .05$) with the outcome at Time 3 (see Tables 6.8 and 6.9) were controlled for in the first step. Optimism and perceived social support at Time 1 were entered in the second step, followed by Time 1 assessments of goal disturbance, TGP, and FGA in the third and final step.

In support of Hypothesis 6(a), goal disturbance, TGP, and FGA at Time 1 together contributed significantly to the prediction of several psychosocial outcomes at Time 3, after controlling for baseline scores, sociodemographic and clinical variables, optimism, and perceived social support. The results of these analyses are summarised in Tables 6.11 to 6.14, which report the unstandardized and standardized beta values from the final models of each regression analysis.

6.2.3.1 Participation

The hierarchical regression analysis predicting participation at Time 3 was significant, as shown in Table 6.11, with Steps 1 and 3 contributing significantly to the model, in accordance with Hypothesis 6(a). The final model accounted for 38% of the variance in participation at the third time point. In addition to baseline scores and pain intensity, FGA at Time 1 was a significant predictor of this outcome. Greater endorsement of this adaptive self-regulatory mode on admission to rehabilitation was predictive of fewer restrictions in participation six months after discharge.

Table 6.11. Summary of hierarchical regression analysis predicting participation at Time 3

Variable	*B*	*SE B*	*β*	*ΔR²*
Step 1				.272***
Participation (T1)	0.38	0.14	0.32**	
Pain intensity (T3)	1.68	0.67	0.27*	
Step 2				.030
Optimism (T1)	0.31	0.63	0.06	
Perceived social support (T1)	-11.25	5.74	-0.21	
Step 3				.147**
Goal disturbance (T1)	16.90	12.31	0.16	
TGP (T1)	-0.35	0.24	-0.16	
FGA (T1)	-0.95	0.39	-0.29*	
				R^2 = .449, Adj. R^2 = .377
				F(7, 53) = 6.18***

Note: An inverse transformation was performed on perceived social support at Time 1, and scores on this variable should be reversed prior to interpretation.
* $p \leq .05$; ** $p \leq .01$; ** * $p \leq .001$

6.2.3.2 Positive and negative affect

Table 6.12 shows that the final regression model for positive affect at Time 3 was significant, accounting for 14% of the variance in this outcome. Step 3 was significant, lending further support to Hypothesis 6(a), although the addition of baseline scores on optimism and perceived social support in the second step failed to contribute significantly to the model. TGP was the only independent predictor in the final regression, with greater assimilative tenacity on admission to rehabilitation being predictive of higher positive affect six months post-discharge. Both age and pain intensity were significantly associated with measures of negative affect at Time 3, and were controlled for in the first step of the hierarchical regression analysis, along with baseline scores on this outcome. In line with Hypothesis 6(a), the addition of Time 1 self-regulatory constructs in the third step contributed significantly to the model, which accounted for 38% of the variance in negative affect at this time point. The only independent predictors in this model were baseline outcome scores and average pain intensity at Time 3.

Table 6.12. Summary of hierarchical regression analyses predicting positive and negative affect at Time 3

Variable	Positive affect				Negative affect			
	B	*SE B*	*β*	*ΔR²*	*B*	*SE B*	*β*	*ΔR²*
Step 1				.076*				.335***
Outcome variable (T1)	0.20	0.16	0.17		0.06	0.03	0.29*	
Age	-	-	-		-0.01	0.01	-0.11	
Pain intensity (T3)	-	-	-		0.02	0.01	0.28*	
Step 2				.008				.014
Optimism (T1)	-0.46	0.40	-0.16		0.01	0.01	0.11	
Perceived social support (T1)	-1.06	3.73	-0.04		0.04	0.06	0.06	
Step 3				.144*				.111*
Goal disturbance (T1)	-7.17	7.24	-0.13		0.18	0.13	0.17	
TGP (T1)	0.48	0.16	0.40**		-0.01	0.01	-0.15	
FGA (T1)	-0.01	0.26	-0.01		-0.01	0.01	-0.25†	
				R^2 = .229, Adj. R^2 = .141				R^2 = .460, Adj. R^2 = .375
				F(6, 53) = 2.62*				*F*(8, 51) = 5.43

Note: An inverse transformation was performed on perceived social support at Time 1, and scores on this variable should be reversed prior to interpretation.
* *p* ≤ .05; ** *p* ≤ .01; ** * *p* ≤ .001; † *p* = .066

6.2.3.3 Quality of life

Hierarchical regression analyses were conducted to predict scores on each domain of the WHOQOL-BREF at Time 3. Level of amputation was significantly associated with physical QoL and was represented by two dummy variables (one for below-knee amputation and the other for above-knee amputation, with bilateral amputation acting as the reference group in each case) in the first step of the equation, along with baseline outcome scores. The overall model was significant ($F_{(8, 53)} = 5.40$, $p < .0001$), accounting for 37% of the variance in the physical domain of QoL at the third time point ($R^2 = .449$, Adj. $R^2 = .366$), with Step 1 being the only significant contributor. In addition to physical QoL at baseline ($\beta = 0.37$, $p = .006$), level of amputation was an independent predictor of this outcome at Time 3, with having a below- ($\beta = 0.51$, $p = .011$) or above-knee ($\beta = 0.72$, $p = .001$) amputation being predictive of better QoL in this domain at Time 3.

The regression model predicting psychological QoL at Time 3 controlled for cause of amputation and baseline scores in the first step. The overall model was significant, accounting for 53% of the variance in this outcome (see Table 6.13), with Steps 1 and 3 making significant contributions. In support of Hypothesis 6(a), the addition of baseline scores on the self-regulatory variables accounted for 7% of the variance in this domain at Time 3, controlling for the other predictors. The only independent predictors in the final model were baseline outcome scores and TGP. Greater assimilative tenacity on admission to rehabilitation was predictive of higher QoL in the psychological domain at six months post-discharge.

QoL in the social relations domain at Time 3 was significantly associated with cause of amputation, which was controlled for in the first step of the hierarchical regression analysis along with baseline scores on this outcome. The overall model successfully explained 29% of the variance in this domain at Time 3 ($F_{(7, 54)} = 4.55$, $p < .0001$, $R^2 = .371$, Adj. $R^2 = .290$), although only Step 1 contributed significantly, and social QoL at baseline (β = -0.63, $p < .0001$) was the only independent predictor in the final regression. Table 6.13 shows that the hierarchical regression analysis was significant for the environment domain of QoL at Time 3. Steps 1 and 3 added significantly to the model, providing support for Hypothesis 6(a). Both baseline outcome scores and FGA were significant predictors of this domain at Time 3, with greater accommodative flexibility on admission to rehabilitation being predictive of better QoL in the environment domain six months after discharge.

Table 6.13. Summary of hierarchical regression analyses predicting psychological and environment domains of QoL at Time 3

Variable	Psychological				Environment			
	B	*SE B*	β	ΔR^2	*B*	*SE B*	β	ΔR^2
Step 1				.479***				.272***
Outcome variable (T1)	0.50	0.11	0.51***		0.54	0.15	0.43***	
Cause of amputation	-0.65	0.69	-0.11		-	-	-	
Step 2				.039				.017
Optimism (T1)	-0.15	0.08	-0.19		-0.09	0.12	-0.10	
Perceived social support (T1)	-1.31	0.76	-0.16		-0.93	1.07	-0.10	
Step 3				.066*				.096*
Goal disturbance (T1)	-1.12	1.71	-0.07		-0.33	2.06	-0.20	
TGP (T1)	0.07	0.03	0.23*		0.04	0.04	0.12	
FGA (T1)	0.06	0.05	0.13		0.16	0.07	0.29*	
	R^2 = .584, Adj. R^2 = .530				R^2 = .385, Adj. R^2 = .318			
	$F(7, 54)$ = 10.83***				$F(6, 55)$ = 5.75***			

Note: An inverse transformation was performed on perceived social support at Time 1, and scores on this variable should be reversed prior to interpretation.
* $p \leq .05$; ** $p \leq .01$; ** * $p \leq .001$

6.2.3.4 Psychosocial adjustment to amputation

As shown in Table 6.14, general adjustment to amputation at Time 3 was significantly predicted by the final regression model, which accounted for 48% of the variance in this outcome. The addition of Time 1 measures of optimism and perceived social support in Step 2 did not add significantly to the prediction of this outcome. Step 3 contributed significantly, however, and accounted for 10% of the total variance explained, providing further support for Hypothesis 6(a). The two independent predictors to emerge in the final model were general adjustment and FGA at Time 1. It was found that showing greater accommodative flexibility on admission to rehabilitation was predictive of better general adjustment to lower limb loss six months post-discharge.

The regression model for social adjustment was also significant, explaining 41% of the variance in this outcome at Time 3 (see Table 6.14). Steps 1 and 3 contributed significantly, with baseline assessments of the self-regulatory constructs accounting for 15% of the variance in social adjustment at the third time point, in accordance with Hypothesis 6(a). Three independent predictors emerged in the final model for social adjustment at Time 3. In addition to baseline scores, lower dispositional optimism and greater assimilative tenacity on admission were predictive of enhanced social adjustment to lower limb amputation six months after discharge.

Adjustment to limitations at Time 3 was significantly associated with average pain intensity at this time point, which was controlled for in Step 1 of the hierarchical regression model, in addition to baseline scores. Although the overall model was significant ($F_{(7,\,53)} = 3.48$, $p = .004$, $R^2 = .315$, Adj. $R^2 = .225$), only Step 1 contributed significantly to the prediction of this outcome, and adjustment to limitations at Time 1 was the only independent predictor to emerge ($\beta = 0.32$, $p = .019$).

Table 6.14. Summary of hierarchical regression analyses predicting general and social adjustment to amputation at Time 3

Variable	General adjustment				Social adjustment			
	B	*SE B*	*β*	*ΔR²*	*B*	*SE B*	*β*	*ΔR²*
Step 1				.425***				.290***
Outcome variable (T1)	0.58	0.14	0.49***		-0.18	0.06	-0.39**	
Step 2				.008				.029
Optimism (T1)	-0.03	0.02	-0.16		0.02	0.01	0.24*	
Perceived social support (T1)	-0.03	0.18	-0.02		0.08	0.08	0.10	
Step 3				.097*				.149**
Goal disturbance (T1)	-0.43	0.37	-0.12		0.13	0.16	0.09	
TGP (T1)	0.01	0.01	0.13		-0.01	0.01	-0.35**	
FGA (T1)	0.03	0.01	0.28*		-0.01	0.01	-0.17	
				R^2 = .529, Adj. R^2 = .478				R^2 = .468, Adj. R^2 = .410
				F(6, 55) = 10.31***				F(6, 55) = 8.07***

Note: An inverse transformation was performed on perceived social support at Time 1 and social adjustment at Time 3, and scores on these variables should be reversed prior to interpretation.
* $p \le .05$; ** $p \le .01$; ** * $p \le .001$

6.2.3.5 Depressive symptomatology

The hierarchical regression analysis predicting depressive symptomatology at Time 3 accounted for 41% of the variance in this outcome ($F_{(6, 53)} = 7.94$, $p < .0001$, $R^2 = .473$, Adj. $R^2 = .414$). Contrary to Hypothesis 6(a), Steps 2 and 3 failed to contribute significantly to the model, with depressive symptoms at baseline emerging as the only significant predictor in the final model ($\beta = 0.63$, $p < .0001$).

6.3 Summary of findings

The fifth and sixth study objectives focused on examining the relationships between self-regulatory constructs and psychosocial outcomes longitudinally. Hierarchical regression analyses were performed to investigate whether goal disturbance, TGP, and FGA on admission to rehabilitation were predictive of psychosocial outcomes at six weeks and six months post-discharge. It was found that these goal-related constructs had little predictive value with regard to psychosocial outcomes at Time 2 once baseline outcome scores had been taken into account. In support of Hypothesis 5(a), however, their contribution to the regression analyses predicting physical and psychological QoL as well as social adjustment was significant, accounting for between 6% and 14% of additional variance in these outcomes. Goal disturbance was a significant predictor of QoL in the environment domain at the second time point, although Step 3 was not significant overall. Both TGP and FGA at baseline were independent predictors of social adjustment at six weeks post-discharge. FGA also emerged as a significant predictor of negative affect at Time 2, although Step 3 did not contribute significantly to its prediction overall.

The utility of goal-related constructs on admission to rehabilitation in predicting psychosocial outcomes following lower limb amputation appeared to increase over time, however. In support of Hypothesis 6(a), the addition of Time 1 measures of goal disturbance, TGP, and FGA contributed between 7% (psychological QoL) and 15% (social adjustment) of additional variance towards the prediction of participation, positive and negative affect, psychological and environmental QoL, general adjustment, and social adjustment at Time 3, controlling for Time 1 outcome scores, optimism, and perceived social support. Greater endorsement of TGP on admission to rehabilitation independently predicted higher levels of positive affect, greater QoL in the psychological domain, and better social adjustment to amputation six months after discharge from the programme. In addition, higher levels of FGA at baseline were significantly predictive of fewer restrictions in participation, better QoL in relation to the environment, and enhanced general adjustment to amputation at six months post-discharge.

6.4 Discussion

The findings of the present chapter provide longitudinal evidence for the efficacy of the framework proposed in the present study in explaining the process of psychosocial adjustment following lower limb amputation. Goal disturbance, TGP, and FGA on admission to rehabilitation together contributed significantly to the prediction of a number of psychosocial outcomes at both six weeks post-discharge and six months post-discharge, as stated in Hypotheses 5(a) and 6(a). The predictive value of the self-regulatory constructs appeared to be stronger at six months post-discharge, as their addition contributed significantly to the prediction of a greater number of psychosocial outcomes at this time point. This strengthening of relationships over time highlights the importance of longitudinal research in capturing the dynamic character of the adjustment process.

6.4.1 Goal disturbance

Although greater disturbance in the attainment of valued goals on admission to rehabilitation was still significantly associated with poorer psychosocial outcomes six weeks after discharge, its influence appeared to weaken over time. This was reflected in the observation that goal disturbance only emerged as an independent predictor of QoL in the environment domain at six weeks post-discharge, and failed to independently predict any of the psychosocial outcomes assessed at six months post-discharge. This contrasts with the findings of a study carried out by Boersma, Maes, and van Elderen (2005), in which goal disturbance 2-5 weeks after hospitalisation for MI was a significant predictor of both HRQL and symptoms of depression 4 months later, after controlling for baseline scores, demographics, angina complaints, coping, and social support. Similarly, Echteld and associates (2003) found that goal disturbance at the time of being placed on waiting list for angioplasty was predictive of disease-specific QoL and negative affect, but not positive affect, three months after the procedure. As noted in

Chapter 5, however, goal disturbance increased significantly from admission to six weeks post-discharge, which may help to explain the weak associations observed between baseline measures of goal disturbance and psychosocial outcomes at follow-up. Change scores in goal disturbance from Time 1 to Time 2 may thus have a closer association with long-term psychosocial outcomes in the present study.

6.4.2 TGP and FGA

TGP and FGA on admission to rehabilitation were significantly associated with enhanced psychosocial outcomes among individuals with lower limb amputations at both follow-up time points, lending further support to the assumptions of the dual-process model (Brandstädter & Renner, 1990), and suggesting that these adaptive self-regulatory modes may serve as an appropriate means for describing the mechanisms underlying the process of psychosocial adjustment in this population. These findings are consistent with a longitudinal study of 80 stroke patients conducted by Darlington and colleagues (2009), in which it was observed that FGA prior to discharge significantly predicted QoL 9-12 months later once baseline scores, age, and gender were controlled for, with TGP approaching significance as a predictor. The significance of TGP and FGA as predictors of psychosocial outcomes over time indicates that assessing these variables early on in the rehabilitation process may help to identify individuals at risk for poor long-term adjustment following amputation. Additionally, these adaptive self-regulatory constructs may represent important targets for interventions to enhance psychosocial adjustment in this population.

Once again, TGP and FGA appeared to diverge in the psychosocial outcomes they were associated with among persons with amputations. Higher assimilative tenacity on admission to rehabilitation was predictive of greater social adjustment at both of the follow-up time points, as well as higher positive affect and better QoL in the psychological domain at six months post-discharge. Higher accommodative flexibility at baseline also independently predicted social adjustment, but only at the second study time point. Greater endorsement of this adaptive self-regulatory mode on admission to rehabilitation also predicted lower negative affect at six weeks post-discharge, as well as fewer restrictions in participation, better environmental QoL, and greater general adjustment to amputation at six months post-discharge. These findings lend further support to the assumption that these two adaptive self-regulatory modes operate in synergy, each augmenting different aspects of psychosocial well-being in this population. The findings also provide longitudinal support for the argument that both modes operate through different mechanisms to enhance psychosocial adjustment to lower limb amputation, with TGP promoting the experience of positive emotions and FGA buffering against negative affect (Heyl et al., 2007).

6.4.3 Sociodemographic and clinical factors

The pattern of associations between sociodemographic and clinical factors and psychosocial outcomes at the follow-up time points differed noticeably from those observed at Time 1. Whereas gender was significantly correlated with negative affect, psychological QoL, general and social adjustment, and depressive symptoms on admission to rehabilitation, it was not associated with any of these outcomes at six weeks or six months post-discharge. Indeed, previous research has indicated that women are at increased risk for symptoms of depression (Williams et al., 2004) and PTSD (Phelps et al., 2008) in the first six months following their amputation surgery, although the gender gap in psychosocial outcomes appears to narrow after this point. These findings suggest that women tend to experience heightened levels of distress in the early stages of adjustment to amputation, and may thus derive benefit from greater psychological input during their rehabilitation programme.

