THE EFFECTS OF EXERCISE CESSATION ON PHYSICAL AND BIO-PSYCHOSOCIAL FACTORS IN AN ELDERLY INSTITUTIONALIZED POPULATION

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ABSTRACT

There is abundant evidence to support the role of exercise in the well being of community-dwelling elderly people. However, the role of cessation of exercise specifically in institutionalized populations has not been addressed in depth.

The effectiveness of exercise programs has mainly been analysed as a function of physical performance, when many of the benefits of exercising in the elderly appear to belong in the bio-psychosocial domain. Additionally, the effects of non-continuous exercise on physical function are not fully understood.

Twenty-nine residents of Ste-Anne's Hospital were participants in a scheduled, physiotherapy-led exercise program. Twenty-five completed testing on physical performance and bio-psychosocial function at four evaluation times around two repetitions of a 12-week exercise class intervention separated by a 12-week period of no exercise. Physical function of the high level group was measured with the 2-Minute Walk Test and gait speed, whereas the performance of the lower level group was monitored with the Physiotherapy Functional Mobility Profile and a measure of activities of daily living.

Results: Cessation of exercise was associated with deterioration in physical performance in both the higher and the lower level groups. Furthermore, in the lower functioning group, deterioration in physical function occurred over the time period of the study. Bio-

psychosocial characteristics illustrated a small deterioration following cessation of exercise.

Conclusions: These findings support the need to replicate this study with a larger sample size. In spite of limiting factors, it does appear that a modification of current practices in exercise programming for older, institutionalized people, would be beneficial to this population, and would increase alignment with recommended best practices based on research with other populations of older adults.

ABRÉGÉ

Tout porte à croire que l'exercice a un rôle majeur sur le bien-être des personnes âgées en institution. Toutefois, les effets de l'arrêt de ces exercices, pour cette même population, n'ont pas été étudiés de façon approfondie.

L'efficacité des programmes d'exercices sur la capacité physique est bien connue mais leurs effets sur le bien-être bio-psycho-social de la personne âgée restent encore a être élucidés.

Vingt-neuf résidents de l'Hôpital Ste-Anne ont participés à un groupe d'exercice d'une durée de 12 semaines, intercalé par une période de 12 semaines sans exercice, pour enfin terminer avec une seconde période d'exercice de 12 semaines. Vingt-cinq sujets ont complété l'étude et ont été évalués à quatre reprises, à intervalle régulier. Dépendant du niveau de fonctionnement de l'individu la capacité physique a été évaluée soi par la distance marchée pendant deux minutes et la vitesse de marche, soi par le Profil de mobilité fonctionnel en physiothérapie et une mesure des activités de la vie quotidienne,.

Résultats : Les résultats ont démontré une détérioration des capacités physiques suivant la période de 12 semaines sans exercice autant pour le groupe de résidents présentants des capacités physiques fonctionnelles plus élevées, que pour celui des résidents dont les capacités physiques étaient plus limitées. Dans ce second groupe, nous avons aussi observé une détérioration des capacités physiques du début à la fin de l'étude. Cette étude

démontre une petite détérioration dans le bien-être bio-psycho-social de ces personnes âgées en institution.

Conclusion : Même si cette étude devrait être reprise avec un plus grand échantillonnage, il demeure que la pratique actuelle de 12 semaines d'exercice suivi par 12 semaines sans exercice doit être révisée.

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"The journey is the reward"
Chinese proverb

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TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

Introduction

"All parts of the body which have a function, if used in moderation and exercised in labours to which each is accustomed, become thereby well-developed and age slowly; but if unused and left idle, they become liable to disease, defective in growth, and age quickly." Hippocrates, 3rd Century BC

There is abundant evidence to support the role of exercise in the well-being of community-dwelling elderly people (Bohannon 1988; Fiatarone *et al.* 1994; Fielding *et al.* 2002; Buchner 2003; Keysor 2003; Satariano *et al.* 2003; Seguin *et al.* 2003). However there is less evidence examining the role of exercise and, specifically, exercise cessation in institutionalized populations. The International Classification of Functioning, Disability and Health (ICF) (WHO 2004) provides the framework for examining functional status of individuals and assists in the examination of the multifactorial components involved in an individual living in their environment. It appears that environmental factors such as institutionalization negatively influence the trajectory of decline in function of elderly populations (Gill *et al.* 2004). Furthermore, while the role of exercise has been examined in the literature, the role of exercise cessation in institutionalized populations has been examined to a limited extent. Policy in nursing homes and other long-term care facilities are not standardized (Morris *et al.* 1999a). Some exercise program interventions that are offered to the institutionalized elderly are not run continuously throughout the year; they can be run on a schedule alternating with a time of non-exercise. Moreover, the effectiveness of these programs has been analysed as

a function of physical performance measures, when many of the benefits of exercising in the elderly may belong to the bio-psychosocial domain.

One institution, Ste-Anne's Hospital, had adopted an exercise intervention provided in a class format for 12 weeks at a time, alternating with 12 weeks of no formal exercising. This study was a preliminary exploration of the effects of exercise cessation on physical and bio-psychosocial variables in an elderly institutionalized population. Additionally, this study served to inform on the effectiveness of this pattern of care in order to enable potential modifications in policy to reflect the more complex needs of this population with respect to function, exercise and physical activity.