Younger age was associated with poorer psychosocial outcomes at follow-up in the present sample, as had previously been observed on admission to rehabilitation. Being younger related to poorer QoL in the physical, social and environment domains six weeks after discharge from rehabilitation at the bivariate level, but did not emerge as a significant predictor in the multivariate analyses. Age was also negatively correlated with negative affect six months after discharge. Phelps and colleagues (2008) similarly observed increasing levels of PTSD symptoms among younger participants over the twelve months following their amputation surgery. These findings indicate that younger individuals who undergo amputation may be at greater risk for emotional distress in the long-term, and may thus require more intensive psychological intervention during their rehabilitation programme, as well as ongoing support following their discharge home.

Having an amputation secondary to acute causes continued to be associated with poorer psychosocial outcomes over time in the present study, and was related to lower QoL in the social and environment domains, and poorer adjustment to limitations six weeks after discharge, as well as poorer psychological and social QoL six months after discharge. This factor was not a significant predictor of any of these outcomes at a multivariate level, however. These findings contrast with previous longitudinal research carried out in this population, in which the associations between amputation etiology and indicators of psychosocial adjustment were non-significant (Phelps et al., 2008; Williams et al., 2004). Amputation etiology was strongly correlated with age in the present sample ($r = 0.64$), with younger participants tending to have amputations secondary to acute causes, which may partly account for its significant associations with psychosocial outcomes. Additionally, having a below- or above-knee amputation, as opposed to bilateral amputations, was significantly predictive of enhanced physical QoL at Time 3. This is in keeping with the broader literature on limb loss, in which level of amputation has proven an important factor in predicting successful functional, although not necessarily psychological, outcome (Horgan & MacLachlan, 2004).

Time since amputation was associated with better adjustment to limitations at six weeks post-discharge, and emerged as a significant predictor of this outcome. A greater amount of time elapsed since amputation may have afforded participants the opportunity to have appropriate revisions made to their homes prior to discharge, thus reducing the extent to which limitations were experienced on their return. Additionally, participants had more time to reconcile themselves to the practical limitations associated with their limb loss, and accommodative processes such as positive reinterpretation and reprioritisation of goals may have resulted in a diminution of their importance to these individuals. Time since amputation was not related to any other psychosocial outcomes across the study period, however, despite the significant variation observed among participants in the number of weeks that had elapsed since their procedure. Although one might assume that greater psychosocial adjustment occurs with the passing of time, this lack of association is consistent with previous cross-sectional research carried out in this patient group (Breakey, 1997; Desmond, 2007; Fisher & Hanspal, 1998a; Frank et al., 1984; Rybarczyk et al., 1992, 1995; Williamson et al., 1994). Longitudinal examinations of psychosocial outcomes such as provided in the present study demonstrate the dynamic character of adjustment to amputation (Kratz et al., 2010; Singh et al., 2009; Williams et al., 2004), however, and suggest that static indicators of time such as the number of weeks since amputation may fail to capture the fluid nature of this process.

Pain intensity, which was assessed concurrently at each time point, continued to be associated with greater psychosocial difficulties at both six weeks and six months post-discharge. At Time 2, higher levels of pain intensity were significantly related to greater negative affect and depressive symptoms, and poorer QoL in the physical, social and environmental domains, and emerged as a significant predictor in the case of negative affect, environmental QoL, and depressive symptomatology. Higher pain intensity at Time 3 was associated with greater restrictions in participation, higher negative affect, and poorer adjustment to limitations, and was independently predictive of participation and negative affect at a multivariate level. Indeed, pain intensity has consistently been found to have a negative impact on a wide range of outcomes among persons with amputations, including activity restrictions (Williamson et al., 1994), employment status (Whyte & Carroll, 2002), depressive symptomatology (Jensen et al., 2002), and physical functioning (Wegener, Castillo, Haythornthwaite, MacKenzie, & Bosse, 2011). These findings indicate the importance of providing ongoing medical and psychological assistance to individuals who suffer from elevated levels of amputation-related pain in order to enhance their prospects of adjusting successfully to their limb loss.

6.4.4 Optimism and perceived social support

Baseline levels of optimism and perceived social support together added significantly to the regression model predicting social adjustment at Time 2, but failed to contribute to the prediction of any outcomes assessed at Time 3, once baseline scores and significantly associated sociodemographic and clinical factors had been controlled for. These findings indicate that TGP and FGA predict psychosocial outcomes more consistently in this population, and represent important targets for interventions to enhance psychosocial adjustment to amputation.

Only one previous study has examined the role of optimism in adjustment to limb loss, which was cross-sectional in design (Dunn, 1996), and found that higher optimism was associated with higher self-esteem and fewer symptoms of depression among persons with amputations. An examination of the bivariate associations between dispositional optimism and psychosocial outcomes in the present study indicates that although higher optimism was associated with enhanced psychosocial outcomes at Time 1 (see Table 4.4), its influence on adjustment weakened considerably over time, with no significant associations being observed at Time 3 (see Table 6.10). Surprisingly, lower optimism on admission to rehabilitation was an independent predictor of greater social adjustment to amputation at both six weeks and six months post-discharge. The non-significant bivariate correlations observed between optimism and social adjustment at these time points (see Table 6.4) indicate that it may be acting as a suppressor variable in these regressions. A suppressor variable is one which has a low correlation with the outcome variable, but improves the prediction of the outcome nonetheless, due to its correlations with other predictor variables (Tzelgov & Henik, 1991). This may explain the counterintuitive nature of the findings observed for the hierarchical regression analyses predicting social adjustment at Times 2 and 3, which should be interpreted with caution.

The bivariate associations between perceived social support and indicators of psychosocial adjustment at follow-up were also non-significant, with the exception of QoL, particularly in the psychological and environmental domains. Perceived social support failed to emerge as an independent predictor of any psychosocial outcomes at either Time 2 or Time 3. This is in keeping with the results of a longitudinal study conducted by Williams and colleagues (2004), in which perceived social support one month after amputation surgery was not significantly predictive of depressive symptoms or satisfaction with life five months later in a sample of 89 individuals with limb loss. In contrast, Unwin and associates (2009) found that higher perceived social support at the beginning of rehabilitation predicted better general adjustment to amputation six months later, although its relationship with positive affect was non-significant.

6.4.5 Limitations of findings

There are some limitations that should be taken into account when interpreting the findings for Objectives 5 and 6. Firstly, attrition is a major obstacle in conducting longitudinal research among individuals with lower limb amputations, as ongoing health issues and mortality associated with chronic etiologies can lead to significant drop-out over time. Attrition rates in the present study were similar to those observed in previous longitudinal research carried out in this population (Phelps et al., 2008; Williams et al., 2004), and resulted in a reduction in the sample size from 98 participants at Time 1 to 75 participants at Time 2, and 62 participants at Time 3. The smaller sample size is likely to have reduced the power and reliability of the findings observed at a multivariate level for the follow-up time points. Nonetheless, post-hoc calculations indicated that the statistical power was 80% or higher for the majority of analyses. In addition, the significant associations observed between self-regulatory constructs and psychosocial outcomes were in the direction specified by the study framework and appeared to be quite robust, accounting for a substantial proportion of the variance explained, particularly at the third time point. Secondly, missing data that resulted from the attrition observed may have affected the representativeness of the sample. Indeed, analyses indicated that individuals who continued to participate in the study had significantly higher scores than those who dropped out on measures of FGA, positive affect, and the psychological domain of QoL (see Section 3.2.3). These observations suggest that those who remained in the study may have represented a particularly well-adjusted sector of this patient group, thus limiting the generalizability of findings to the wider population of persons with amputations. Finally, the observation that dispositional optimism may have acted as a suppressor variable in the hierarchical regression models predicting physical QoL and social adjustment at Time 2 cautions vigilance in the interpretation of these analyses. The broader limitations of these findings will be discussed in greater depth in Chapter 7.

6.4.6 Conclusion

The results for Objectives 5 and 6 offer convincing longitudinal evidence for the utility of the present study framework in illuminating the mechanisms underlying psychosocial adjustment to lower limb amputation over time. The use of assimilative tenacity and accommodative flexibility on admission to rehabilitation was significantly predictive of enhanced psychosocial outcomes among persons with lower limb loss in both the short- and long-term, underlining their importance as a means of identifying individuals at risk for poor outcomes in this patient group and as potential targets for intervention. The practical and theoretical implications of these findings will be discussed further in Chapter 7.

CHAPTER 7

DISCUSSION

This chapter provides a general discussion of the present study, its strengths and limitations, the practical and theoretical implications of its findings, and suggestions for future research.

7.1 Review of the rationale for the present study

Lower limb amputation is a life-changing event that can cause significant disruptions in many important areas of existence. Although a substantial minority of individuals suffer from emotional difficulties in the months and years following this procedure, most adapt successfully to the losses and limitations incurred, with some achieving positive change and growth as a result of their experiences. The purpose of the present study was to explore the dynamics underlying the process of psychosocial adjustment to lower limb amputation from a self-regulation perspective, in order to better understand the diversity of outcomes observed in this population.

The theoretical framework for the present study was informed by two models from the literature on self-regulation. According to the cybernetic model of self-regulation (Carver & Scheier, 1998), the rate at which people progress towards the attainment of valued goals has affective consequences. If goal progress is slower than desired, negative affect is experienced, whereas positive affect results if goal progress occurs at a faster rate than anticipated. The dual-process model (Brandstädter & Renner, 1990) delineates two modes of adaptive self-regulation that individuals adopt to manage such discrepancies between perceived and desired goal attainment. TGP involves the adjustment of one’s situation to personal goals, and is adaptive as long as goal attainment remains feasible. When goals exceed available resources or irreversible losses are encountered, shifting from TGP to FGA, which involves the adjustment of personal goals to situational constraints, helps to alleviate feelings of helplessness and preserve a sense of efficacy. However, both modes can synergistically complement each other during concrete coping episodes that confront the individual with a variety of adaptive tasks.

The aim of the present study was to explore the relationships between goal disturbance, assimilative tenacity, accommodative flexibility, and various positive and negative indicators of psychosocial adjustment among individuals with lower limb amputations from admission to rehabilitation up to six months post-discharge.

7.2 Summary of findings

As detailed in Chapters 4, 5 and 6, the findings of the present study offer convincing evidence for the utility of the present study framework in describing the process of psychosocial adjustment to lower limb amputation.

Goal disturbance, TGP, and FGA together contributed significantly to the variance explained in all psychosocial outcomes assessed on admission to rehabilitation, with the exception of environmental QoL, after controlling for sociodemographic and clinical factors, optimism, and perceived social support. Goal disturbance emerged as a significant predictor of participation, negative affect, physical and psychological QoL, general adjustment, adjustment to limitations, and depressive symptomatology, with higher goal disturbance being associated with poorer outcomes. TGP independently predicted positive affect and adjustment to limitations, while FGA was predictive of negative affect, QoL in the psychological and social domains, general adjustment, and symptoms of depression, with greater use of these adaptive self-regulatory modes being associated with more favourable outcomes. Moderated regression analyses revealed that TGP mitigated the negative impact of goal disturbance and pain intensity on adjustment to limitations, while FGA acted as a buffer in the relationship between pain intensity and both negative affect and adjustment to limitations. The ameliorative effect of FGA on participation, general adjustment, and social adjustment was found to be particularly strong among younger participants. A combination of low TGP and high FGA had the greatest protective influence against negative affect, whereas high levels of both adaptive self-regulatory modes produced the best outcome in terms of adjustment to limitations, although only at lower levels of pain intensity.

The goals rated as most important and most impacted by amputation in the present sample were similar to those of other patient groups. Physically-oriented goals appeared to diminish in importance over time, while self- and socially-oriented goals grew in significance. Goals relating to the self appeared to become more difficult to attain over the study period, whereas goals associated with independence and social relations became easier to achieve. Although many of the predictor and outcome variables assessed in the present study remained stable across the three study time points, participation, general adjustment, and social adjustment were found to increase over time, while TGP, positive affect, and adjustment to limitations diminished over the study period. Goal disturbance increased from Time 1 to Time 2, whereas environmental QoL decreased significantly over the same time period.

The associations between baseline assessments of goal disturbance, TGP, and FGA, and psychosocial outcomes had diminished by six weeks after discharge from rehabilitation, with these variables together contributing significantly to the prediction of physical QoL, psychological QoL, and social adjustment only, having controlled for baseline scores, sociodemographic and clinical factors, optimism, and perceived social support. Goal disturbance emerged as a significant predictor of environmental QoL, FGA remained a significant predictor of negative affect, while both TGP and FGA predicted social adjustment at this time point. The relationships between these self-regulatory constructs and psychosocial outcomes at six months post-discharge were stronger, however. Goal disturbance, TGP, and FGA at baseline together added significantly to the prediction of participation, positive and negative affect, psychological and environmental QoL, general adjustment, and social adjustment at this time point, controlling for baseline scores, sociodemographic and clinical factors, optimism, and perceived social support. Goal disturbance failed to significantly predict any outcomes at Time 3. However, FGA was independently predictive of participation, environmental QoL, and general adjustment, and TGP significantly predicted positive affect, psychological QoL and social adjustment.

7.3 Theoretical implications

The findings of the present study contribute significantly to the literature on psychosocial adjustment to amputation in a number of ways. Firstly, despite the recommendations of various authors (Boersma, 2004; Siegert et al., 2004; Sivaraman Nair, 2003; Van Damme et al., 2009), self-regulation theory has rarely been applied to the experience of acquired physical disability. The present study, which examined psychosocial adjustment to limb loss from this theoretical perspective, thus represents an important development in the literature on amputation, and disability more generally, and its findings help to broaden our understanding of the mechanisms underlying adjustment and the role that individuals' goals play in this process. Overall, the results offer convincing evidence for the utility of the framework adopted in the present study for understanding the process of psychosocial adjustment to lower limb amputation. As hypothesised, goal disturbance, TGP, and FGA on admission to rehabilitation together accounted for a significant amount of the variance in psychosocial outcomes both cross-sectionally and longitudinally, even after controlling for significantly associated sociodemographic and clinical variables, optimism, and perceived social support.

The present study provides support for many of the assumptions of self-regulation theory. Firstly, goal disturbance was found to be predictive of negative outcomes on admission to rehabilitation, but had no significant association with positive affect. This observation is in keeping with the tenets of self-regulation theory, which postulates that a slower perceived rate of progress towards attaining one's goals elicits negative affect, and corresponds with the findings of previous studies of psychosocial adjustment in patients with both acute (Boersma, Maes, & Joekes, 2005; Boersma, Maes, & van Elderen, 2005; Echteld et al., 2001; Echteld et al., 2003; Joekes et al., 2005) and chronic (Affleck et al., 1998; Offerman et al., 2010; Rapkin et al., 1994; Schwartz & Drotar, 2009; van der Veek et al., 2007) conditions. These findings suggest that goal disturbance is useful in predicting negative adjustment outcomes, but may need to be supplemented with a measure of goal progress where positive indicators of adjustment are of interest. In addition, the significant increase observed in this variable following discharge denotes its importance as a potential target for interventions to enhance adjustment to amputation.

With regard to assimilative tenacity and accommodative flexibility, the present study provides support for a number of the assumptions put forward in the dual-process model. Firstly, both adaptive self-regulatory modes were predictive of better psychosocial outcomes, both cross-sectionally and longitudinally, as observed in previous research conducted among persons with chronic illness and disability (Boerner, 2004; Darlington et al., 2007; Darlington et al., 2009; Heyl et al., 2007; van Lankveld et al., 2011). Both modes predicted different outcomes, however. Whereas FGA was a significant predictor of negative outcomes such as depressive symptomatology and negative affect, TGP predicted positive affect. This may account for why both assimilative tenacity and accommodative flexibility are positively associated with subjective well-being, with FGA enhancing well-being by reducing the experience of negative emotions, and TGP doing so by increasing positive emotions (Heyl et al., 2007).

These findings support the proposition that TGP and FGA have a synergistic as opposed to antagonistic relationship during concrete episodes of coping such as encountered following amputation (Brandstädter, 2009). This assumption was further supported by the interaction effects that were observed between the two modes, which showed that negative affect was lowest at high levels of FGA and low levels of TGP, whereas adjustment to limitations was greatest at high levels of both adaptive self-regulatory modes. These findings reflect those of a study conducted by Heyl and colleagues (2007) in a sample of adults with age-related vision loss. The finding that the beneficial impact of FGA on psychosocial outcomes was strongest for younger participants provides support for the dual-process model's supposition that the transition from assimilative to accommodative modes that usually occurs as a result of the aging process may take place at an earlier stage when irreversible impairment is incurred (Brandstädter, 2009). The decrease in TGP observed over time appears to provide further indication of this process at work. Given the number of assumptions made in the dual-process model that were met in the present study, it appears that this theoretical model provides a particularly useful account of psychosocial adjustment to amputation, and there is much scope for further application of this model to other groups of patients with acquired disability.