CHAPTER 1

LITERATURE REVIEW

1.1 Functional Status

An individual interacts with their environment in multiple dimensions. For the purposes of this thesis, functional status is the term used to describe this complex relationship, which includes the description of abilities in physical, cognitive and behavioural domains (Ikegami 1995). The International Classification of Functioning, Disability and Health (ICF) describes a framework whereby intrinsic and extrinsic elements interact with each other to complete the image of an individual in terms of functional status (WHO 2004). Comprehensive geriatric assessments fulfil the multi-dimensional evaluations recommended by the ICF framework. A comprehensive geriatric assessment is recommended for the evaluation of functional status in the elderly, in order to complement physical function measures, and monitor other domains. The measurement of functional status encompasses the assessment of characteristics in the physical and cognitive domains, and includes behavioural symptoms (Vorhies *et al.* 1993; Ikegami 1995). The ICF supports the use of assessments which can be used to describe the functional status of an individual in different domains (WHO 2004). Intrinsic characteristics in the domains of physical structure, body function and other (bio-psychosocial) elements are influenced by extrinsic characteristics on many planes.

1.2 Change in Functional Status with Age

Decline in physical and bio-psychosocial domains is associated with older age (Vorhies *et al.* 1993; Häkkinen *et al.* 2000; Steffen *et al.* 2002; Brand 2003). The changes appear more pronounced in institutionalized populations, which are generally seen as a frail subset within the larger aging population (McCusker 2003; Torres *et al.* 2004). Indeed, once institutionalized, decline in the elderly tends to be more rapid than in community-dwelling populations (Connelly 2000; Brand 2003; McCusker 2003; Stewart 2003). In the context of the institutionalized elderly, the term "functional decline" has been coined to describe the progressive loss of physical abilities and/or the loss of cognitive abilities, including behavioural symptoms and social activity participation. Often viewed as inevitable, functional decline has become a part of the fabric of institutionalized patient care (Vorhies *et al.* 1993; Stewart 2003). The precise role of environmental factors on functional decline remains unclear. Using the framework developed by the WHO, the ICF describes the classification of declines in the context of the person in his or her environment (WHO 2004). This includes identifying body functions and structures (intrinsic factors), and activities and participation (societal perspectives). The exact nature of the relationship between functional status and physical capacity continues to be explored (Young 1986; Judge *et al.* 1996).

At the levels of body function and body structure, changes include decline in muscle strength (Elliott *et al.* 2002; Brouwer *et al.* 2004), which can be attributed to several causes. Strength losses may be related to sarcopenia, the progressive loss of muscle fibre size or to other physiological factors such as generalized progressive loss of functional

motor units, decreased sensory capacity as well as central nervous system (CNS) and reflex slowing. Intrinsic non-muscular factors may also play a role in strength loss, including architectural changes such as an increase in the proportion of connective tissues (Häkkinen *et al.* 2000; Ivey *et al.* 2000b; Elliott *et al.* 2002; Brand 2003; Brouwer *et al.* 2004). In addition to changes relating to muscle function, the elderly undergo modifications in their response to body fat content. In younger populations, Body-Mass Index (BMI) values of greater than 25 kg/m^2 are associated with the development of adverse health conditions, whereas in the elderly, especially the institutionalized elderly, higher BMIs appear to have a protective effect. Published reports indicate that there is evidence to suggest BMIs of between 25 to 27.4 kg/m^2 are associated with the lowest mortality rates in institutionalized elderly populations (Kergoat 1998; Landi *et al.* 2000; Germain 2001).

In addition to the above intrinsic factors, extrinsic factors have an important role to play. Intrinsic capacity factors interact with extrinsic factors such as inactivity (Connelly 2000; Elliott *et al.* 2002; Gill *et al.* 2003; Gill *et al.* 2004; Tucker *et al.* 2004). Mobility, balance and other performance skills have been linked with activity levels and are modifiable through exercise (Vorhies *et al.* 1993; Shumway-Cook *et al.* 1997b; Morris *et al.* 1999a; Keysor 2003; Sheppard *et al.* 2003; Stewart 2003; Latham *et al.* 2004; Tucker *et al.* 2004). Average gait speed scores are slower in older adults when compared to younger adults (Guralnik *et al.* 1995; Latham *et al.* 2004), but the reason for the difference may be age-related changes or lower activity levels. Activities of daily living may become more difficult for older adults due to physical or cognitive problems and cognitive function

may be impaired due to disease or aging processes. Similarly, older adults may become more restricted in their physical and social activities especially once institutionalized, and mood and social performance may deteriorate as a function of increased isolation brought on by cognitive changes or various other environmental factors.

In institutionalized populations, inactivity appears to be one of the main causes of decline when disease processes are stable (Connelly 2000; Brand 2003). Research has shown that decline can be at least partially attributed to the resident's more passive role and his or her dissociation from habitual social routines (Mor *et al.* 1995; Covinsky *et al.* 2003). Significant initiative on the part of the resident is required to stay physically active. Thus reasons for this decline may be partly physiological but may also relate to the adoption of a "sick role" by the resident and the tendency of staff to perform tasks for the resident. Various factors associated with institutionalization, including the common practice of assisting the resident in dressing, can facilitate health by conserving energy, or conversely can contribute to decline through disuse and inactivity (Connelly 2000; Brand 2003; Gill *et al.* 2004).

The functional decline that coincides with institutionalization is often considered irreversible and permanent, however some dimensions of decline may be minimized or even nullified through exercise (Fiatarone *et al.* 1994; Fielding *et al.* 2002; Stewart 2003; Gill *et al.* 2004). Physical activity and exercise can partially mediate both physical and bio-psychosocial aspects of decline. Addressing rates of decline in institutionalized populations has yet to be targeted with firm policy and strategies (Fiatarone *et al.* 1994;

Morris *et al.* 1999a; Bennett 2000; Ng *et al.* 2000; Buchner 2003; Ory *et al.* 2003; Brouwer *et al.* 2004). If inactivity is a prime factor leading to decline, it is crucial to have effective exercise and physical activity programs in place in institutions.