The present study also contributed significantly to the literature on psychosocial adjustment to amputation by broadening our understanding of the dynamic nature of this process. The longitudinal research design afforded a greater insight into the temporal characteristics of adjustment and facilitated the identification of factors that predict long-term psychosocial outcomes following amputation, such as TGP and FGA, which could prove valuable in the early detection of individuals at risk for adjustment difficulties, and may represent important targets for interventions to enhance adjustment in this patient group. The finding that the predictive value of self-regulatory constructs appeared to be stronger at six months than at six weeks post-discharge points to a strengthening of relationships over time. In addition, while some psychosocial outcomes remained stable over time, others increased or decreased steadily, or dipped temporarily following discharge from rehabilitation. These findings suggest that adjustment to amputation is a fluid process, and highlight the vital role that longitudinal research has to play in identifying such fluctuations in psychosocial outcomes that are not immediately apparent in cross-sectional studies and capturing the dynamic character of this process.

Finally, the present study contributed significantly by examining positive as well as negative indicators of psychosocial adjustment to amputation, which allowed for the exploration of potential differences between these dimensions of well-being in terms of their trajectories and underlying mechanisms in this population. The results indicated that positive and negative outcomes diverged in their associations with predictor variables. Firstly, goal disturbance was a significant predictor of negative affect at the first time point but had a non-significant relationship with positive affect, in keeping with previous studies of goal disturbance among individuals with chronic illness and disability (Echteld et al., 2001; Van Der Veek et al., 2009). Secondly, it was found that positive and negative affect were associated with different self-regulatory processes. Whereas TGP was a significant predictor of positive affect at Times 1 and 3, FGA predicted negative affect at the first and second time points. Positive affect was also found to decrease significantly over time among persons with amputations, while negative affect remained stable. Together, these findings suggest that positive and negative affect are independent constructs with different paths and underlying processes, as postulated by previous authors (Diener & Emmons, 1984; Watson et al., 1988), and indicate the importance of adopting a theoretical approach such as self-regulation theory when exploring adjustment to chronic illness and disability, in order to account for the experience of both affective outcomes.

Self-regulation theory has a number of strengths that recommend it as a means of exploring psychosocial adjustment to lower limb amputation. Firstly, the self-regulatory processes it delineates are universal to any situation in which an individual is confronted with change. This broad applicability is particularly important when seeking an understanding of adjustment in a population as heterogeneous in sociodemographic and clinical profile as individuals with lower limb amputations. The parsimonious account of adaptation offered by self-regulation theory is also attractive, and the constructs it describes have a certain intuitive appeal, and a simplicity of meaning that allows them to fit in easily with theories of resilience and adaptation (Brands et al., in press; De Vlieger, Bussche, Eccleston, & Crombez, 2006; Frazier et al., 2007; Leipold & Greve, 2009; Morling & Evered, 2006; Park, 2010). Seeking common themes and processes in psychosocial adjustment to chronic illness and disability is also important for the development of interventions beneficial to all patients undergoing rehabilitation rather than one particular group, which can then be tailored to condition-specific issues as appropriate (Kuijer & De Ridder, 2003). Another major strength of self-regulation theory is its capacity to account for the experience of both positive and negative outcomes. The findings of the present study lend further support to the argument that positive and negative affect are independent constructs rather than opposite poles of the same dimension (Diener & Emmons, 1984; Watson et al., 1988) that are predicted by different psychological factors, and emphasise the importance of assessing both aspects of well-being in research on chronic illness and disability in order to develop a more complete understanding of the separate processes that elicit each affective response.

Self-regulation theory appears to offer several advantages over the transactional theory of stress and coping (Lazarus & Folkman, 1984), a widely influential theory that has informed several studies on adjustment to amputation (Desmond, 2007; Desmond & MacLachlan, 2006b; Livneh et al., 1999), in describing people’s responses to the stress associated with the loss of a limb. For example, several authors have highlighted the advantages of the assimilative-accommodative distinction proposed by Brandstädter and colleagues (Brandstädter & Renner, 1990; Brandstädter, 2009; Brandtstädter & Rothermund, 2002), which recognises the influence of situational factors in determining the utility of coping strategies, above other coping dichotomies that have been proposed such as problem-focused versus emotion-focused coping (Lazarus & Folkman, 1984), which assert a priori whether a particular coping mechanism is adaptive or maladaptive, irrespective of the situation or stressor it is being employed to deal with (Aspinwall, 2004; Skinner et al., 2003; Van Damme, Crombez, & Eccleston, 2008). Stress-coping theory (Lazarus & Folkman, 1984) has also been criticised for failing to capture the dynamic, interactive quality of coping processes, particularly in situations such as following acquired disability where a person must contend with multiple stressors simultaneously (Aspinwall, 2004; Brands et al., in press). Describing coping in terms of self-regulatory processes may more appropriately encapsulate the process of adaptation, which is characterised by the simultaneous interaction of achieving maximal restoration while minimising losses (Brands et al., in press).

The literature on psychosocial adjustment to amputation has been limited to date by a dearth of theory-based research. The findings of the present study demonstrate the value inherent in adopting a theoretical approach to conducting research, with self-regulation theory offering a simple, parsimonious, and clear account of the adjustment process, which served as a useful organising framework for the study and enabled the development of testable research questions and hypotheses (Dunn & Elliott, 2008). The application of such a broad theoretical approach enabled the study to move beyond the scope of research on psychosocial adjustment to acquired physical disability and bring together different strands of knowledge, allowing for the identification of aspects of self-regulation and adaptation common to all human beings. Indeed, the process of adaptation is universal, with all human beings living in an unpredictable world in which they are frequently exposed to changes, both minor and significant, that must be assimilated or accommodated to. Although it is vital to acknowledge unique aspects of the experience of amputation such as issues arising around body image and phantom limb pain, and the individual journey that each person embarks on in adjusting to their new bodies and ways of being in the world, it is also important to acknowledge the universal aspects of this experience, and to allow for insights on adaptation from other areas of thought. The general literature on self-regulation provides many useful insights into the importance of valued, attainable goals in maintaining emotional well-being. Future research on psychosocial adjustment to amputation should look to this and other established theoretical fields for guidance, so that commonalities can be identified in the adaptation process, and a shared viewpoint can be developed from the pooling together of these different sources of knowledge.

7.4 Practical implications

Little is currently known about the types of goals that are valued by persons with amputations, or those they are particularly hindered in attaining as a result of their limb loss. In keeping with the literature on life goals in chronic illness and disability (Conrad et al., 2010; McNamara et al., 2006; Montgomery et al., 1996), goals relating to social relationships and self-concept were found to be of greatest importance to participants in the present study. These goals are rarely considered in the rehabilitation process, however, despite their associations with psychosocial well-being. Indeed, rehabilitation goals tend to focus almost exclusively on physical aspects of recovery, and patients are often not consulted in their formation (Bloom et al., 2006; Boerner & Cimarolli, 2005). Previous research has found that the motivation of an individual to participate fully in rehabilitation depends on concurrence between therapeutic and personal goals (Conrad et al., 2010; Sivaraman Nair, 2003; Wade, 1999). This demonstrates the importance of looking beyond physical goals and finding out what else matters to patients, as disturbances in other life domains may interfere with their rehabilitation progress through their impact on psychosocial well-being. Given that patients are more aware than health care professionals of the resources they have access to, and are thus experts on their own needs and capabilities, consulting them on the goals they most value could help to reduce the tension and mismatch that often occurs between the goals prescribed by the rehabilitation team and the patient’s own concerns and aspirations. The administration of a measure such as the GFI (Maes et al., 2002) or goal elicitation procedures such as PPA (Little, 1983) and MIM (Ylvisaker et al., 2008), may aid in this process.

Elevated levels of disturbance in the attainment of important higher-order goals have consistently been associated with decrements in psychosocial well-being (Boersma, Maes, & van Elderen, 2005; Echteld et al., 2003; Offerman et al., 2010; van der Veek et al., 2007), as observed on admission to rehabilitation among individuals with lower limb amputations in the present study. The finding that goal disturbance increased among participants following discharge from rehabilitation indicates the need for rehabilitation staff to pre-empt difficulties that individuals may experience in attaining goals on their return home following discharge. An assessment of the perceived attainability of goals prior to discharge may be useful in determining whether patients have realistic expectations for goal attainment, and whether they require assistance in developing alternative means of accomplishing valued goals or activities. This would encourage patients to have realistic expectations about their recovery, while providing them with attainable goals to continue to strive towards (Sivaraman Nair, 2003). The observed increase in goal disturbance following discharge from rehabilitation also highlights the importance of providing ongoing support to persons with lower limb amputation, particularly in the immediate period upon their return home, as the reality of life with a disability becomes more apparent.

MIM (Ylvisaker et al., 2008), also referred to as identity oriented goal training (McPherson et al., 2009), is a self-regulation theory-based intervention developed for persons with acquired brain injury, which focuses on identity reconstruction and realistic goal setting to live a meaningful life post-injury (Kangas & McDonald, 2011). MIM was specifically designed for application in multidisciplinary rehabilitation programmes, and facilitates goal engagement by asking patients to select a ‘role model’ they aspire towards being like, and using this as a means of encouraging them to think about their own personally valued goals. The literature on MIM is currently limited to a single pilot study conducted by McPherson and colleagues (2009), who found that this intervention resulted in improved mood among ten patients with acquired brain injury, but had little impact on actual goal attainment scores three months later. These findings, albeit limited, indicate the potential utility of individualised rehabilitation interventions based on self-regulation theory in identifying patients’ goals. This information could be used to inform rehabilitation goals so as to enhance motivation to fully engage in the rehabilitation process (Sivaraman Nair, 2003).

Given the ability of TGP and FGA on admission to rehabilitation to predict a range of psychosocial outcomes six months post-discharge among persons with lower limb amputations, the TGP/FGA scales (Brandstädter & Renner, 1990) may prove valuable as screening tools to identify individuals in this patient group who are at risk for difficulties in long-term psychosocial adjustment. Assessing TGP and FGA at an early stage in the rehabilitation process could help to identify persons who may struggle to adapt to their new circumstances and would benefit from assistance in identifying goals they can continue to strive towards and letting go of those that are no longer attainable. Indeed, Sivaraman Nair (2003) has suggested that coping with the loss of valued goals and refocusing on more attainable goals is essential for rehabilitation to be a success.

As described in Chapter 5, TGP changed over time in the present study. This is in keeping with a longitudinal study conducted by Darlington and colleagues (2007), in which changes in mean scores were observed for both TGP and FGA over four time points in a sample of stroke patients. These findings indicate that assimilative tenacity and accommodative flexibility are dynamic strategies rather than rigid personality traits, and may thus be amenable to intervention. The dual-process model may serve as a useful foundation for the development of interventions to facilitate adjustment to chronic illness and disability through promoting continued striving towards attainable goals and providing support in dissolving commitment to goals that are no longer feasible. Indeed, a recently developed cognitive-behavioural therapy intervention for rheumatic diseases was theoretically grounded in the dual-process model, and included sessions specifically targeted at enhancing both assimilative and accommodative coping responses (Vriezekolk et al., 2011). A formal evaluation of the effectiveness of this intervention is currently underway. However, the authors found that satisfaction rates were high among the 25 patients who participated in a trial version of this programme. This model is particularly suited to the rehabilitation context due to its focus on the goals of the individual, and could easily be adopted into the goal-oriented approach that is already common practice in these settings (Brands et al., in press).

Another existing intervention that may help to foster both assimilative tenacity and accommodative flexibility following amputation is Acceptance and Commitment Therapy

(ACT: Hayes, Strosahl, & Wilson, 1999). The core goal of ACT is to facilitate individuals to lead a life full of purpose and meaning by focusing on and engaging with their goals and values, while taking into account the limitations imposed by their situational constraints (Kangas & McDonald, 2011). ACT views psychological flexibility as a central feature of emotional well-being, which it aims to establish through six core processes: acceptance, cognitive defusion, contact with the present moment, self-as-context, values, and committed action. The concept of psychological flexibility, defined as “how a person: (1) adapts to fluctuating situational demands, (2) reconfigures mental resources, (3) shifts perspective, and (4) balances competing desires, needs, and life domains” (Kashdan & Rottenberg, 2010, p. 866), has substantial overlap with aspects of both TGP and FGA, suggesting that ACT may be useful in enhancing the use of these adaptive self-regulatory modes.

There is a growing evidence base of randomised controlled trials that demonstrate the effectiveness of ACT in treating a range of psychological and medical conditions, including depression and anxiety disorders (Roemer, Orsillo, & Salters-Pedneault, 2008), chronic pain (Dahl, Wilson, & Nilsson, 2004), and self-management of diabetes (Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007), although this intervention has yet to be applied to persons with acquired disability. Given the focus of ACT on accepting what cannot be changed and taking action to live a meaningful life, this therapeutic intervention may help individuals to become more flexible in their responses to the adversity encountered following amputation while continuing to strive towards valued goals. Future research should investigate the efficacy of ACT in enhancing TGP and FGA, and, concomitantly, psychosocial adjustment, following lower limb amputation and other forms of acquired disability.

7.5 Study limitations

The findings of the present study should be considered in light of the following limitations.

Firstly, the small sample size obtained at Times 2 and 3 calls into question the statistical power and reliability of the analyses for these time points. Post-hoc estimations of statistical power for the hierarchical regression models revealed that the majority of analyses across the three time points had 80% power or greater, however, with medium effect sizes being observed, which lends credence to the reliability of the longitudinal results. Of principal concern are the findings of the moderated regression analyses, as a sample size of at least 150-200 is generally recommended for the detection of significant interaction effects (Hoyt et al., 2006), although the moderating effects of TGP and FGA observed were clearly robust enough to be detected in a smaller sample. Further research is required to examine whether the moderating effects of the two adaptive self-regulatory modes are stronger in a larger sample of persons with amputations.

A major obstacle in conducting longitudinal research among individuals with lower limb amputations is the considerable attrition that frequently occurs as a consequence of the comorbidities and high mortality rate associated with chronic amputation etiologies. In the present study, the sample size decreased from 98 participants at baseline to 75 at Time 2 (77% of the original sample), and 62 at Time 3 (63% of the original sample). This is in keeping with attrition rates observed in previous longitudinal studies of persons with amputations that were of a comparable sample size (Phelps et al., 2008; Williams et al., 2004). As statistical methods such as repeated measures ANOVAs and multiple regression employ listwise deletion, which requires participants to contribute data at each time point in order to be included in the analyses, sample sizes for the analysis of follow-up data tend to be quite small, thus limiting the statistical power and reliability of findings. Newer statistical techniques such as multilevel modelling offer significant advantages in the analysis of longitudinal data due to their greater flexibility in the handling of missing data (Kwok et al., 2008). In addition, multilevel modelling permits the examination of non-linear trends in data, whereas multiple regression analyses are limited to linear interpretations of changes over time (Kratz et al., 2010). Although linear trends were observed in a number of the psychosocial outcomes assessed in the present study, others such as goal disturbance and environmental QoL appeared to fluctuate over time. In addition, previous research has found that certain psychosocial outcomes such as loneliness and depressive symptomatology may follow a non-linear trajectory among persons with amputations (Kratz et al., 2010; Singh et al., 2009). Unfortunately, the use of multilevel modelling was not possible in the present study due to a limited sample size and number of time points (Kwok et al., 2008). Future studies incorporating additional waves of data could employ multilevel modelling techniques to further explore the trajectories of change in psychosocial outcomes among individuals with lower limb amputations and their associations with self-regulatory variables over time.

Another limitation of the current research is the exclusive reliance on self-report measures to assess predictors and outcomes of interest. This raises a number of potential issues that require consideration. Firstly, common method variance can occur when self-report questionnaires are used to collect data concurrently from the same participants. Defined as "variance that is attributable to the measurement method rather than to the constructs the measures represent" (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003, p. 879), common method variance can potentially result in systematic measurement errors that can either inflate or deflate the correlations observed between constructs and generate both Type I and Type II errors. Secondly, response biases may have influenced scores, and cross-validation by family members or other observers in future research would be desirable. However, given that psychosocial well-being is very much a subjective experience, with "outsiders" tending to evaluate the difficulties faced by individuals with acquired disability much more negatively than the "insiders" directly experiencing them (Dunn, 2000), self-report measures appear to be the most appropriate means available of gaining an insight into this process. Additionally, qualitative interview methods could be employed to bolster the findings obtained from questionnaires and tease out any issues of interest that may arise from the quantitative data collected (Johnson & Onwuegbuzie, 2004).

The representativeness of the sample in the present study may limit the generalizability of findings. Firstly, the proportion of women who took part in the present study was significantly smaller than observed among non-participants, which suggests that females were under-represented in the sample. The ratio of males to females is similar to previous studies conducted in this patient group, however (Atherton & Robertson, 2006; Phelps et al., 2008; Unwin et al., 2009). In addition, participants for the present study were recruited from a prosthetic rehabilitation programme, and are thus likely to represent a healthier and more able-bodied sector of this population, as many individuals who undergo amputation never attend formal rehabilitation due to age or ill health (Dillingham, Pezzin, & MacKenzie, 1998, 2003). Recruiting participants from hospital settings following amputation surgery may have increased the generalizability of findings. Previous authors have highlighted the significant challenges involved in such an approach, however (Kratz et al., 2010; Phelps et al., 2008).

The limited timeframe of study, from admission to rehabilitation up until six months after discharge, offered only a brief glimpse into the adaptation process, and more extensive longitudinal studies are required to investigate the trajectory of psychosocial adjustment beyond this period. Additionally, there was significant heterogeneity across participants in terms of the amount of time elapsed since amputation, which may have influenced findings. With the exception of adjustment to limitations at Time 3, however, time since amputation was unrelated to any of the psychosocial outcomes assessed in the present study. Although this finding may appear to be counterintuitive, very few studies have found an association between this factor and indicators of psychosocial adjustment among persons with amputations (Horgan & MacLachlan, 2004). Indeed, previous research has demonstrated that many individuals continue to experience emotional difficulties several decades after the loss of their limb (Desmond & MacLachlan, 2006a). These findings demonstrate that psychosocial adjustment to amputation is an ongoing process, and patients may benefit from psychological intervention regardless of how much time has elapsed since the initial event.

7.6 Future research

The results of the present study point towards a number of possible avenues for future research on both psychosocial adjustment to amputation and self-regulation theory.

Firstly, with regard to psychosocial adjustment to amputation, the findings of the present study demonstrate the importance of examining both positive and negative indicators of this process, which appear to be influenced by different underlying mechanisms, given the diverging patterns of associations with predictor variables that were observed. Future research should further explore this dichotomy of affective responses, with a particular emphasis on positive outcomes, which for so long have been overlooked in the psychological literature and research on acquired physical disability (Dunn, Uswatte, & Elliott, 2009). It would be interesting to look at indicators of positive adjustment in this population other than positive affect, and to examine how they relate to self-regulatory processes. For example, posttraumatic growth (Tedeschi & Calhoun, 2004) may have closer ties with FGA, given the common themes of acceptance and benefit finding. Secondly, the changes that were observed in self-regulatory and outcome variables across the study period highlight the importance of examining the process of psychosocial adjustment to amputation longitudinally, and there is much scope for future research to further explore the mechanisms underlying changes in psychosocial outcomes over time in this population. As mentioned previously, the use of multilevel modelling techniques would allow for the exploration of intra- as well as inter-individual trajectories of change, and would permit the detection of non-linear patterns.

Lastly, the finding that TGP and FGA were predictive of better long-term adjustment to amputation indicates the need for the development and piloting of rehabilitation-based interventions to encourage the use of these adaptive self-regulatory modes early on in the adjustment process. Future research should examine the efficacy of existing interventions such as MIM (Ylvisaker et al., 2008) and ACT (Hayes et al., 1999) in improving psychosocial outcomes in this patient group in the long-term. Additionally, the finding that goal disturbance increased significantly following discharge from rehabilitation underscores the need for developing new techniques or piloting existing goal assessments that rehabilitation team members could use to identify patients’ valued goals prior to discharge and pre-empt any difficulties they might experience in their attainment, so as to ease their transition back into the home environment and enhance psychosocial well-being.

A number of gaps in the literature on self-regulation became apparent on conducting the present study, which merit investigation in future research. For example, there was little interaction between goal disturbance, as assessed using the GFI (Maes et al., 2002), and either TGP or FGA in predicting psychosocial outcomes among individuals with amputations in the present study. It may be worthwhile exploring alternative means of examining goal disturbance in future studies, such as assessing concrete rather than higher-order goals, or eliciting patients’ own goals, to see if they would fit in better with these two adaptive self-regulatory modes and offer a more complete picture of the connections between goal discrepancies, assimilative and accommodative coping, and psychosocial outcomes. Additionally, it would be of interest to explore whether measures of goal progress relate differently to psychosocial outcomes, as suggested by the different patterns of findings that emerge with the use of such assessments (Affleck et al., 1998).

Although the parsimony of assimilative tenacity and accommodative flexibility in summarising the processes underlying adaptation to chronic illness and disability is appealing, it would be interesting to learn more about the specific mechanisms through which these adaptive self-regulatory modes operate. Future research should focus on teasing out the specific strategies associated with assimilation and accommodation, such as downward social comparison, positive reappraisal, goal disengagement, the acquisition of knowledge and skills, and the use of compensatory means, which are frequently alluded to in the qualitative literature on adjustment to amputation (Saradjian et al., 2008; Senra, Oliveira, Leal, & Vieira, 2012; Sjödahl, Gard, & Jarnlo, 2004). This could be achieved through a combination of quantitative and qualitative data collection methods, to gain a more well-rounded insight into the characteristics of these strategies and the types of situations in which they are employed (Johnson & Onwuegbuzie, 2004). In addition, there is a tendency in research based on self-regulation theory to focus primarily on psychological outcomes such as well-being or life satisfaction, even in populations where physical health and/or functioning is significantly impaired (Bailly et al., 2012; Boerner, 2004; Boersma, Maes, & van Elderen, 2005; Darlington et al., 2007; Darlington et al., 2009; van der Veek et al., 2007; van Lankveld et al., 2011). Another potential way to expand our current understanding of self-regulation would be for future studies to include indicators of physical well-being as well as psychological measures in order to explore their associations with self-regulatory processes.

7.7 Conclusion

The findings of the present study provide cross-sectional and longitudinal evidence to support the utility of self-regulation theory in describing the process of psychosocial adjustment to lower limb amputation. Greater assimilative tenacity and accommodative flexibility on admission to rehabilitation were predictive of enhanced psychosocial outcomes six months after discharge, and thus represent important targets for intervention in this patient group.

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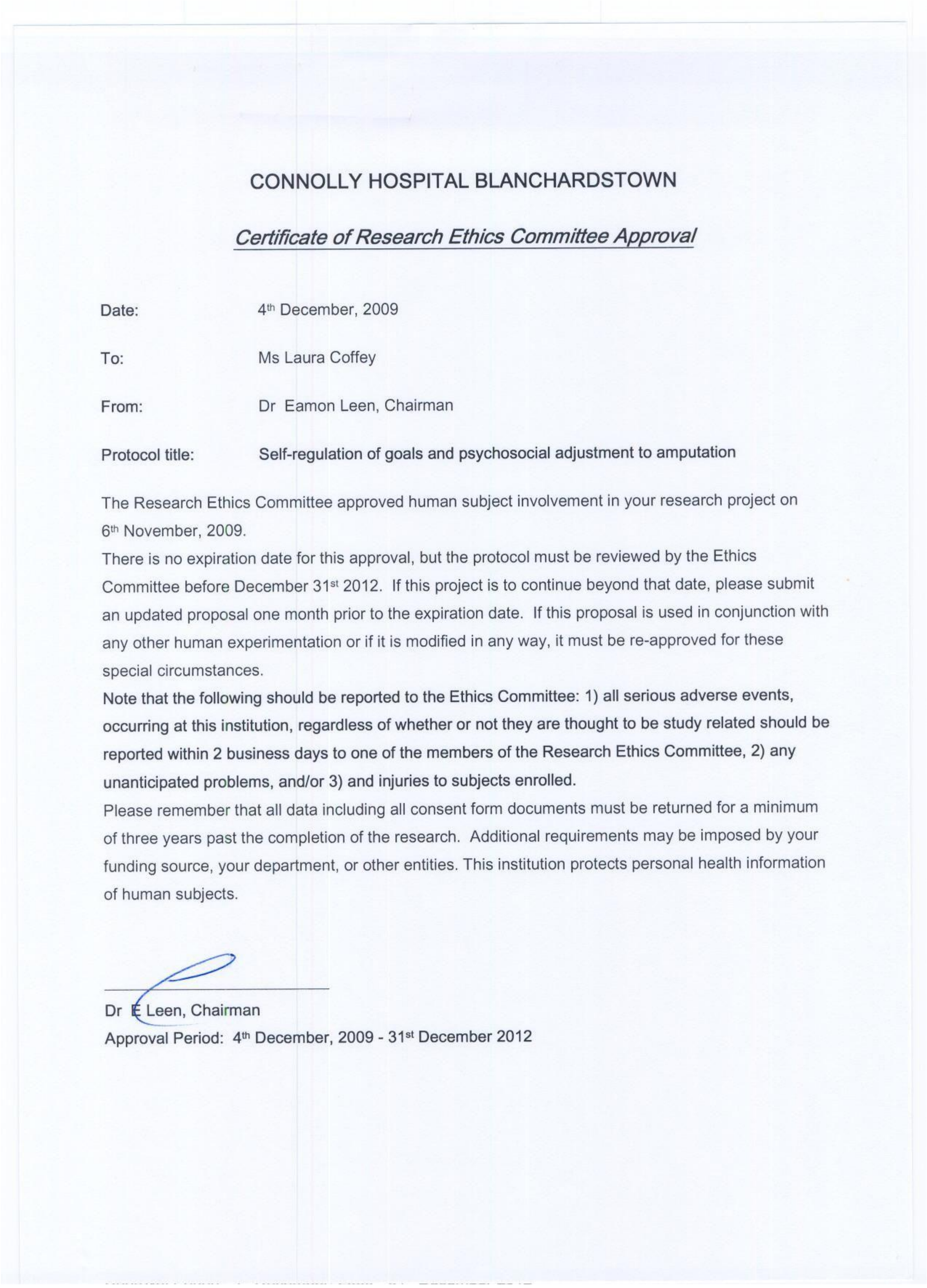
APPENDIX A

LETTER OF APPROVAL FROM HOSPITAL 1 ETHICS COMMITTEE



CONNOLLY HOSPITAL BLANCHARDSTOWN

Certificate of Research Ethics Committee Approval

Date: 4th December, 2009

To: Ms Laura Coffey

From: Dr Eamon Leen, Chairman

Protocol title: **Self-regulation of goals and psychosocial adjustment to amputation**

The Research Ethics Committee approved human subject involvement in your research project on 6th November, 2009.

There is no expiration date for this approval, but the protocol must be reviewed by the Ethics Committee before December 31st 2012. If this project is to continue beyond that date, please submit an updated proposal one month prior to the expiration date. If this proposal is used in conjunction with any other human experimentation or if it is modified in any way, it must be re-approved for these special circumstances.

Note that the following should be reported to the Ethics Committee: 1) all serious adverse events, occurring at this institution, regardless of whether or not they are thought to be study related should be reported within 2 business days to one of the members of the Research Ethics Committee, 2) any unanticipated problems, and/or 3) and injuries to subjects enrolled.

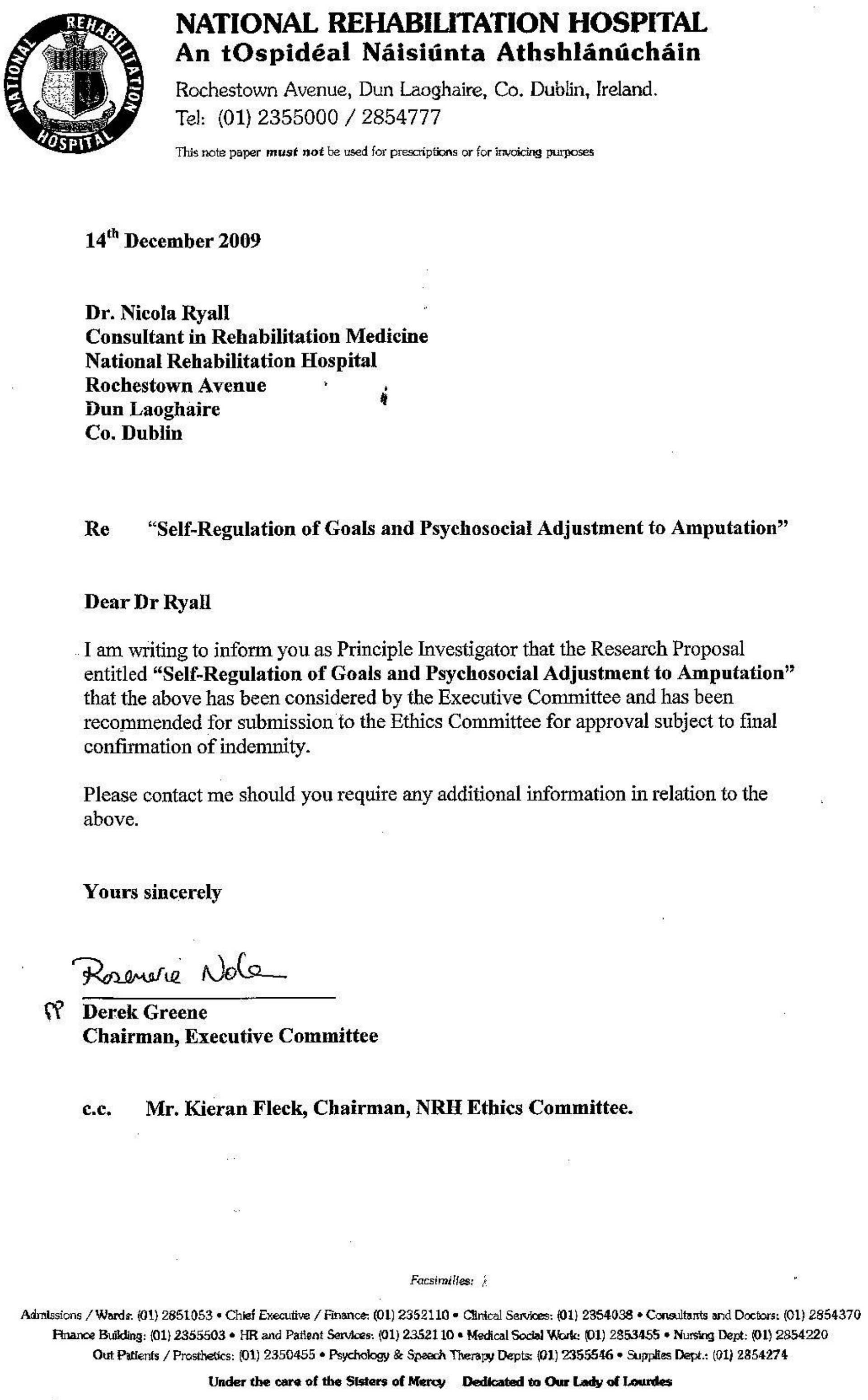
Please remember that all data including all consent form documents must be returned for a minimum of three years past the completion of the research. Additional requirements may be imposed by your funding source, your department, or other entities. This institution protects personal health information of human subjects.

Dr E Leen, Chairman

Approval Period: 4th December, 2009 - 31st December 2012

APPENDIX B

LETTER OF APPROVAL FROM HOSPITAL 2 ETHICS COMMITTEE



NATIONAL REHABILITATION HOSPITAL
An tOspidéal Náisiúnta Athshlánúcháin
Rochestown Avenue, Dun Laoghaire, Co. Dublin, Ireland.
Tel: (01) 2355000 / 2854777

14th December 2009

Dr. Nicola Ryall
Consultant in Rehabilitation Medicine
National Rehabilitation Hospital
Rochestown Avenue
Dun Laoghaire
Co. Dublin

Re “Self-Regulation of Goals and Psychosocial Adjustment to Amputation”

Dear Dr Ryall

I am writing to inform you as Principle Investigator that the Research Proposal entitled **“Self-Regulation of Goals and Psychosocial Adjustment to Amputation”** that the above has been considered by the Executive Committee and has been recommended for submission to the Ethics Committee for approval subject to final confirmation of indemnity.

Please contact me should you require any additional information in relation to the above.

Yours sincerely

Rosemarie Nol

pp **Derek Greene**
Chairman, Executive Committee

c.c. Mr. Kieran Fleck, Chairman, NRH Ethics Committee.

Facsimiles:
Admissions / Wards: (01) 2851053 • Chief Executive / Finance: (01) 2352110 • Clinical Services: (01) 2354038 • Consultants and Doctors: (01) 2854370
Finance Building: (01) 2355503 • HR and Patient Services: (01) 2352110 • Medical Social Work: (01) 2853455 • Nursing Dept: (01) 2854220
Out Patients / Prosthetics: (01) 2350455 • Psychology & Speech Therapy Depts: (01) 2355546 • Supplies Dept.: (01) 2854274
Under the care of the Sisters of Mercy Dedicated to Our Lady of Lourdes

APPENDIX C

INFORMATION SHEET

Self-Regulation of Goals and Psychosocial Adjustment to Amputation

Researchers: Names of researchers

Introduction

You are being invited to take part in a research study. Before you decide whether or not to take part, it is important that you understand why the study is being done and what it will involve. Please take time to read the following information carefully and feel free to discuss it with others. If you have any questions or would like more information, please let us know.

What is the purpose of the study?

The overall aim of this study is to gain a better understanding of how people adjust to losing a limb, and how their life goals are affected by this experience.

Why have I been invited?

This study aims to investigate how people adjust to amputation over time. You have been chosen to take part in this study as you have recently experienced the loss of a limb.

Do I have to take part?

No, it is completely up to you whether you take part or not. If you do decide to take part, you are free to withdraw from the study at ANY time without giving a reason. Your decision will not affect the standard of care you receive.

What will happen to me if I take part?

You are being asked to take part in a study about your experience of adjusting to losing a limb. If you are interested in taking part, you will meet with a researcher, who will tell you more about the study and answer any questions you may have. If you decide to take part, you will be asked to sign a consent form, which indicates that you agree to participate in the study. Once you have signed the consent form, the researcher will arrange to meet with you again within the next few days. At this meeting, the researcher will assist you in filling out a questionnaire, which should take approximately 30 minutes to complete. You will also be asked to fill out a questionnaire on two other occasions:

- six weeks after you have finished your rehabilitation programme
- six months after you have finished

On each of these occasions, the questionnaire will be posted to where you live along with a stamped, addressed envelope in which to return it. Please note that if you would like some help in completing the questionnaire, the researcher can visit you at your home to assist you in filling it out.