1.3 Benefits of Exercise

The benefits to older adults of exercising on a regular basis have been well-documented (Bohannon 1988; Fiatarone *et al.* 1994; Fielding *et al.* 2002; Buchner 2003; Keysor 2003; Satariano *et al.* 2003; Seguin *et al.* 2003). In addition to improving well-being, strength and endurance, an increased level of physical activity has a dose-response relationship with reducing mortality, minimizing the physiological changes associated with aging, decreasing the risk of chronic diseases such as cardiovascular disease, stroke, diabetes mellitus, obesity, hypertension, osteoporosis, depression and some forms of cancer, as well as reducing the incidence of falls (Bennett 2000; Keysor 2003; Seguin *et al.* 2003).

1.3.1 Benefits of Exercise in Physical Domains

Physical activity refers to body movements that cause an increase in the metabolic rate (Keysor 2003). Exercise is one subset of physical activity, and usually refers to a planned or structured activity that results in improved physical fitness (Kino-Québec 2002; Keysor 2003). In the elderly, the distinction between physical activity and exercise in often unclear. Some activities, such as walking, can be considered either a physical activity, or exercise, or both, which results in confusion in the research literature. Physical inactivity is a risk factor for falls in the institutionalized elderly (Gill *et al.* 2003; Mihalko *et al.* 2003). Strengthening and balance retraining have been identified as

effective components of fall prevention strategies (Cesari *et al.* 2002; Seguin *et al.* 2003). In addition to primary prevention, exercise may be used in the treatment of disease, and in preventing disability and further decline in function (Keysor 2003; Stewart 2003). There is evidence to suggest that exercise training has significant modest to moderate effects on gait speed, functional ambulation and balance (Galindo-Ciocon *et al.* 1995; Brouwer *et al.* 2004; Latham *et al.* 2004). Studies have demonstrated the benefits of exercise in terms of physical performance, strength, mobility, balance and self-confidence (Bohannon 1988; Fiatarone *et al.* 1994; Newnham 1994; Galindo-Ciocon *et al.* 1995; Ardman 1998; Bennett 2000; Buchner 2003; Satariano *et al.* 2003). Although there seems to be evidence indicating a carryover effect after exercises have ended (Buchner 1993; Häkkinen *et al.* 2000; Ivey *et al.* 2000a; Ivey *et al.* 2000b; Hauer *et al.* 2001; Trappe *et al.* 2002; Latham *et al.* 2004), many of the studies examining this carryover effect have targeted relatively well or community-dwelling seniors, not institutionalized Veterans. Moreover, the outcomes utilized have been predominantly physical function measures.

1.3.2 Benefits of Exercise in Bio-Psychosocial Domains

Mood and behaviour symptoms were examined with special interest due to evidence in the literature supporting the role of exercise in decreasing the severity of these symptoms in older populations (Surgeon-General 1996; Health-Canada 1999; Kino-Québec 2002; Leppämäki *et al.* 2002). Exercise in one form or another has been shown to be beneficial in the bio-psychosocial realm in the elderly. Regular physical exercise improves mood, sense of well-being, sleep patterns, cognitive function and social interactions (Ikegami

1995; Bennett 2000; Leppämäki *et al.* 2002; Seguin *et al.* 2003; Weuve *et al.* 2004). Exercise has also been shown to alleviate depression, anxiety, agitation and pain (Surgeon-General 1996; Bennett 2000; Timonen *et al.* 2002; Seguin *et al.* 2003). An interesting link between improvement in social functioning and decrease in burden of illness has been investigated by some authors (Satariano *et al.* 2003).

Current research has revealed that bio-psychosocial characteristics also have an impact on physical function. The role of depression as related to increased rates of falls and fractures has been explored in the literature (Bennett 2000; Cesari *et al.* 2002). Tinetti *et al* (1995) examined the role of "affective impairments" in falls and loss of functional independence (Tinetti *et al.* 1995). The exact nature of the relationship between exercise, bio-psychosocial characteristics and physical function continues to be explored in the literature.

1.4 Current Trends in Exercise Programming

Effective strategies for decreasing the risk of falls, improving physical function, cognitive function and mood include a variety of exercise programs of varying durations and intensities (Fiatarone *et al.* 1994; Shumway-Cook *et al.* 1997a; Shumway-Cook *et al.* 1997b; Nadeau *et al.* 1999; Brill *et al.* 2000; Hauer *et al.* 2001; Kino-Québec 2002; Seguin *et al.* 2003).

In an institutional setting, exercise programs commonly take the form of supervised exercise classes directed towards achieving improved general mobility and balance, and

increased strength through progressive resistance weight training in group settings. Organized exercises in the format of groups and classes permit social networking and social support between participants, and have been shown to be an effective strategy for enhancing compliance (Fiatarone *et al.* 1994; Morris *et al.* 1999a; Hauer *et al.* 2001; Seguin *et al.* 2003). Exercise classes implemented for the institutionalized elderly address the cardiovascular system, muscle strength and socialization simultaneously, and are a popular intervention in nursing homes and other chronic care institutions (Seguin *et al.* 2003).

Exercise program frequencies of two and three times per week were used almost in exclusivity in a recent literature review (Latham *et al.* 2004). Eight to 16 weeks were the most common durations, although justifications varied (Shumway-Cook *et al.* 1997b; Ardman 1998; Weiss *et al.* 2000; Cott *et al.* 2002; Leppämäki *et al.* 2002; Timonen *et al.* 2002; Seguin *et al.* 2003). Approximately half the strength gains in one year measured in a total of 1007 subjects occurred during the first 12 weeks of an exercise program (Ivey *et al.* 2000b).

The evidence indicates that a varied program incorporating strength, balance, stretching, socialization and other intangibles appears to be the most effective intervention in the institutionalized elderly (Cesari *et al.* 2002; Seguin *et al.* 2003). Although most of the studies demonstrated an effect, that is, an improvement that was greater than that expected merely by chance, it remained unclear as to which was the best combination of frequency and duration. In conclusion, the literature illustrates that there appears to be

evidence to support exercise making a difference in terms of protection from decline in physical and bio-psychosocial domains in institutionalized elderly populations.

1.5 De-Training

Published evidence examining the effects of cessation of exercises or exercise programs in elderly institutionalized populations, specifically in men, is sparse. Studies researching the results of de-training have mainly used populations of community-dwelling younger old (those less than 80 years old) (Smith *et al.* 2003; Toraman 2005). Furthermore, much of the published data on elderly subjects deal with female subjects, whose response to training and to de-training may be different from that of men (Bassey *et al.* 1992; Ivey *et al.* 2000a). Of the studies that have addressed the subject of detraining, many were underpowered (Connelly 2000; Trappe *et al.* 2002). Habitual activities have been suggested to play a strong role in the maintenance of gains from exercise programs, yet there is scant information on this factor in the current literature (Dutta 2000; Ivey *et al.* 2000a).

What seems to be beyond a doubt is that strength deteriorates after cessation of training programs (Buchner 1993; Toraman 2005; Toraman *et al.* 2005). Sources disagree on the degree and speed with which deterioration occurs, but some authors have claimed losses of up to 21% after 2 weeks' cessation (Connelly 2000) and 31% after 12 weeks' cessation (Newnham 1994). It may be that the rate of decline increases after the age of 80 years (Connelly 2000), however it remains as yet unclear precisely how these strength changes translate into functional change.

1.6 Recommendations for Physical Activity and Exercise

Recommendations and guidelines for exercise and physical activity among the institutionalized elderly do not appear to be systematically and rigorously applied. It is therefore important to examine current policies and patterns of care within institutions to illuminate the possibilities for application of exercise programming, enabling them to be consistent with current recommendations and health promotion messages (Satariano *et al.* 2003). Major consensus conferences and the report of the United States Surgeon General (Surgeon-General 1996; Kino-Québec 2002) have focused attention on physical inactivity as an important issue related to increased health problems (Morey *et al.* 2003; Ory *et al.* 2003; Weuve *et al.* 2004). Health promotion interventions in the community have included public health campaigns (Surgeon-General 1996; Kino-Québec 2002; Satariano *et al.* 2003) and physician-based exercise counselling for older adults (Morey *et al.* 2003; Ory *et al.* 2003). Exercise and gait training in nursing homes and long-term care settings have been encouraged as a treatment for physical functional deficits and as a part of fall prevention strategies (Galindo-Ciocon *et al.* 1995; Judge *et al.* 1996; Mellilo *et al.* 1996; Guelich 1999; Hauer *et al.* 2001; Mehta *et al.* 2002; Keysor 2003).

Current guidelines indicate that exercise at a moderate intensity for an accumulated total of 30 minutes on most days of the week is necessary to obtain optimal benefits from physical activity. For the elderly, guidelines specify daily stretching and endurance activities and strengthening and agility activities two to four times per week (Surgeon-General 1996; Health-Canada 1999; Kino-Québec 2002). Relatively less attention has

been focused on exercise and physical activity in nursing homes and long-term care settings as part of actual health promotion programs for residents (Buchner 2003; Ory *et al.* 2003; Weuve *et al.* 2004). Studies suggest it is never too late to encourage health promotion and illness prevention in older adults (Buchner 2003; Morey *et al.* 2003; Ory *et al.* 2003; Satariano *et al.* 2003; Sheppard *et al.* 2003).

1.7 Summary

In conclusion, functional status in elderly population is a complex issue that is influenced by characteristics and factors in several domains. The change in functional status over time in the elderly, while often in a downward direction may be influenced by exercise programs, a concept that has been supported by governmental agency publications and public policy statements. Sources disagree on the optimal frequency and intensity with which programs should be offered, but published evidence indicates that programs should be provided daily (Morris *et al.* 1999a; Brouwer *et al.* 2004). The studies examined mainly dealt with populations that were community-dwelling, younger than 80 years old and that had a high proportion of female subjects.

CHAPTER 2

DEVELOPMENT OF THE STUDY

2.1 Study Rationale

There is evidence supporting the beneficial effects of exercise programs in terms of physical gains in elderly populations. However, evidence is relatively sparse concerning the effects of cessation of exercise on physical aspects, as well as the effects of this non-continuous exercise programming in the institutionalized elderly, a frail and at-risk population. A few studies have examined the effects of exercise interventions on mood, behaviour, and other bio-psychosocial characteristics, but few have studied the effects of cessation of exercising on these same variables (Connelly 2000; Buchner 2003). Therefore, it was felt that an objective examination of the current custom of ceasing exercise programs was both timely and important, in order to base potential future modifications of existing programs on current "best-practice" evidence.