What are the possible risks of taking part?

Asking you to think about how important life goals have been affected by amputation may cause emotional distress. If you feel uncomfortable or upset at any stage, you can withdraw without any consequences. In addition, the research team will help you in accessing suitable support systems if required.

What are the possible benefits of taking part?

There are no direct benefits from taking part in the study. However, it is expected that the research will increase our knowledge of the factors that contribute to successful rehabilitation and adjustment to amputation. Having a better understanding of these issues may lead to the development of interventions to aid future rehabilitation patients in the adjustment process.

What information will be held about me?

If you agree to take part, all information collected will be kept strictly confidential within the limitations of the law. All information will have your name and address removed so as to preserve confidentiality. Any information that will identify you in any way will be removed. The researcher, Ms. Laura Coffey, will be responsible for the safety and security of the data. The procedures for handling, processing, storage and destruction of your data will be compliant with the Data Protection Act (1998).

What will happen to the results of the study?

The results of this study will form the basis for preparation of reports, academic publications, conference papers and other scientific publications.

What will happen if I don't want to carry on with the study?

Your participation in this study is entirely voluntary. You are free to decline to take part or to withdraw from the study any time without having to give a reason. If you choose not to participate in the study, or to withdraw once entered, you will not be penalised. It will not affect your medical care and you will not give up any benefits you had before entering the study. Any participation you had in the study previous to your departure from the study will be stricken from the record and destroyed if you so wish. Participation in this study will in no way affect your legal rights.

Who is organising and funding the research?

This research is being organised by a research team from Hospital X and Dublin City University. The research is funded by the School of Nursing, Dublin City University.

Complaints

If you have any concerns about this study, please contact a member of the research team who will do their best to answer your questions:

Name of principal investigator: e-mail address

Name of co-investigator 1: e-mail address

Name of co-investigator 2: e-mail address

Name of co-investigator 3: e-mail address

Name of co-investigator 4: e-mail address

Ms. Laura Coffey (researcher): e-mail laura.coffey5@mail.dcu.ie

If you wish to discuss any concerns you may have with an independent source, please contact:

The Secretary, Ethics Committee, Name of Hospital X, Address of Hospital X.

Phone:

This research has been reviewed by the Hospital X Research Ethics Committee.

You will be given a copy of the information sheet and a signed consent form to keep.

Thank you for taking time to read this sheet.

If you have any queries regarding this study, please contact the researcher at the following:

Name: Laura Coffey

Address: School of Nursing and Human Sciences
Dublin City University
Glasnevin
Dublin 9
Ireland

Phone: (01) 7006917

Email: laura.coffey5@mail.dcu.ie

APPENDIX D

CONSENT FORM

Date:

CONSENT FORM

Title of project: Self-Regulation of Goals and Psychosocial Adjustment to Amputation

Researchers: Names of researchers

Please read the following statements and initial box:

1. I confirm that I have read and understand the information sheet dated X for the above study and have had the opportunity to ask questions and have had these answered satisfactorily. ☐
2. I confirm that I have had sufficient time to consider whether or not I want to be included in the study. ☐
3. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. ☐
4. I agree to take part in the above study. ☐

CONTINUED ON NEXT PAGE

Date:

CONSENT FORM

Title of project:	Self-Regulation of Goals and Psychosocial Adjustment to Amputation
Researchers:	Names of researchers

Name of patient	Date	Signature
Name of person taking consent (If different from researcher)	Date	Signature
Researcher (to be contacted If there are any problems)	Date	Signature

Comments or concerns during the study

If you have any concerns about this study that you wish to discuss with an independent source, please contact:

Secretary of the Ethics Committee, Name of Hospital X, Address of Hospital X.

Phone:

APPENDIX E

CONTACT DETAILS FORM

Participant Details

Identification code: ☐

Name: ______________________________

Address: ______________________________

____

____

____

Home phone number: ______________________________

Mobile phone number: ______________________________

Please note: This information will be stored in a separate locked filing cabinet to your questionnaires and will only be accessible to members of the research team. We will ensure that your anonymity is retained throughout the study.

APPENDIX F

TIME 1 QUESTIONNAIRE

Self-Regulation of Goals and Psychosocial Adjustment to Amputation

Questionnaire (T1)

Identification code: ☐

Dear Participant,

Thank you for agreeing to take part in this study. The following questionnaire should take approximately 30 minutes to complete. Please try to answer <u>all</u> of the questions, and be as honest as you can throughout.

<u>About You</u>

To begin we would like to ask you a few general questions about yourself. Please circle the correct answer or fill in the spaces provided as appropriate.

1. What is your date of birth?	________ / ________ / ________ Day Month Year	
2. What is your gender?	Male	Female
3. What is the highest education you received?	None at all Primary school Secondary school Third level	
4. What is your marital status?	Single Married Living as married	Separated Divorced Widowed

5. What is your living situation?

Living alone
Living with partner
Living with partner and children
Living with family
Living with others

6. How long ago did you have your amputation? ________________________________

Please note: if you have had more than one amputation surgery please refer to your first surgery

7. At what level was your amputation carried out?

Below-knee
Through-knee
Above-knee
Bilateral

8. What was your amputation a result of?

Peripheral vascular disorder
Diabetes
Cancer
Accident
Other (please specify):

____

9. Do you suffer from any other medical problem(s)? Yes No

10. If yes, what other medical problem(s) do you experience?

Cardiac problems
Respiratory problems
Previous stroke
Diabetes
Other (please specify):

____

11. Have you been fitted with a prosthetic limb? Yes No

12. If so, how many hours a day on average do you wear your prosthesis? ______ hours

13. Do you experience residual (stump) pain (pain in the remaining part of your amputated limb)?

    Yes No

14. Do you experience phantom limb pain (pain in the part of the limb which was amputated)?

    Yes No

15. Please rate your pain by circling the one number that best describes your pain on the **average**.

0 No Pain	1	2	3	4	5	6	7	8	9	10 Pain as bad as you can imagine

Section 1 (Goal Facilitation Inventory)

This section asks about the goals you have in life, how important they are to you, and how much they have been affected by your amputation.

The following is a list of things that people may find important in their everyday lives. **To what extent is each of the following things important to you in your everyday life?** This question is answered separately for each of the items listed below. Please circle the appropriate number.

		Not at all important	Not important	Neither important nor unimportant	Important	Very important
1.	Feeling relaxed	1	2	3	4	5
2.	Experiencing excitement	1	2	3	4	5
3.	Having fun	1	2	3	4	5
4.	Experiencing bodily pleasures	1	2	3	4	5
5.	Being healthy	1	2	3	4	5
6.	Discovering new things	1	2	3	4	5
7.	Understanding the world around me	1	2	3	4	5

		Not at all important	Not important	Neither important nor unimportant	Important	Very important
8.	Coming up with new ideas	1	2	3	4	5
9.	Keeping up my self-confidence	1	2	3	4	5
10	Feeling like I belong here	1	2	3	4	5
11.	Reaching a higher level of consciousness	1	2	3	4	5
12.	Feeling unique	1	2	3	4	5
13.	Discovering who I truly am	1	2	3	4	5
14.	Making my own decisions in life	1	2	3	4	5
15.	Doing things better than others	1	2	3	4	5
16.	Receiving support from others	1	2	3	4	5
17.	Feeling connected to the people around me	1	2	3	4	5
18.	Fulfilling my duties to others	1	2	3	4	5
19.	Respecting rules	1	2	3	4	5
20.	Treating others fairly	1	2	3	4	5
21.	Supporting others	1	2	3	4	5
22.	Meeting a challenging standard of performance	1	2	3	4	5
23.	Doing creative things	1	2	3	4	5
24.	Having daily activities run smoothly	1	2	3	4	5
25.	Obtaining more money or possessions	1	2	3	4	5
26.	Ensuring my safety	1	2	3	4	5

To what extent are you currently hindered in achieving each of the following things due to your amputation? This question is answered separately for each of the items listed below. Please circle the appropriate number.

		Not at all hindered	Hardly hindered	Partly hindered	Very hindered	Completely hindered
1.	Feeling relaxed	1	2	3	4	5
2.	Experiencing excitement	1	2	3	4	5
3.	Having fun	1	2	3	4	5
4.	Experiencing bodily pleasures	1	2	3	4	5
5.	Being healthy	1	2	3	4	5
6.	Discovering new things	1	2	3	4	5
7.	Understanding the world around me	1	2	3	4	5
8.	Coming up with new ideas	1	2	3	4	5
9.	Keeping up my self-confidence	1	2	3	4	5
10	Feeling like I belong here	1	2	3	4	5
11.	Reaching a higher level of consciousness	1	2	3	4	5
12.	Feeling unique	1	2	3	4	5
13.	Discovering who I truly am	1	2	3	4	5
14.	Making my own decisions in life	1	2	3	4	5
15.	Doing things better than others	1	2	3	4	5
16.	Receiving support from others	1	2	3	4	5
17.	Feeling connected to the people around me	1	2	3	4	5
18.	Fulfilling my duties to others	1	2	3	4	5
19.	Respecting rules	1	2	3	4	5
20.	Treating others fairly	1	2	3	4	5
21.	Supporting others	1	2	3	4	5
22.	Meeting a challenging standard of performance	1	2	3	4	5

		Not at all hindered	Hardly hindered	Partly hindered	Very hindered	Completely hindered
23.	Doing creative things	1	2	3	4	5
24.	Having daily activities run smoothly	1	2	3	4	5
25.	Obtaining more money or possessions	1	2	3	4	5
26.	Ensuring my safety	1	2	3	4	5

Section 2 (Life Orientation Test-Revised)

This section asks about your outlook on life and your expectations for the future.

Please respond to the following statements about yourself by circling the appropriate number to indicate the extent of your agreement or disagreement. Be as honest as you can throughout. Try not to let your response to one statement influence your response to other statements. There are no right or wrong answers.

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.	In uncertain times, I usually expect the best.	1	2	3	4	5
2.	It's easy for me to relax.	1	2	3	4	5
3.	If something can go wrong for me, it will.	1	2	3	4	5
4.	I'm always optimistic about my future.	1	2	3	4	5
5.	I enjoy my friends a lot.	1	2	3	4	5
6.	It's important for me to keep busy.	1	2	3	4	5
7.	I hardly ever expect things to go my way.	1	2	3	4	5
8.	I don't get upset too easily.	1	2	3	4	5
9.	I rarely count on good things happening to me.	1	2	3	4	5
10.	Overall, I expect more good things to happen to me than bad.	1	2	3	4	5

Section 3 (Multidimensional Scale of Perceived Social Support)

This section asks about the support you receive from the people closest to you.

We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement by circling the appropriate number.

		Very strongly disagree	Strongly disagree	Mildly disagree	Neutral	Mildly agree	Strongly agree	Very strongly agree
1.	There is a special person who is around when I am in need.	1	2	3	4	5	6	7
2.	There is a special person with whom I can share my joys and sorrows.	1	2	3	4	5	6	7
3.	My family really tries to help me.	1	2	3	4	5	6	7
4.	I get the emotional help and support I need from my family.	1	2	3	4	5	6	7
5.	I have a special person who is a real source of comfort to me.	1	2	3	4	5	6	7
6.	My friends really try to help me	1	2	3	4	5	6	7
7.	I can count on my friends when things go wrong.	1	2	3	4	5	6	7
8.	I can talk about my problems with my family.	1	2	3	4	5	6	7
9.	I have friends with whom I can share my joys and sorrows.	1	2	3	4	5	6	7
10.	There is a special person in my life who cares about my feelings.	1	2	3	4	5	6	7
11.	My family is willing to help me make decisions.	1	2	3	4	5	6	7
12.	I can talk about my problems with my friends.	1	2	3	4	5	6	7

Section 4 (WHO Disability Assessment Schedule 2.0)

This section asks about any difficulties you may experience participating in various activities due to your physical disability.

H1	How do you rate your overall health in the past 30 days?	Very good	Good	Moderate	Bad	Very bad

This questionnaire asks about difficulties due to your physical disability. Think back over the last 30 days and answer these questions thinking about how much difficulty you had doing the following activities. For each question, please circle only one response.

In the last 30 days, how much difficulty did you have in:						
S1	Standing for long periods such as 30 minutes?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S2	Taking care of your household responsibilities?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S3	Learning a new task (e.g. learning how to get to a new place)?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S4	How much of a problem did you have joining in community activities (e.g. festivities, religious or other activities) in the same way as anyone else can?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S5	How much have you been emotionally affected by your physical disability?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S6	Concentrating on doing something for ten minutes?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S7	Walking a long distance such as a kilometre?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S8	Washing your whole body?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S9	Getting dressed?	None	Mild	Moderate	Severe	Extreme/ Cannot do

In the last 30 days, how much difficulty did you have in:						
S10	Dealing with people you do not know?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S11	Maintaining a friendship?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S12	Your day to day work?	None	Mild	Moderate	Severe	Extreme/ Cannot do

H2	Overall, how much did these difficulties interfere with your life?	Not at all	Mildly	Moderately	Severely	Extremely
H3	Overall, in the past 30 days, how many days were these difficulties present?	RECORD NUMBER OF DAYS ____ / 30				
H4	In the past 30 days, for how many days were you totally unable to carry out your usual activities or work because of your physical disability?	RECORD NUMBER OF DAYS ____ / 30				
H5	In the past 30 days, not counting the days that you were totally unable, for how many days did you cut back or reduce your usual activities or work because of your physical disability?	RECORD NUMBER OF DAYS ____ / 30				

Section 5 (Tenacious Goal Pursuit/Flexible Goal Adjustment Scales)

This section asks about what you usually do when you are faced with difficult tasks.

Please indicate the extent to which you agree or disagree with the following statements by circling the appropriate number.

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.	When I get stuck on something, it's hard for me to find a new approach.	1	2	3	4	5
2.	The harder a goal is to achieve, the more appeal it has to me.	1	2	3	4	5
3.	I can be very stubborn in pursuing my goals.	1	2	3	4	5
4.	I find it easy to see something positive even in a serious mishap.	1	2	3	4	5
5.	When faced with obstacles, I usually increase my efforts.	1	2	3	4	5
6.	To avoid disappointment, I don't set my goals too high.	1	2	3	4	5
7.	Even when things seem hopeless, I keep on fighting to reach my goals.	1	2	3	4	5
8.	When everything seems to be going wrong, I can usually find a positive side.	1	2	3	4	5
9.	I tend to lose interest in matters where I cannot keep up with others.	1	2	3	4	5
10.	I find it easy to give up a wish if it seems very difficult to fulfill.	1	2	3	4	5
11.	When I run up against overwhelming obstacles, I prefer to look for a new goal.	1	2	3	4	5
12.	Life is much more pleasurable when I do not expect too much from it.	1	2	3	4	5
13.	I create problems for myself because of my high demands.	1	2	3	4	5

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
14.	When I have tried hard but cannot solve a problem, I find it easy just to leave it unsolved.	1	2	3	4	5
15.	In general, I am not upset very long about an opportunity passed up.	1	2	3	4	5
16.	I adapt quite easily to changes in plans or circumstances.	1	2	3	4	5
17.	I usually find something positive even in giving up something I cherish.	1	2	3	4	5
18.	I avoid struggling with problems for which I have no solutions.	1	2	3	4	5
19.	I usually have no difficulty in recognizing my limits.	1	2	3	4	5
20.	If I find I cannot reach a goal, I prefer to change my goal rather than to keep trying.	1	2	3	4	5
21.	After a serious setback, I soon turn to new tasks.	1	2	3	4	5
22.	Faced with a serious problem, I sometimes simply pay no attention to it.	1	2	3	4	5
23.	If I don’t readily get something I want, I pursue it with patience.	1	2	3	4	5
24.	Faced with a disappointment, I usually remind myself that other things in life are just as important.	1	2	3	4	5
25.	I find that even life’s troubles have a bright side.	1	2	3	4	5
26.	It is difficult for me to accept a setback or defeat.	1	2	3	4	5
27.	Even when a situation seems hopeless, I still try to master it.	1	2	3	4	5
28.	I stick to my goals and projects even in the face of great difficulties.	1	2	3	4	5

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
29.	When I get into serious trouble, I immediately look at how to make the best out of the situation.	1	2	3	4	5
30.	I am never really satisfied unless things come up to my wishes exactly.	1	2	3	4	5

Section 6 (Positive and Negative Affect Schedule)

This section asks about the different feelings and emotions that you may have experienced in the past few weeks.

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way during the past few weeks. Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely

______ interested

______ distressed

______ excited

______ upset

______ strong

______ guilty

______ scared

______ hostile

______ enthusiastic

______ proud

______ irritable

______ alert

______ ashamed

______ inspired

______ nervous

______ determined

______ attentive

______ jittery

______ active

______ afraid

Section 7 (WHO Quality of Life Questionnaire-Brief Version)

This section asks how you feel about your quality of life, health, or areas of your life.

Please answer all of the questions. If you are unsure about which response to give to a question, please choose the one that appears most appropriate. This can often be your first response.

We ask that you think about your life **in the last four weeks** when answering these questions.

Please read each question, assess your feelings, and circle the number on the scale for each question that gives the best answer for you.

		Very poor	Poor	Neither poor nor good	Good	Very good
a	How would you rate your quality of life?	1	2	3	4	5

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
b	How satisfied are you with your health?	1	2	3	4	5

The following questions ask about **how much** you have experienced certain things in the last four weeks.