2.2 Study Objective

The objective of this study was to evaluate the effects of cessation of a 12-week exercise program, primarily on physical performance and secondarily on the bio-psychosocial characteristics of residents of Ste-Anne's Hospital (SAH). The effects of the non-continuous nature of this programming were also explored. The null hypothesis of this study is that cessation of an exercise intervention would not have an adverse effect on physical or bio-psychosocial variables, and the provision of this pattern of exercise

intervention would not result in an overall decline in physical and bio-psychosocial variables in this population. Expectations were that objective measures would improve with the exercise class intervention and deteriorate with cessation of exercise. Because the intervention was mainly in the physical domain, the strongest relationships were expected between the phases of the program and the physical measures; the association between the phases and bio-psychosocial measures was expected to be less strong. The working assumption of SAH was that participants would improve with exercise, and that the on/off pattern of exercise intervention programming would maintain their status over time. A contrary finding could persuade SAH to re-examine the intensity of the exercise intervention, and/or the length of the on/off periods.

This study served as a pilot study; the results will be used to inform future exercise intervention studies and stimulate a broader review of current physical activity policies for institutionalized elderly, as well as to modify existing practices at the study's centre, Ste-Anne's Hospital.

2.3 Clinical Setting

2.3.1 Ste-Anne's Hospital

Ste-Anne's Hospital (SAH) is a long-term care institution in a suburb of Montréal, Québec that, in 2002, supported a resident population of approximately 500 Veterans (96.8% male, 3.2% female). Residents over the age of 70 years were by far the majority (98.7% of the population) at the time. Census results in 2002 indicated that the physical autonomy of residents ranged from highly autonomous (physically independent, n = 107,

20.1%), through mid-level (requiring assistive devices and/or physical assistance, n=156, 29.4%), to physically low-level (non-ambulatory and/or bed- or chair-bound, n=275, 51.4%) (DVA 2002).

Existing Physical Activity Programs at Ste-Anne's Hospital

Ste-Anne's Hospital (SAH) is considered by administration and residents to be the *milieu de vie* of the residents, thus many opportunities for social exchange have been cultivated over the years. Unfortunately, this has not extended to quite such a degree into the physical domain. In the years that this study was being planned and implemented, SAH offered activities and recreational programs through the Recreation Department and the Volunteer Bureau to residents, such as bowling and outings to malls and restaurants, but these did not specifically address the physical activity requirements of the residents and they were not structured exercise programs. In terms of the physical function perspective, the SAH activity programs and recreational activities were not built on an exercise science framework. Furthermore, there were variations between nursing units as to the degree to which staff encouraged physical activity amongst residents through these outings as well as through walking programs on the nursing units. An additional limitation in an exercise context was that these social and recreational activities were mainly offered to residents who were physically independent. Due to the more social nature of these activities, outcomes relating to physical function were not measured, and descriptive and inferential analysis of data relating to physical function was also not performed.

The Physiotherapy Department of SAH provides structured exercise interventions: twice-weekly exercise sessions for 3 months' duration (12 weeks) in the fall and in the spring of each year. Two research projects conducted previously in the Physiotherapy Department (Newnham 1994; Ardman 1998), were of 12 weeks' duration. This may have resulted in the current practice of providing exercise class sessions of 12 weeks' duration.

The exercise groups that were made available to residents included three standardized levels of exercise: High Level, Intermediate Level and Low Level. The Low Level class alternated exercise classes for 12 weeks with individual physical therapy for 12 weeks and was not part of this study due to there being no actual cessation of the intervention. In contrast, the High Level (Class 1) and Intermediate Level (Class 2) exercise classes were offered to residents for 12 weeks followed by a 12-week "off-period" or period of cessation. For many years previously, SAH had implemented the policy of 3 months of having the exercise intervention alternating with three months "off" the exercise program (cessation, or de-training) for the Intermediate and High level exercise classes. This policy had perhaps been adapted from the previously mentioned studies performed at SAH. Upon examination, no convincing evidence was found in the literature to support the adoption of the policy of a 3-month on/off cyclical schedule. The exercises performed by Class 1 and Class 2 included a general warm-up, flexibility, strengthening and mobility exercises of approximately 1 hour's length in total, performed twice weekly; more details of the classes' content may be found in Appendix I.

In summary, SAH had provided many opportunities for socialization over the years for residents; however, physical activity and exercise programs were few. The 12-week exercise class schedule had been a reality for some time; however, this pattern of service provision was shown to be inconsistent with published guidelines for physical activity, raising concerns as to the appropriateness of this policy. It was therefore considered important to examine the effects of exercise and its cessation on the physical and bio-psychosocial function of participants.

Existing Documentation of Exercise Program Effectiveness

Evidence-based practice is based on the measurement, collection, analysis and interpretation of objective outcomes. The health care professionals from the Physiotherapy Department of SAH had recorded some measures in terms of physical response to resident participation in group exercise interventions in past years. A retrospective chart audit of physical performance measures evaluated in conjunction with the series of 12-week exercise classes provided some information supporting the need for further study.

In reviewing the records over the past four years, there was evidence demonstrating that residents experienced some benefit (reflected in physical performance measures) from the exercise interventions, however, no effort had been made to measure the effects of the exercise programs on mood, behaviour and other bio-psychosocial characteristics. No data were available documenting the effects of cessation of the exercise intervention. Inconsistencies in data collection included missing data due to patient dropout or staffing

turnover as well as the use of different physical performance measures over time. That is, different measures were used for different exercise classes depending on who led the classes, and on the level of physical autonomy of the participants of the groups.

The common practice of monitoring physical measures prior to and following exercise intervention had yielded some promising data, but indicated that further study was warranted.

2.4 In Conclusion

The retrospective chart audit indicated that the staff of the Physiotherapy Department of Ste-Anne's Hospital had attempted to address the issue of exercise and functional decline with exercise classes and walking programs without strict adherence to best practice recommendations, thus warranting this empirical investigation of customary practices. Outcome measures that were used monitored physical outcomes only, and were used in many but not all of the subjects. There was some evidence to support the effectiveness of the exercise intervention for residents immediately after the completion of the intervention, but it was unclear as to the long-term effects on physical outcomes and bio-psychosocial outcomes, of stopping the interventions, hence the relevance of this study. Additionally, in order to improve, residents must have room for improvement. It was of interest to determine whether the apparent room for improvement was due to habitual activities, or absence of same, during the "off-period", or other reasons. Examining mood, behaviour and other bio-psychosocial characteristics addressed in this study will assist in illuminating these other reasons.

CHAPTER 3

METHODS AND PROCEDURES

This chapter presents the design, procedures, measures and analysis plan for the study.

3.1 Research Design

The model of this study was of a prospective observational design, with an "A-B-A-B" scheme (Tripodi 1994). The design was non-interventional in that the program of 12-week on and 12-week off exercise was in practice at SAH. The general objective of this study was to examine the effects of the cessation of exercise and the overall effect of the program on residents' function. Tests of physical function and measures in the bio-psychosocial domain were taken every 12 weeks for 36 weeks, the timing of which coincided with two sessions of 12 weeks of exercises, separated by 12 weeks of cessation of exercise ("off-period"), as illustrated in Figure 1. This modified repeated measures design mimics the current clinical practice of assessing and re-assessing patient status before and following therapeutic interventions.

The specific objective of the study was to examine the effects of cessation of exercise on the physical performance of residents of SAH as measured in the higher level class by the Two-Minute Walk Test (2-MWT) (Class 1) and in the intermediate level class by the Physiotherapy Functional Mobility Profile (PFMP) (Class 2). The second objective was to examine the effects of cessation of exercise on bio-psychosocial indicators as assessed

FIGURE 1: Study Time-Line – Period in Cycle and Measurement Timing

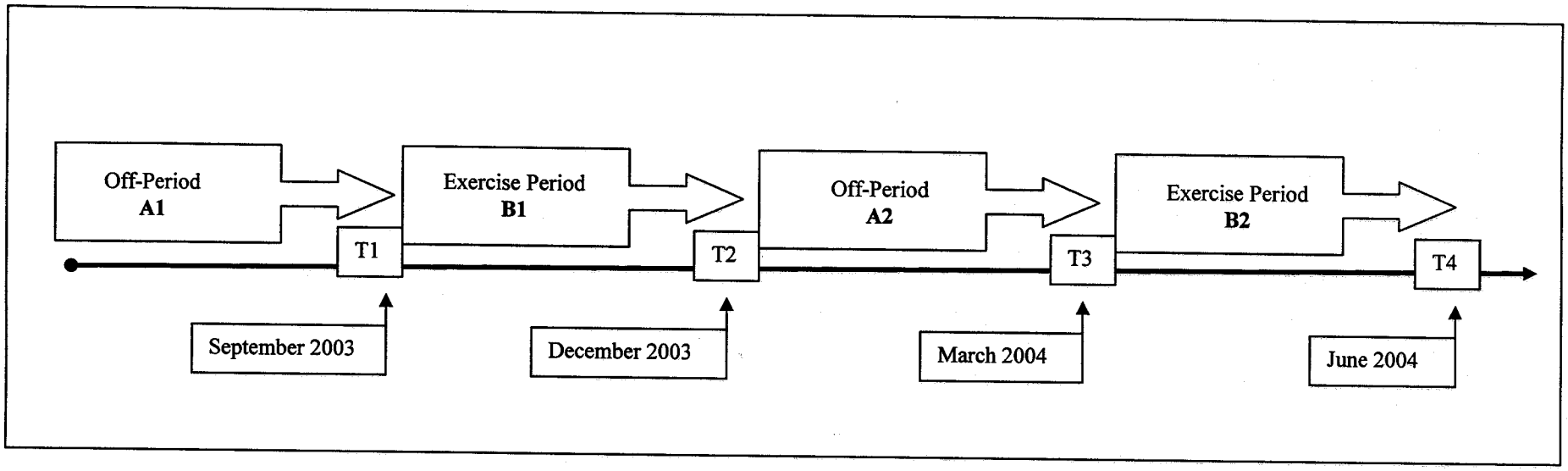


FIGURE 1: Comprehensive evaluations took place at times T1, T2, T3 and T4 as indicated above. Subjects participated in the two 12-week exercise periods, and ceased exercising in a formal context in the intervening 12-week "off-period'.

in a single-subject study of variables pertinent to each subject at baseline (e.g. pain, mood). The third objective was to compare performance status at 36 weeks, relative to baseline values, to evaluate the effects of the cyclical pattern of exercise offered at SAH on physical performance as measured by the 2-MWT (Class 1) and the PFMP (Class 2).

3.2 Study Population

3.2.1 Criteria for Inclusion and Exclusion to the Two Exercise Classes

The inclusion and exclusion criteria for the existing exercise classes were set by the administrators of the classes in conjunction with the Chief of Physiotherapy. These criteria included the following: physician referral to one of the two twice-weekly exercise classes, age over 70 years, resident assent to participation in an exercise class, and the ability to understand verbal or written French and/or English. Exclusion criteria included an impairment of cognitive status severe enough to prevent participation in a group setting, medical history and/or co-morbidities precluding participation in an exercise group and in its associated tests, subjects who were legally blind and those in acute or end-stage illness. Eligible subjects were enrolled in one of two exercise classes depending on their ambulation status and ability to work autonomously in a group setting. Residents who required some supervision and guidance for semi-autonomous participation in a group setting were registered for Class 2. Residents who walked independently and could work autonomously or semi-autonomously were registered in Class 1.