		Not at all	A little	A moderate amount	Very much	An extreme amount
c	To what extent do you feel that physical pain prevents you from doing what you need to do?	1	2	3	4	5
d	How much do you need any medical treatment to function in your daily life?	1	2	3	4	5
e	How much do you enjoy life?	1	2	3	4	5
f	To what extent do you feel your life to be meaningful?	1	2	3	4	5

		Not at all	A little	A moderate amount	Very much	Extremely
g	How well are you able to concentrate?	1	2	3	4	5
h	How safe do you feel in your daily life?	1	2	3	4	5
i	How healthy is your physical environment?	1	2	3	4	5

The following questions ask about **how completely** you experience or were able to do certain things in the last four weeks.

		Not at all	A little	Moderately	Mostly	Completely
j	Do you have enough energy for everyday life?	1	2	3	4	5
k	Are you able to accept your bodily appearance?	1	2	3	4	5
l	Have you enough money to meet your needs?	1	2	3	4	5
m	How available to you is the information that you need in your day-to-day life?	1	2	3	4	5
n	To what extent do you have the opportunity for leisure activities?	1	2	3	4	5

		Very poor	Poor	Neither poor nor good	Good	Very good
o	How well are you able to get around?	1	2	3	4	5

The following questions ask you to say how **good or satisfied** you have felt about various aspects of your life over the last four weeks.

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
p	How satisfied are you with your sleep?	1	2	3	4	5
q	How satisfied are you with your ability to perform your daily living activities?	1	2	3	4	5
r	How satisfied are you with your capacity for work?	1	2	3	4	5
s	How satisfied are you with yourself?	1	2	3	4	5
t	How satisfied are you with your personal relationships?	1	2	3	4	5
u	How satisfied are you with your sex life?	1	2	3	4	5
v	How satisfied are you with the support you get from your friends?	1	2	3	4	5
w	How satisfied are you with the conditions of your living place?	1	2	3	4	5
x	How satisfied are you with your access to health services?	1	2	3	4	5
y	How satisfied are you with your transport?	1	2	3	4	5

The following question refers to **how often** you have felt or experienced certain things in the last four weeks.

		Never	Seldom	Quite often	Very often	Always
z	How often do you have negative feelings such as blue mood, despair, anxiety, depression?	1	2	3	4	5

Section 8 (Trinity Amputation and Prosthesis Experience Scales)

This section asks about your experience of losing a limb and how it affects you.

Below are written a series of statements concerning limb loss. Please read through each statement carefully. Then ***tick the box*** beside each statement, which shows how strongly you agree or disagree with it.

		Strongly disagree	Disagree	Agree	Strongly agree	N/A
1.	I have adjusted to having a limb loss	1	2	3	4	[ ]
2.	As time goes by, I accept my limb loss more	1	2	3	4	[ ]
3.	I feel that I have dealt successfully with this part of my life	1	2	3	4	[ ]
4.	Although I have limb loss, my life is full	1	2	3	4	[ ]
5.	I have gotten used to my limb loss	1	2	3	4	[ ]
6.	I don't care if somebody looks at my amputation	1	2	3	4	[ ]
7.	I find it easy to talk about my limb loss	1	2	3	4	[ ]
8.	I don't mind people asking about my limb loss	1	2	3	4	[ ]
9.	I find it easy to talk about my limb loss in conversation	1	2	3	4	[ ]
10.	I don't care if somebody notices that I have limb loss	1	2	3	4	[ ]
11.	My limb loss interferes with the ability to do my work	1	2	3	4	[ ]
12.	Having a limb loss makes me more dependent on others than I would like	1	2	3	4	[ ]
13.	Having a limb loss limits the kind of work that I can do	1	2	3	4	[ ]
14.	Being an amputee means that I can't do what I want to do	1	2	3	4	[ ]
15.	Having a limb loss limits the amount of work that I can do	1	2	3	4	[ ]

Section 9 (Beck Depression Inventory-II)

This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** that best describes the way you have been feeling during the **past two weeks, including today**. Circle the number beside the statement that you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure you do not choose more than one statement for any group.

1. Sadness	
0	I do not feel sad.
1	I feel sad much of the time.
2	I am sad all of the time.
3	I am so sad or unhappy that I can't stand it.
2. Pessimism	
0	I am not discouraged about my future.
1	I feel more discouraged about my future than I used to be.
2	I do not expect things to work out for me.
3	I feel my future is hopeless and will only get worse.
3. Past Failure	
0	I do not feel like a failure.
1	I have failed more than I should have.
2	As I look back, I see a lot of failures.
3	I feel I am a total failure as a person.
4. Loss of Pleasure	
0	I get as much pleasure as I ever did from the things I enjoy.
1	I don't enjoy things as much as I used to.
2	I get very little pleasure from the things I used to enjoy.
3	I can't get any pleasure from the things I used to enjoy.
5. Guilty Feelings	
0	I don't feel particularly guilty.
1	I feel guilty over many things I have done or should have done.
2	I feel quite guilty most of the time.
3	I feel guilty all of the time.
P.T.O.	

6. Punishment Feelings	
0	I don’t feel I am being punished.
1	I feel I may be punished.
2	I expect to be punished.
3	I feel I am being punished.
7. Self-Dislike	
0	I feel the same about myself as ever.
1	I have lost confidence in myself.
2	I am disappointed in myself.
3	I dislike myself.
8. Self-Criticalness	
0	I don’t criticise or blame myself more than usual.
1	I am more critical of myself than I used to be.
2	I criticise myself for all of my faults.
3	I blame myself for everything bad that happens.
9. Suicidal Thoughts or Wishes	
0	I don’t have thoughts of killing myself.
1	I have thoughts of killing myself, but I would not carry them out.
2	I would like to kill myself.
3	I would kill myself if I had the chance.
10. Crying	
0	I don’t cry any more than I used to.
1	I cry more than I used to.
2	I cry over every little thing.
3	I feel like crying, but I can’t.
11. Agitation	
0	I am no more restless or wound up than usual.
1	I feel more restless or wound up than usual.
2	I am so restless or agitated that it’s hard to stay still.
3	I am so restless or agitated that I have to keep moving or doing something.
12. Loss of Interest	
0	I have not lost interest in other people or activities.
1	I am less interested in other people or things than before.
2	I have lost most of my interest in other people or things.
3	It’s hard to get interested in anything.
P.T.O.	

13. Indecisiveness	
0	I make decisions about as well as ever.
1	I find it more difficult to make decisions than usual.
2	I have much greater difficulty in making decisions than I used to.
3	I have trouble making any decisions.
14. Worthlessness	
0	I do not feel I am worthless.
1	I don’t consider myself as worthwhile and useful as I used to.
2	I feel more worthless as compared to other people.
3	I feel utterly worthless.
15. Loss of Energy	
0	I have as much energy as ever.
1	I have less energy than I used to have.
2	I don’t have enough energy to do very much.
3	I don’t have enough energy to do anything.
16. Changes in Sleeping Pattern	
0	I have not experienced any change in my sleeping pattern
1a 1b	I sleep somewhat more than usual. I sleep somewhat less than usual.
2a 2b	I sleep a lot more than usual. I sleep a lot less than usual.
3a 3b	I sleep most of the day. I wake up 1-2 hours early and can’t get back to sleep.
17. Irritability	
0	I am no more irritable than usual.
1	I am more irritable than usual.
2	I am much more irritable than usual.
3	I am irritable all the time.
18. Changes in Appetite	
0	I have not experienced any change in my appetite.
1a 1b	My appetite is somewhat less than usual. My appetite is somewhat greater than usual.
2a 2b	My appetite is much less than before. My appetite is much greater than usual.
3a 3b	I have no appetite at all. I crave food all the time.
P.T.O.	

19. Concentration Difficulty	
0	I can concentrate as well as ever.
1	I can't concentrate as well as usual.
2	It's hard for me to keep my mind on anything for very long.
3	I find I can't concentrate on anything.
20. Tiredness or Fatigue	
0	I am no more tired or fatigued than usual.
1	I get more tired or fatigued more easily than usual.
2	I am too tired or fatigued to do a lot of the things I used to do.
3	I am too tired or fatigued to do most of the things I used to do.
21. Loss of Interest in Sex	
0	I have not noticed any recent change in my interest in sex.
1	I am less interested in sex than I used to be.
2	I am much less interested in sex now.
3	I have lost interest in sex completely.

Thank you for your time.

APPENDIX G

TIME 2 COVER LETTER

Patient Name
Patient Address

Laura Coffey
School of Nursing and Human Sciences
Dublin City University
Dublin 9

Date

Dear Patient Name,

Many thanks for participating in the study ‘Self-Regulation of Goals and Psychosocial Adjustment to Amputation’ during your time at Hospital X. This gave us really valuable information. This study is being carried out by myself and Dr. X.

As you may recall, follow-up questionnaires are to be completed as part of this study. Please find enclosed the first follow-up questionnaire, which is to be completed six weeks after being discharged from Hospital X. The questionnaire will take approximately 30-40 minutes to fill in.

We would be very grateful if you would take the time to complete the questionnaire and return it in the enclosed postage-paid envelope as soon as possible. As we want to look at how people’s experiences might change over time, getting completed questionnaires back from people at each time point is very important. Please note that your continued participation in this study is completely voluntary, and all information provided will be kept strictly confidential.

If you have been experiencing emotional distress since your discharge from Hospital X, we recommend that you consult your general practitioner or local mental health services.

If you have any questions about the questionnaire or any other aspect of the study, or if you would like help filling in the questionnaire, please do not hesitate to contact me at **01 7006917**. We wish to thank you again for your continued participation.

Yours sincerely,

Laura Coffey.

APPENDIX H

TIME 2 QUESTIONNAIRE

Self-Regulation of Goals and Psychosocial Adjustment to Amputation

Questionnaire (T2)

Identification code: ☐

Dear Participant,

Thank you for agreeing to take part in this study. The following questionnaire should take approximately 30-40 minutes to complete. Please try to answer <u>all</u> of the questions, and be as honest as you can throughout.

About You

To begin we would like to ask you a few general questions about yourself. Please circle the correct answer or fill in the spaces provided as appropriate.

1. What is your living situation?
   - Living alone
   - Living with partner
   - Living with partner and children
   - Living with family
   - Living with others

2. Have you been fitted with a prosthetic limb? Yes No

3. If so, how many hours a day on average do you wear your prosthesis? ______ hours

4. Do you experience residual (stump) pain (pain in the remaining part of your amputated limb)?

   Yes No

5. Do you experience phantom limb pain (pain in the part of the limb which was amputated)?

Yes No

6. Please rate your pain by circling the one number that best describes your pain on the **average**.

0 No Pain	1	2	3	4	5	6	7	8	9	10 Pain as bad as you can imagine

Section 1

This section asks about the goals you have in life, how important they are to you, and how much they have been affected by your amputation.

The following is a list of things that people may find important in their everyday lives. **To what extent is each of the following things important to you in your everyday life?** This question is answered separately for each of the items listed below. Please circle the appropriate number.

		Not at all important	Not important	Neither important nor unimportant	Important	Very important
1.	Feeling relaxed	1	2	3	4	5
2.	Experiencing excitement	1	2	3	4	5
3.	Having fun	1	2	3	4	5
4.	Experiencing bodily pleasures	1	2	3	4	5
5.	Being healthy	1	2	3	4	5
6.	Discovering new things	1	2	3	4	5
7.	Understanding the world around me	1	2	3	4	5

		Not at all important	Not important	Neither important nor unimportant	Important	Very important
8.	Coming up with new ideas	1	2	3	4	5
9.	Keeping up my self-confidence	1	2	3	4	5
10	Feeling like I belong here	1	2	3	4	5
11.	Reaching a higher level of consciousness	1	2	3	4	5
12.	Feeling unique	1	2	3	4	5
13.	Discovering who I truly am	1	2	3	4	5
14.	Making my own decisions in life	1	2	3	4	5
15.	Doing things better than others	1	2	3	4	5
16.	Receiving support from others	1	2	3	4	5
17.	Feeling connected to the people around me	1	2	3	4	5
18.	Fulfilling my duties to others	1	2	3	4	5
19.	Respecting rules	1	2	3	4	5
20.	Treating others fairly	1	2	3	4	5
21.	Supporting others	1	2	3	4	5
22.	Meeting a challenging standard of performance	1	2	3	4	5
23.	Doing creative things	1	2	3	4	5
24.	Having daily activities run smoothly	1	2	3	4	5
25.	Obtaining more money or possessions	1	2	3	4	5
26.	Ensuring my safety	1	2	3	4	5

To what extent are you currently hindered in achieving each of the following things due to your amputation? This question is answered separately for each of the items listed below. Please circle the appropriate number.

		Not at all hindered	Hardly hindered	Partly hindered	Very hindered	Completely hindered
1.	Feeling relaxed	1	2	3	4	5
2.	Experiencing excitement	1	2	3	4	5
3.	Having fun	1	2	3	4	5
4.	Experiencing bodily pleasures	1	2	3	4	5
5.	Being healthy	1	2	3	4	5
6.	Discovering new things	1	2	3	4	5
7.	Understanding the world around me	1	2	3	4	5
8.	Coming up with new ideas	1	2	3	4	5
9.	Keeping up my self-confidence	1	2	3	4	5
10	Feeling like I belong here	1	2	3	4	5
11.	Reaching a higher level of consciousness	1	2	3	4	5
12.	Feeling unique	1	2	3	4	5
13.	Discovering who I truly am	1	2	3	4	5
14.	Making my own decisions in life	1	2	3	4	5
15.	Doing things better than others	1	2	3	4	5
16.	Receiving support from others	1	2	3	4	5
17.	Feeling connected to the people around me	1	2	3	4	5
18.	Fulfilling my duties to others	1	2	3	4	5
19.	Respecting rules	1	2	3	4	5
20.	Treating others fairly	1	2	3	4	5
21.	Supporting others	1	2	3	4	5
22.	Meeting a challenging standard of performance	1	2	3	4	5

		Not at all hindered	Hardly hindered	Partly hindered	Very hindered	Completely hindered
23.	Doing creative things	1	2	3	4	5
24.	Having daily activities run smoothly	1	2	3	4	5
25.	Obtaining more money or possessions	1	2	3	4	5
26.	Ensuring my safety	1	2	3	4	5

Section 2

This section asks about your outlook on life and your expectations for the future.

Please respond to the following statements about yourself by circling the appropriate number to indicate the extent of your agreement or disagreement. Be as honest as you can throughout. Try not to let your response to one statement influence your response to other statements. There are no right or wrong answers.

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.	In uncertain times, I usually expect the best.	1	2	3	4	5
2.	It's easy for me to relax.	1	2	3	4	5
3.	If something can go wrong for me, it will.	1	2	3	4	5
4.	I'm always optimistic about my future.	1	2	3	4	5
5.	I enjoy my friends a lot.	1	2	3	4	5
6.	It's important for me to keep busy.	1	2	3	4	5
7.	I hardly ever expect things to go my way.	1	2	3	4	5
8.	I don't get upset too easily.	1	2	3	4	5
9.	I rarely count on good things happening to me.	1	2	3	4	5
10.	Overall, I expect more good things to happen to me than bad.	1	2	3	4	5

Section 3

This section asks about the support you receive from the people closest to you.

We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement by circling the appropriate number.

		Very strongly disagree	Strongly disagree	Mildly disagree	Neutral	Mildly agree	Strongly agree	Very strongly agree
1.	There is a special person who is around when I am in need.	1	2	3	4	5	6	7
2.	There is a special person with whom I can share my joys and sorrows.	1	2	3	4	5	6	7
3.	My family really tries to help me.	1	2	3	4	5	6	7
4.	I get the emotional help and support I need from my family.	1	2	3	4	5	6	7
5.	I have a special person who is a real source of comfort to me.	1	2	3	4	5	6	7
6.	My friends really try to help me	1	2	3	4	5	6	7
7.	I can count on my friends when things go wrong.	1	2	3	4	5	6	7
8.	I can talk about my problems with my family.	1	2	3	4	5	6	7
9.	I have friends with whom I can share my joys and sorrows.	1	2	3	4	5	6	7
10.	There is a special person in my life who cares about my feelings.	1	2	3	4	5	6	7
11.	My family is willing to help me make decisions.	1	2	3	4	5	6	7
12.	I can talk about my problems with my friends.	1	2	3	4	5	6	7

Section 4

This section asks about any difficulties you may experience participating in various activities due to your physical disability.

H1	How do you rate your overall health in the past 30 days?	Very good	Good	Moderate	Bad	Very bad

This questionnaire asks about difficulties due to your physical disability. Think back over the last 30 days and answer these questions thinking about how much difficulty you had doing the following activities. For each question, please circle only one response.