3.2.2 Study Sample Selection

All participants at the beginning of the first session (Fall of 2003) of the exercise classes described above were invited by the primary researcher to take part in the study. Twenty-nine subjects were thus recruited as a convenience sample following the procedures illustrated above.

3.3 Sample Size

Given the preliminary nature of the study and the use of a convenience sample, no power calculations were conducted. The magnitude of change observed in this study will be used to establish appropriate sample sizes for future research.

3.4 Ethical Considerations

McGill's Institutional Review Board and Ste-Anne's Hospital's Scientific Evaluation Committee approved this study's protocol. Subjects were invited to participate in the study by the primary researcher, and their files were coded with a number to keep their identity confidential. The primary researcher obtained informed consent from all the residents invited to participate in the study, in September 2003. Subjects who could participate in the class and the assessments, but had cognitive impairments severe enough to preclude their signing of the consent, verbally assented to participation in the study, and informed consent was obtained from their legal health care proxy. The Ethics Certificate and French and English copies of the consent form may be consulted in Appendix II.

3.5 Instrumentation

3.5.1 Physical Measures

The specific physical performance measure for participants in Class 1 was a measure of functional ambulation (2-MWT); for the participants in Class 2, the measure was of functional mobility (PFMP). To further support the consistency of findings, secondary outcomes for both classes were assessed: walking ability (gait speed) for subjects in Class 1, and activities of daily living [ADL scale from the Minimum Data Set (MDS for Long Term Care, v. 2.0)] for subjects in Class 2. Such tests as these are non-invasive and inexpensive ways to measure functional status. The physical measures testing procedures were standardized and are described below.

Two-Minute Walk Test (2-MWT)

Used as the primary physical outcome in Class 1 (High Level exercise group), the Two-Minute Walk Test (2-MWT) is widely used in clinical practice and has demonstrated reliability and validity when used with elderly populations, such as those found at SAH (Finch *et al.* 2002). The 2-MWT showed a moderate relationship with physiologic measures such as VO_{2max} (r=0.45) and VO_2/kg (r=0.55), and gait speed (r=-0.61) in elderly populations with co-morbidities similar to those of the study's subjects (Finch *et al.* 2002; Miller *et al.* 2002). An *a priori* decision was made on the basis of clinical experience and the practicalities of the testing centre (SAH), to define clinically significant change on the 2-MWT as a distance of 10m. At SAH, a distance of 10m represents the approximate distance from bed to toilet in two-thirds of SAH residents'

living areas. On this time-based test, higher scores indicate better performance, and is the distance covered, in meters, in the time allotted to the test.

The 2-MWT is described in Finch *et al* (2002). Equipment required included: an unobstructed quiet hallway of four lengths of approximately 15 m at 90° to each other, patient with usual walking aid, patient wearing usual footwear and a calibrated stopwatch. Patient is instructed to walk at his usual pace for two minutes' time along the hallway. The stopwatch is started once patient begins to walk, and standardized encouragement is given every 15 m. The patient may sit and rest at any time for as long as necessary. The test result is the total distance completed as measured to the nearest 10^{th} of a meter. This test takes 5 to 10 minutes allowing for test set-up and resident's rest after completion.

Physiotherapy Functional Mobility Profile (PFMP)

The predominant measure of physical functional mobility utilized in the Physiotherapy Department at SAH at the time of the study was the Physiotherapy Functional Mobility Profile (PFMP). This test was developed by a team of clinicians as a measure of global mobility in an adult institutionalized population (Brosseau *et al.* 1995; Platt *et al.* 1998). The PFMP assesses nine functional dimensions; each graded on a 7-point scale. Intra-rater reliability was demonstrated to be high (0.99, $p<0.05$), through a repeated measures analysis of variance (Platt *et al.* 1998). Inter-rater reliability estimates of the PFMP were very strong (ICC = 0.97) for raters who were trained therapists (Brosseau *et al.* 1995), as was the case in this study. These assessments were made independently through the

ratings of seven therapists of nine videotaped clients. Ratings were made 10 months apart on chronic care residents, and were stable over time ($F=0.28$, $df=1,8$, $p<.05$) (Platt *et al.* 1998). The items sum to a total of 63 points, and scores are reported as a percentage (%), to one decimal place. For this study, clinically significant change on this test was defined as a change in score of 6 points out of a score of 63 (9.5%). This represents an improvement of one point on two thirds of the items on the test. Higher scores indicate better performance on this test. For a copy of this instrument, refer to Appendix III.