In the last 30 days, how much difficulty did you have in:						
S1	Standing for long periods such as 30 minutes?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S2	Taking care of your household responsibilities?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S3	Learning a new task (e.g. learning how to get to a new place)?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S4	How much of a problem did you have joining in community activities (e.g. festivities, religious or other activities) in the same way as anyone else can?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S5	How much have you been emotionally affected by your physical disability?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S6	Concentrating on doing something for ten minutes?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S7	Walking a long distance such as a kilometre?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S8	Washing your whole body?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S9	Getting dressed?	None	Mild	Moderate	Severe	Extreme/ Cannot do

In the last 30 days, how much difficulty did you have in:						
S10	Dealing with people you do not know?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S11	Maintaining a friendship?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S12	Your day to day work?	None	Mild	Moderate	Severe	Extreme/ Cannot do

H2	Overall, how much did these difficulties interfere with your life?	Not at all	Mildly	Moderately	Severely	Extremely
H3	Overall, in the past 30 days, how many days were these difficulties present?	RECORD NUMBER OF DAYS ____ / 30				
H4	In the past 30 days, for how many days were you totally unable to carry out your usual activities or work because of your physical disability?	RECORD NUMBER OF DAYS ____ / 30				
H5	In the past 30 days, not counting the days that you were totally unable, for how many days did you cut back or reduce your usual activities or work because of your physical disability?	RECORD NUMBER OF DAYS ____ / 30				

Section 5

This section asks about what you usually do when you are faced with difficult tasks.

Please indicate the extent to which you agree or disagree with the following statements by circling the appropriate number.

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.	When I get stuck on something, it's hard for me to find a new approach.	1	2	3	4	5
2.	The harder a goal is to achieve, the more appeal it has to me.	1	2	3	4	5
3.	I can be very stubborn in pursuing my goals.	1	2	3	4	5
4.	I find it easy to see something positive even in a serious mishap.	1	2	3	4	5
5.	When faced with obstacles, I usually increase my efforts.	1	2	3	4	5
6.	To avoid disappointment, I don't set my goals too high.	1	2	3	4	5
7.	Even when things seem hopeless, I keep on fighting to reach my goals.	1	2	3	4	5
8.	When everything seems to be going wrong, I can usually find a positive side.	1	2	3	4	5
9.	I tend to lose interest in matters where I cannot keep up with others.	1	2	3	4	5
10.	I find it easy to give up a wish if it seems very difficult to fulfill.	1	2	3	4	5
11.	When I run up against overwhelming obstacles, I prefer to look for a new goal.	1	2	3	4	5
12.	Life is much more pleasurable when I do not expect too much from it.	1	2	3	4	5
13.	I create problems for myself because of my high demands.	1	2	3	4	5

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
14.	When I have tried hard but cannot solve a problem, I find it easy just to leave it unsolved.	1	2	3	4	5
15.	In general, I am not upset very long about an opportunity passed up.	1	2	3	4	5
16.	I adapt quite easily to changes in plans or circumstances.	1	2	3	4	5
17.	I usually find something positive even in giving up something I cherish.	1	2	3	4	5
18.	I avoid struggling with problems for which I have no solutions.	1	2	3	4	5
19.	I usually have no difficulty in recognizing my limits.	1	2	3	4	5
20.	If I find I cannot reach a goal, I prefer to change my goal rather than to keep trying.	1	2	3	4	5
21.	After a serious setback, I soon turn to new tasks.	1	2	3	4	5
22.	Faced with a serious problem, I sometimes simply pay no attention to it.	1	2	3	4	5
23.	If I don’t readily get something I want, I pursue it with patience.	1	2	3	4	5
24.	Faced with a disappointment, I usually remind myself that other things in life are just as important.	1	2	3	4	5
25.	I find that even life’s troubles have a bright side.	1	2	3	4	5
26.	It is difficult for me to accept a setback or defeat.	1	2	3	4	5
27.	Even when a situation seems hopeless, I still try to master it.	1	2	3	4	5
28.	I stick to my goals and projects even in the face of great difficulties.	1	2	3	4	5

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
29.	When I get into serious trouble, I immediately look at how to make the best out of the situation.	1	2	3	4	5
30.	I am never really satisfied unless things come up to my wishes exactly.	1	2	3	4	5

Section 6

This section asks about the different feelings and emotions that you may have experienced in the past few weeks.

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way during the past few weeks. Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely

_____ interested

_____ distressed

_____ excited

_____ upset

_____ strong

_____ guilty

_____ scared

_____ hostile

_____ enthusiastic

_____ proud

_____ irritable

_____ alert

_____ ashamed

_____ inspired

_____ nervous

_____ determined

_____ attentive

_____ jittery

_____ active

_____ afraid

Section 7

This section asks how you feel about your quality of life, health, or areas of your life.

Please answer all of the questions. If you are unsure about which response to give to a question, please choose the one that appears most appropriate. This can often be your first response.

We ask that you think about your life **in the last four weeks** when answering these questions.

Please read each question, assess your feelings, and circle the number on the scale for each question that gives the best answer for you.

		Very poor	Poor	Neither poor nor good	Good	Very good
a	How would you rate your quality of life?	1	2	3	4	5

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
b	How satisfied are you with your health?	1	2	3	4	5

The following questions ask about **how much** you have experienced certain things in the last four weeks.

		Not at all	A little	A moderate amount	Very much	An extreme amount
c	To what extent do you feel that physical pain prevents you from doing what you need to do?	1	2	3	4	5
d	How much do you need any medical treatment to function in your daily life?	1	2	3	4	5
e	How much do you enjoy life?	1	2	3	4	5
f	To what extent do you feel your life to be meaningful?	1	2	3	4	5

		Not at all	A little	A moderate amount	Very much	Extremely
g	How well are you able to concentrate?	1	2	3	4	5
h	How safe do you feel in your daily life?	1	2	3	4	5
i	How healthy is your physical environment?	1	2	3	4	5

The following questions ask about **how completely** you experience or were able to do certain things in the last four weeks.

		Not at all	A little	Moderately	Mostly	Completely
j	Do you have enough energy for everyday life?	1	2	3	4	5
k	Are you able to accept your bodily appearance?	1	2	3	4	5
l	Have you enough money to meet your needs?	1	2	3	4	5
m	How available to you is the information that you need in your day-to-day life?	1	2	3	4	5
n	To what extent do you have the opportunity for leisure activities?	1	2	3	4	5

		Very poor	Poor	Neither poor nor good	Good	Very good
o	How well are you able to get around?	1	2	3	4	5

The following questions ask you to say how **good or satisfied** you have felt about various aspects of your life over the last four weeks.

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
p	How satisfied are you with your sleep?	1	2	3	4	5
q	How satisfied are you with your ability to perform your daily living activities?	1	2	3	4	5
r	How satisfied are you with your capacity for work?	1	2	3	4	5
s	How satisfied are you with yourself?	1	2	3	4	5
t	How satisfied are you with your personal relationships?	1	2	3	4	5
u	How satisfied are you with your sex life?	1	2	3	4	5
v	How satisfied are you with the support you get from your friends?	1	2	3	4	5
w	How satisfied are you with the conditions of your living place?	1	2	3	4	5
x	How satisfied are you with your access to health services?	1	2	3	4	5
y	How satisfied are you with your transport?	1	2	3	4	5

The following question refers to **how often** you have felt or experienced certain things in the last four weeks.

		Never	Seldom	Quite often	Very often	Always
z	How often do you have negative feelings such as blue mood, despair, anxiety, depression?	1	2	3	4	5

Section 8

This section asks about your experience of losing a limb and how it affects you.

Below are written a series of statements concerning limb loss. Please read through each statement carefully. Then ***tick the box*** beside each statement, which shows how strongly you agree or disagree with it.

		Strongly disagree	Disagree	Agree	Strongly agree	N/A
1.	I have adjusted to having a limb loss	1	2	3	4	[ ]
2.	As time goes by, I accept my limb loss more	1	2	3	4	[ ]
3.	I feel that I have dealt successfully with this part of my life	1	2	3	4	[ ]
4.	Although I have limb loss, my life is full	1	2	3	4	[ ]
5.	I have gotten used to my limb loss	1	2	3	4	[ ]
6.	I don't care if somebody looks at my amputation	1	2	3	4	[ ]
7.	I find it easy to talk about my limb loss	1	2	3	4	[ ]
8.	I don't mind people asking about my limb loss	1	2	3	4	[ ]
9.	I find it easy to talk about my limb loss in conversation	1	2	3	4	[ ]
10.	I don't care if somebody notices that I have limb loss	1	2	3	4	[ ]
11.	My limb loss interferes with the ability to do my work	1	2	3	4	[ ]
12.	Having a limb loss makes me more dependent on others than I would like	1	2	3	4	[ ]
13.	Having a limb loss limits the kind of work that I can do	1	2	3	4	[ ]
14.	Being an amputee means that I can't do what I want to do	1	2	3	4	[ ]
15.	Having a limb loss limits the amount of work that I can do	1	2	3	4	[ ]

Section 9

This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** that best describes the way you have been feeling during the **past two weeks, including today**. Circle the number beside the statement that you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure you do not choose more than one statement for any group.

1. Sadness	
0	I do not feel sad.
1	I feel sad much of the time.
2	I am sad all of the time.
3	I am so sad or unhappy that I can't stand it.
2. Pessimism	
0	I am not discouraged about my future.
1	I feel more discouraged about my future than I used to be.
2	I do not expect things to work out for me.
3	I feel my future is hopeless and will only get worse.
3. Past Failure	
0	I do not feel like a failure.
1	I have failed more than I should have.
2	As I look back, I see a lot of failures.
3	I feel I am a total failure as a person.
4. Loss of Pleasure	
0	I get as much pleasure as I ever did from the things I enjoy.
1	I don't enjoy things as much as I used to.
2	I get very little pleasure from the things I used to enjoy.
3	I can't get any pleasure from the things I used to enjoy.
5. Guilty Feelings	
0	I don't feel particularly guilty.
1	I feel guilty over many things I have done or should have done.
2	I feel quite guilty most of the time.
3	I feel guilty all of the time.
P.T.O.	

6. Punishment Feelings	
0	I don’t feel I am being punished.
1	I feel I may be punished.
2	I expect to be punished.
3	I feel I am being punished.
7. Self-Dislike	
0	I feel the same about myself as ever.
1	I have lost confidence in myself.
2	I am disappointed in myself.
3	I dislike myself.
8. Self-Criticalness	
0	I don’t criticise or blame myself more than usual.
1	I am more critical of myself than I used to be.
2	I criticise myself for all of my faults.
3	I blame myself for everything bad that happens.
9. Suicidal Thoughts or Wishes	
0	I don’t have thoughts of killing myself.
1	I have thoughts of killing myself, but I would not carry them out.
2	I would like to kill myself.
3	I would kill myself if I had the chance.
10. Crying	
0	I don’t cry any more than I used to.
1	I cry more than I used to.
2	I cry over every little thing.
3	I feel like crying, but I can’t.
11. Agitation	
0	I am no more restless or wound up than usual.
1	I feel more restless or wound up than usual.
2	I am so restless or agitated that it’s hard to stay still.
3	I am so restless or agitated that I have to keep moving or doing something.
12. Loss of Interest	
0	I have not lost interest in other people or activities.
1	I am less interested in other people or things than before.
2	I have lost most of my interest in other people or things.
3	It’s hard to get interested in anything.

P.T.O.

13. Indecisiveness	
0	I make decisions about as well as ever.
1	I find it more difficult to make decisions than usual.
2	I have much greater difficulty in making decisions than I used to.
3	I have trouble making any decisions.
14. Worthlessness	
0	I do not feel I am worthless.
1	I don’t consider myself as worthwhile and useful as I used to.
2	I feel more worthless as compared to other people.
3	I feel utterly worthless.
15. Loss of Energy	
0	I have as much energy as ever.
1	I have less energy than I used to have.
2	I don’t have enough energy to do very much.
3	I don’t have enough energy to do anything.
16. Changes in Sleeping Pattern	
0	I have not experienced any change in my sleeping pattern
1a	I sleep somewhat more than usual.
1b	I sleep somewhat less than usual.
2a	I sleep a lot more than usual.
2b	I sleep a lot less than usual.
3a	I sleep most of the day.
3b	I wake up 1-2 hours early and can’t get back to sleep.
17. Irritability	
0	I am no more irritable than usual.
1	I am more irritable than usual.
2	I am much more irritable than usual.
3	I am irritable all the time.
18. Changes in Appetite	
0	I have not experienced any change in my appetite.
1a	My appetite is somewhat less than usual.
1b	My appetite is somewhat greater than usual.
2a	My appetite is much less than before.
2b	My appetite is much greater than usual.
3a	I have no appetite at all.
3b	I crave food all the time.
P.T.O.	

19. Concentration Difficulty	
0	I can concentrate as well as ever.
1	I can't concentrate as well as usual.
2	It's hard for me to keep my mind on anything for very long.
3	I find I can't concentrate on anything.
20. Tiredness or Fatigue	
0	I am no more tired or fatigued than usual.
1	I get more tired or fatigued more easily than usual.
2	I am too tired or fatigued to do a lot of the things I used to do.
3	I am too tired or fatigued to do most of the things I used to do.
21. Loss of Interest in Sex	
0	I have not noticed any recent change in my interest in sex.
1	I am less interested in sex than I used to be.
2	I am much less interested in sex now.
3	I have lost interest in sex completely.

Today's date: _________

Thank you for your time.

Please return this questionnaire in the postage-paid envelope provided as soon as possible.

APPENDIX I

TIME 3 COVER LETTER

Patient Name
Patient Address

Laura Coffey
School of Nursing and Human Sciences
Dublin City University
Dublin 9

Date

Dear Patient Name,

Many thanks for your continued participation in the study ‘Self-Regulation of Goals and Psychosocial Adjustment to Amputation’, which is being carried out by myself and Dr. X of Hospital X.

As you may recall, follow-up questionnaires are to be completed as part of this study. Please find enclosed the second follow-up questionnaire, which is to be completed six months after being discharged from Hospital X. The questionnaire will take approximately 30-40 minutes to fill in.

We would be very grateful if you would take the time to complete the questionnaire and return it in the enclosed postage-paid envelope as soon as possible. As we want to look at how people’s experiences might change over time, getting completed questionnaires back from people at each time point is very important. Please note that your continued participation in this study is completely voluntary, and all information provided will be kept strictly confidential.

If you have been experiencing emotional distress since your discharge from Hospital X, we recommend that you consult your general practitioner or local mental health services.

If you have any questions about the questionnaire or any other aspect of the study, or if you would like help filling in the questionnaire, please do not hesitate to contact me at **01 7006917**. We wish to thank you again for your continued participation.

Yours sincerely,

Laura Coffey.

APPENDIX J

TIME 3 QUESTIONNAIRE

Self-Regulation of Goals and Psychosocial Adjustment to Amputation

Questionnaire (T3)

Identification code: ☐

Dear Participant,

Thank you for agreeing to take part in this study. The following questionnaire should take approximately 30-40 minutes to complete. Please try to answer all of the questions, and be as honest as you can throughout.

About You

To begin we would like to ask you a few general questions about yourself. Please circle the correct answer or fill in the spaces provided as appropriate.

7. What is your living situation?
   - Living alone
   - Living with partner
   - Living with partner and children
   - Living with family
   - Living with others

8. Have you been fitted with a prosthetic limb? Yes No

9. If so, how many hours a day on average do you wear your prosthesis? ______ hours

10. Do you experience residual (stump) pain (pain in the remaining part of your amputated limb)?

    Yes No

11. Do you experience phantom limb pain (pain in the part of the limb which was amputated)?

Yes No

12. Please rate your pain by circling the one number that best describes your pain on the **average**.

0 No Pain	1	2	3	4	5	6	7	8	9	10 Pain as bad as you can imagine

Section 1

This section asks about the goals you have in life, how important they are to you, and how much they have been affected by your amputation.

The following is a list of things that people may find important in their everyday lives. **To what extent is each of the following things important to you in your everyday life?** This question is answered separately for each of the items listed below. Please circle the appropriate number.

		Not at all important	Not important	Neither important nor unimportant	Important	Very important
1.	Feeling relaxed	1	2	3	4	5
2.	Experiencing excitement	1	2	3	4	5
3.	Having fun	1	2	3	4	5
4.	Experiencing bodily pleasures	1	2	3	4	5
5.	Being healthy	1	2	3	4	5
6.	Discovering new things	1	2	3	4	5
7.	Understanding the world around me	1	2	3	4	5

		Not at all important	Not important	Neither important nor unimportant	Important	Very important
8.	Coming up with new ideas	1	2	3	4	5
9.	Keeping up my self-confidence	1	2	3	4	5
10	Feeling like I belong here	1	2	3	4	5
11.	Reaching a higher level of consciousness	1	2	3	4	5
12.	Feeling unique	1	2	3	4	5
13.	Discovering who I truly am	1	2	3	4	5
14.	Making my own decisions in life	1	2	3	4	5
15.	Doing things better than others	1	2	3	4	5
16.	Receiving support from others	1	2	3	4	5
17.	Feeling connected to the people around me	1	2	3	4	5
18.	Fulfilling my duties to others	1	2	3	4	5
19.	Respecting rules	1	2	3	4	5
20.	Treating others fairly	1	2	3	4	5
21.	Supporting others	1	2	3	4	5
22.	Meeting a challenging standard of performance	1	2	3	4	5
23.	Doing creative things	1	2	3	4	5
24.	Having daily activities run smoothly	1	2	3	4	5
25.	Obtaining more money or possessions	1	2	3	4	5
26.	Ensuring my safety	1	2	3	4	5

To what extent are you currently hindered in achieving each of the following things due to your amputation? This question is answered separately for each of the items listed below. Please circle the appropriate number.

		Not at all hindered	Hardly hindered	Partly hindered	Very hindered	Completely hindered
1.	Feeling relaxed	1	2	3	4	5
2.	Experiencing excitement	1	2	3	4	5
3.	Having fun	1	2	3	4	5
4.	Experiencing bodily pleasures	1	2	3	4	5
5.	Being healthy	1	2	3	4	5
6.	Discovering new things	1	2	3	4	5
7.	Understanding the world around me	1	2	3	4	5
8.	Coming up with new ideas	1	2	3	4	5
9.	Keeping up my self-confidence	1	2	3	4	5
10	Feeling like I belong here	1	2	3	4	5
11.	Reaching a higher level of consciousness	1	2	3	4	5
12.	Feeling unique	1	2	3	4	5
13.	Discovering who I truly am	1	2	3	4	5
14.	Making my own decisions in life	1	2	3	4	5
15.	Doing things better than others	1	2	3	4	5
16.	Receiving support from others	1	2	3	4	5
17.	Feeling connected to the people around me	1	2	3	4	5
18.	Fulfilling my duties to others	1	2	3	4	5
19.	Respecting rules	1	2	3	4	5
20.	Treating others fairly	1	2	3	4	5
21.	Supporting others	1	2	3	4	5
22.	Meeting a challenging standard of performance	1	2	3	4	5

		Not at all hindered	Hardly hindered	Partly hindered	Very hindered	Completely hindered
23.	Doing creative things	1	2	3	4	5
24.	Having daily activities run smoothly	1	2	3	4	5
25.	Obtaining more money or possessions	1	2	3	4	5
26.	Ensuring my safety	1	2	3	4	5

Section 2

This section asks about your outlook on life and your expectations for the future.

Please respond to the following statements about yourself by circling the appropriate number to indicate the extent of your agreement or disagreement. Be as honest as you can throughout. Try not to let your response to one statement influence your response to other statements. There are no right or wrong answers.

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.	In uncertain times, I usually expect the best.	1	2	3	4	5
2.	It's easy for me to relax.	1	2	3	4	5
3.	If something can go wrong for me, it will.	1	2	3	4	5
4.	I'm always optimistic about my future.	1	2	3	4	5
5.	I enjoy my friends a lot.	1	2	3	4	5
6.	It's important for me to keep busy.	1	2	3	4	5
7.	I hardly ever expect things to go my way.	1	2	3	4	5
8.	I don't get upset too easily.	1	2	3	4	5
9.	I rarely count on good things happening to me.	1	2	3	4	5
10.	Overall, I expect more good things to happen to me than bad.	1	2	3	4	5

Section 3

This section asks about the support you receive from the people closest to you.

We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement by circling the appropriate number.

		Very strongly disagree	Strongly disagree	Mildly disagree	Neutral	Mildly agree	Strongly agree	Very strongly agree
1.	There is a special person who is around when I am in need.	1	2	3	4	5	6	7
2.	There is a special person with whom I can share my joys and sorrows.	1	2	3	4	5	6	7
3.	My family really tries to help me.	1	2	3	4	5	6	7
4.	I get the emotional help and support I need from my family.	1	2	3	4	5	6	7
5.	I have a special person who is a real source of comfort to me.	1	2	3	4	5	6	7
6.	My friends really try to help me	1	2	3	4	5	6	7
7.	I can count on my friends when things go wrong.	1	2	3	4	5	6	7
8.	I can talk about my problems with my family.	1	2	3	4	5	6	7
9.	I have friends with whom I can share my joys and sorrows.	1	2	3	4	5	6	7
10.	There is a special person in my life who cares about my feelings.	1	2	3	4	5	6	7
11.	My family is willing to help me make decisions.	1	2	3	4	5	6	7
12.	I can talk about my problems with my friends.	1	2	3	4	5	6	7

Section 4

This section asks about any difficulties you may experience participating in various activities due to your physical disability.

H1	How do you rate your overall health in the past 30 days?	Very good	Good	Moderate	Bad	Very bad

This questionnaire asks about difficulties due to your physical disability. Think back over the last 30 days and answer these questions thinking about how much difficulty you had doing the following activities. For each question, please circle only one response.

In the last 30 days, how much difficulty did you have in:						
S1	Standing for long periods such as 30 minutes?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S2	Taking care of your household responsibilities?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S3	Learning a new task (e.g. learning how to get to a new place)?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S4	How much of a problem did you have joining in community activities (e.g. festivities, religious or other activities) in the same way as anyone else can?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S5	How much have you been emotionally affected by your physical disability?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S6	Concentrating on doing something for ten minutes?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S7	Walking a long distance such as a kilometre?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S8	Washing your whole body?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S9	Getting dressed?	None	Mild	Moderate	Severe	Extreme/ Cannot do

In the last 30 days, how much difficulty did you have in:						
S10	Dealing with people you do not know?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S11	Maintaining a friendship?	None	Mild	Moderate	Severe	Extreme/ Cannot do
S12	Your day to day work?	None	Mild	Moderate	Severe	Extreme/ Cannot do

H2	Overall, how much did these difficulties interfere with your life?	Not at all	Mildly	Moderately	Severely	Extremely
H3	Overall, in the past 30 days, how many days were these difficulties present?	RECORD NUMBER OF DAYS ____ / 30				
H4	In the past 30 days, for how many days were you totally unable to carry out your usual activities or work because of your physical disability?	RECORD NUMBER OF DAYS ____ / 30				
H5	In the past 30 days, not counting the days that you were totally unable, for how many days did you cut back or reduce your usual activities or work because of your physical disability?	RECORD NUMBER OF DAYS ____ / 30				

Section 5

This section asks about what you usually do when you are faced with difficult tasks.

Please indicate the extent to which you agree or disagree with the following statements by circling the appropriate number.

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.	When I get stuck on something, it's hard for me to find a new approach.	1	2	3	4	5
2.	The harder a goal is to achieve, the more appeal it has to me.	1	2	3	4	5
3.	I can be very stubborn in pursuing my goals.	1	2	3	4	5
4.	I find it easy to see something positive even in a serious mishap.	1	2	3	4	5
5.	When faced with obstacles, I usually increase my efforts.	1	2	3	4	5
6.	To avoid disappointment, I don't set my goals too high.	1	2	3	4	5
7.	Even when things seem hopeless, I keep on fighting to reach my goals.	1	2	3	4	5
8.	When everything seems to be going wrong, I can usually find a positive side.	1	2	3	4	5
9.	I tend to lose interest in matters where I cannot keep up with others.	1	2	3	4	5
10.	I find it easy to give up a wish if it seems very difficult to fulfill.	1	2	3	4	5
11.	When I run up against overwhelming obstacles, I prefer to look for a new goal.	1	2	3	4	5
12.	Life is much more pleasurable when I do not expect too much from it.	1	2	3	4	5
13.	I create problems for myself because of my high demands.	1	2	3	4	5

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
14.	When I have tried hard but cannot solve a problem, I find it easy just to leave it unsolved.	1	2	3	4	5
15.	In general, I am not upset very long about an opportunity passed up.	1	2	3	4	5
16.	I adapt quite easily to changes in plans or circumstances.	1	2	3	4	5
17.	I usually find something positive even in giving up something I cherish.	1	2	3	4	5
18.	I avoid struggling with problems for which I have no solutions.	1	2	3	4	5
19.	I usually have no difficulty in recognizing my limits.	1	2	3	4	5
20.	If I find I cannot reach a goal, I prefer to change my goal rather than to keep trying.	1	2	3	4	5
21.	After a serious setback, I soon turn to new tasks.	1	2	3	4	5
22.	Faced with a serious problem, I sometimes simply pay no attention to it.	1	2	3	4	5
23.	If I don’t readily get something I want, I pursue it with patience.	1	2	3	4	5
24.	Faced with a disappointment, I usually remind myself that other things in life are just as important.	1	2	3	4	5
25.	I find that even life’s troubles have a bright side.	1	2	3	4	5
26.	It is difficult for me to accept a setback or defeat.	1	2	3	4	5
27.	Even when a situation seems hopeless, I still try to master it.	1	2	3	4	5
28.	I stick to my goals and projects even in the face of great difficulties.	1	2	3	4	5

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
29.	When I get into serious trouble, I immediately look at how to make the best out of the situation.	1	2	3	4	5
30.	I am never really satisfied unless things come up to my wishes exactly.	1	2	3	4	5

Section 6

This section asks about the different feelings and emotions that you may have experienced in the past few weeks.

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way during the past few weeks. Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely

_____ interested

_____ distressed

_____ excited

_____ upset

_____ strong

_____ guilty

_____ scared

_____ hostile

_____ enthusiastic

_____ proud

_____ irritable

_____ alert

_____ ashamed

_____ inspired

_____ nervous

_____ determined

_____ attentive

_____ jittery

_____ active

_____ afraid

Section 7

This section asks how you feel about your quality of life, health, or areas of your life.

Please answer all of the questions. If you are unsure about which response to give to a question, please choose the one that appears most appropriate. This can often be your first response.

We ask that you think about your life **in the last four weeks** when answering these questions.

Please read each question, assess your feelings, and circle the number on the scale for each question that gives the best answer for you.

		Very poor	Poor	Neither poor nor good	Good	Very good
a	How would you rate your quality of life?	1	2	3	4	5

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
b	How satisfied are you with your health?	1	2	3	4	5

The following questions ask about **how much** you have experienced certain things in the last four weeks.

		Not at all	A little	A moderate amount	Very much	An extreme amount
c	To what extent do you feel that physical pain prevents you from doing what you need to do?	1	2	3	4	5
d	How much do you need any medical treatment to function in your daily life?	1	2	3	4	5
e	How much do you enjoy life?	1	2	3	4	5
f	To what extent do you feel your life to be meaningful?	1	2	3	4	5

		Not at all	A little	A moderate amount	Very much	Extremely
g	How well are you able to concentrate?	1	2	3	4	5
h	How safe do you feel in your daily life?	1	2	3	4	5
i	How healthy is your physical environment?	1	2	3	4	5

The following questions ask about **how completely** you experience or were able to do certain things in the last four weeks.

		Not at all	A little	Moderately	Mostly	Completely
j	Do you have enough energy for everyday life?	1	2	3	4	5
k	Are you able to accept your bodily appearance?	1	2	3	4	5
l	Have you enough money to meet your needs?	1	2	3	4	5
m	How available to you is the information that you need in your day-to-day life?	1	2	3	4	5
n	To what extent do you have the opportunity for leisure activities?	1	2	3	4	5

		Very poor	Poor	Neither poor nor good	Good	Very good
o	How well are you able to get around?	1	2	3	4	5

The following questions ask you to say how **good or satisfied** you have felt about various aspects of your life over the last four weeks.

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
p	How satisfied are you with your sleep?	1	2	3	4	5
q	How satisfied are you with your ability to perform your daily living activities?	1	2	3	4	5
r	How satisfied are you with your capacity for work?	1	2	3	4	5
s	How satisfied are you with yourself?	1	2	3	4	5
t	How satisfied are you with your personal relationships?	1	2	3	4	5
u	How satisfied are you with your sex life?	1	2	3	4	5
v	How satisfied are you with the support you get from your friends?	1	2	3	4	5
w	How satisfied are you with the conditions of your living place?	1	2	3	4	5
x	How satisfied are you with your access to health services?	1	2	3	4	5
y	How satisfied are you with your transport?	1	2	3	4	5

The following question refers to **how often** you have felt or experienced certain things in the last four weeks.

		Never	Seldom	Quite often	Very often	Always
z	How often do you have negative feelings such as blue mood, despair, anxiety, depression?	1	2	3	4	5

Section 8

This section asks about your experience of losing a limb and how it affects you.

Below are written a series of statements concerning limb loss. Please read through each statement carefully. Then ***tick the box*** beside each statement, which shows how strongly you agree or disagree with it.

		Strongly disagree	Disagree	Agree	Strongly agree	N/A
1.	I have adjusted to having a limb loss	1	2	3	4	[ ]
2.	As time goes by, I accept my limb loss more	1	2	3	4	[ ]
3.	I feel that I have dealt successfully with this part of my life	1	2	3	4	[ ]
4.	Although I have limb loss, my life is full	1	2	3	4	[ ]
5.	I have gotten used to my limb loss	1	2	3	4	[ ]
6.	I don't care if somebody looks at my amputation	1	2	3	4	[ ]
7.	I find it easy to talk about my limb loss	1	2	3	4	[ ]
8.	I don't mind people asking about my limb loss	1	2	3	4	[ ]
9.	I find it easy to talk about my limb loss in conversation	1	2	3	4	[ ]
10.	I don't care if somebody notices that I have limb loss	1	2	3	4	[ ]
11.	My limb loss interferes with the ability to do my work	1	2	3	4	[ ]
12.	Having a limb loss makes me more dependent on others than I would like	1	2	3	4	[ ]
13.	Having a limb loss limits the kind of work that I can do	1	2	3	4	[ ]
14.	Being an amputee means that I can't do what I want to do	1	2	3	4	[ ]
15.	Having a limb loss limits the amount of work that I can do	1	2	3	4	[ ]

Section 9

This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** that best describes the way you have been feeling during the **past two weeks, including today**. Circle the number beside the statement that you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure you do not choose more than one statement for any group.

1. Sadness	
0	I do not feel sad.
1	I feel sad much of the time.
2	I am sad all of the time.
3	I am so sad or unhappy that I can't stand it.
2. Pessimism	
0	I am not discouraged about my future.
1	I feel more discouraged about my future than I used to be.
2	I do not expect things to work out for me.
3	I feel my future is hopeless and will only get worse.
3. Past Failure	
0	I do not feel like a failure.
1	I have failed more than I should have.
2	As I look back, I see a lot of failures.
3	I feel I am a total failure as a person.
4. Loss of Pleasure	
0	I get as much pleasure as I ever did from the things I enjoy.
1	I don't enjoy things as much as I used to.
2	I get very little pleasure from the things I used to enjoy.
3	I can't get any pleasure from the things I used to enjoy.
5. Guilty Feelings	
0	I don't feel particularly guilty.
1	I feel guilty over many things I have done or should have done.
2	I feel quite guilty most of the time.
3	I feel guilty all of the time.
P.T.O.	

6. Punishment Feelings	
0	I don’t feel I am being punished.
1	I feel I may be punished.
2	I expect to be punished.
3	I feel I am being punished.
7. Self-Dislike	
0	I feel the same about myself as ever.
1	I have lost confidence in myself.
2	I am disappointed in myself.
3	I dislike myself.
8. Self-Criticalness	
0	I don’t criticise or blame myself more than usual.
1	I am more critical of myself than I used to be.
2	I criticise myself for all of my faults.
3	I blame myself for everything bad that happens.
9. Suicidal Thoughts or Wishes	
0	I don’t have thoughts of killing myself.
1	I have thoughts of killing myself, but I would not carry them out.
2	I would like to kill myself.
3	I would kill myself if I had the chance.
10. Crying	
0	I don’t cry any more than I used to.
1	I cry more than I used to.
2	I cry over every little thing.
3	I feel like crying, but I can’t.
11. Agitation	
0	I am no more restless or wound up than usual.
1	I feel more restless or wound up than usual.
2	I am so restless or agitated that it’s hard to stay still.
3	I am so restless or agitated that I have to keep moving or doing something.
12. Loss of Interest	
0	I have not lost interest in other people or activities.
1	I am less interested in other people or things than before.
2	I have lost most of my interest in other people or things.
3	It’s hard to get interested in anything.
P.T.O.	

13. Indecisiveness	
0	I make decisions about as well as ever.
1	I find it more difficult to make decisions than usual.
2	I have much greater difficulty in making decisions than I used to.
3	I have trouble making any decisions.
14. Worthlessness	
0	I do not feel I am worthless.
1	I don't consider myself as worthwhile and useful as I used to.
2	I feel more worthless as compared to other people.
3	I feel utterly worthless.
15. Loss of Energy	
0	I have as much energy as ever.
1	I have less energy than I used to have.
2	I don't have enough energy to do very much.
3	I don't have enough energy to do anything.
16. Changes in Sleeping Pattern	
0	I have not experienced any change in my sleeping pattern
1a 1b	I sleep somewhat more than usual. I sleep somewhat less than usual.
2a 2b	I sleep a lot more than usual. I sleep a lot less than usual.
3a 3b	I sleep most of the day. I wake up 1-2 hours early and can't get back to sleep.
17. Irritability	
0	I am no more irritable than usual.
1	I am more irritable than usual.
2	I am much more irritable than usual.
3	I am irritable all the time.
18. Changes in Appetite	
0	I have not experienced any change in my appetite.
1a 1b	My appetite is somewhat less than usual. My appetite is somewhat greater than usual.
2a 2b	My appetite is much less than before. My appetite is much greater than usual.
3a 3b	I have no appetite at all. I crave food all the time.
P.T.O.	

19. Concentration Difficulty	
0	I can concentrate as well as ever.
1	I can’t concentrate as well as usual.
2	It’s hard for me to keep my mind on anything for very long.
3	I find I can’t concentrate on anything.
20. Tiredness or Fatigue	
0	I am no more tired or fatigued than usual.
1	I get more tired or fatigued more easily than usual.
2	I am too tired or fatigued to do a lot of the things I used to do.
3	I am too tired or fatigued to do most of the things I used to do.
21. Loss of Interest in Sex	
0	I have not noticed any recent change in my interest in sex.
1	I am less interested in sex than I used to be.
2	I am much less interested in sex now.
3	I have lost interest in sex completely.

Today’s date: ________

Thank you for your time.

Please return this questionnaire in the postage-paid envelope provided as soon as possible.