Secondary Physical Performance Measure (Gait Speed)

Gait speed has been used extensively in the literature to describe walking ability in heterogeneous populations similar to those residing at SAH (Finch *et al.* 2002). Gait speed has been strongly recommended as an indicator of mobility and falls (Studenski *et al.* 2003) and has been recommended as a criterion measure for other mobility tests. Finch et al (2002) have also demonstrated good to excellent validity of the test, including the use of gait speed as the gold standard against which to compare many other outcome measures. Inter rater and test-retest reliability estimates have been good to excellent ($r = 0.94$ to 0.99, $ICC = 0.90$ to 0.99) (Finch *et al.* 2002) in populations of the healthy elderly, those with chronic stroke, Alzheimer Disease, neurological deficits or osteoarthritis. Equipment required for this test include an unobstructed quiet hallway of approximately 20 m, patient with usual walking aid and wearing usual footwear, as well as a calibrated stopwatch. Patient is instructed to walk at his usual pace the length of the hallway. The stopwatch is started when patient's leading foot crosses a mark on the floor after allowing for approximately 1 m acceleration, and the stopwatch is stopped when patient's leading

foot crosses the second mark on the floor, 15 m from the first. The evaluator walks slightly behind the patient for safety reasons, and to eliminate the effect of pacing. Time is recorded to the nearest 100^{th} of a second, and result is the outcome of the distance (15 m) divided by the time in seconds (unit is m/s). In this time-based test, higher scores indicate better performance. This test takes 5 to 10 minutes allowing for test set-up and patient's rest after completion.

3.5.2 Bio-Psychosocial and ADL Measures

The Minimum Data Set for Long Term Care, v. 2.0 (MDS) is a comprehensive geriatric assessment that includes items that measure physical and cognitive function, social interaction, mood, behaviour, and other conditions (Sgadari *et al.* 1997; Casten *et al.* 1998; Lawton *et al.* 1998). Additional MDS variables include height and weight, which permit calculation of Body-Mass Index (BMI).

The MDS has been shown to be a comprehensive, standardized instrument for evaluating the needs and strengths of nursing home residents (Hawes *et al.* 1997; Hirdes *et al.* 1997). A hallmark of the MDS assessment is the focus on observed behaviours. The MDS has been mandated in various jurisdictions including Ontario and Nova Scotia long-term care hospitals and in United States nursing homes. It has been shown to be reliably scored in terms of individual items and sub-scale scores. The validity of the sub-scales has also been examined relative to other existing measures. Subscales of the MDS have been validated as outcome measures in the literature (Mor *et al.* 1995; Schroll *et al.* 1997; Sgadari *et al.* 1997; Gambassi *et al.* 1998; Morris *et al.* 1999b; Rantanen *et al.* 2000).

Five of these subscales were used in this study. They include the physical measure of Activities of Daily Living Scale (Long Format) (ADL), and four bio-psychosocial measures: the Depression Rating Scale (DRS) (Ooi *et al.* 1999; Burrows *et al.* 2000), the Pain Scale (InterRai; Fries *et al.* 2001), the Aggressive Behavior Scale (ABS) (personal communication: Jeff Poss, PhD), and the Index of Social Engagement (ISE) (Mor *et al.* 1995; Schroll *et al.* 1997). Lower scores in the first four scales are indicative of less impairment (better status). In the 5th scale, the ISE, a greater score indicates more social engagement (better status). Chart reviews, interviews and analysis of medication records were standardized and adhered strictly to the Procedures Manual provided by RAI (InterRai). Subjects were assessed over a defined period of time as per the RAI manual. Subject performance was discussed with the appropriate staff on relevant shifts. A copy of the MDS instrument can be found in Appendix IV.

3.6 Data Collection Procedures

The primary researcher met individually with each of the 29 exercise class participants who had agreed to be intgerviewed regarding their participation in the study beginning in September 2003. The primary researcher explained the context of the research, the evaluation procedures for physical and bio-psychosocial measures, confidentiality issues, contact information and answered all questions. All 29 participants verbally assented to participate in the study. Twenty-seven subjects were legally able to sign their own informed consent forms, which they did in the presence of a witness. As previously discussed, two subjects were not able to sign consent due to cognitive impairments, therefore the primary researcher communicated with their health care proxy (the wife of

each subject) to explain the research project. Both consented on behalf of their husbands to participate in the project and signed the informed consent forms to that effect.

Physical and bio-psychosocial measures were evaluated at four points in time. Two rehabilitation therapists with a combined 22 years' experience assessed subjects' physical measures conforming to standard procedures, as had been the routine during the course of the exercise groups in previous years. Two physical therapists (the author and a research assistant) with a combined 43 years' experience performed the evaluations of the bio-psychosocial variables. These two trained physical therapists followed the published guidelines for the use of the MDS for these evaluations (InterRai).

The role of sedentariness and habitual activity in the elderly have been raised as important factors in the ability to maintain functional status in the absence of active participation in an exercise program (Morey *et al.* 2003). Therefore, in addition to the above standard tests, information was collected by the primary researcher and the research assistant regarding each resident's level of activity during the "off-period" and any unusual events that could have influenced outcomes or could assist in explaining findings. Outings for shopping and for meals to local malls, restaurants and Royal Canadian Legion branches as well as visits to family, and participation in recreational activities such as bowling, were monitored for all subjects through interviews with subjects, their ward staff and family members. Falls, illness such as gastroenteritis, and any other adverse events, including fracture and death, were noted, whether related to the

exercise group or not, through the MDS interview and informal interview. Responsibilities for each aspect of the collection of data can be examined in Table 1.

3.7 Exercise Class Content

Consistent with published evidence to ensure the best result, subjects were trained in tasks closely resembling their daily events (Ardman 1998). The primary focus of the exercises addressed strength and endurance of the upper and lower extremities. Generally, both classes began with warm-up exercises for the upper and lower extremities. The participants in the classes then progressed through a variety of upper and lower extremity stretches, resisted exercises using body weight and/or cuff weights, and a modified, monitored circuit strength training routine. Additionally, Class 1 performed agility and balance exercises within a closely supervised framework. A brief cool-down period including stretches and deep breathing was included at the end of each session. Independent or assisted ambulation was a part of both classes' programs for residents who were able to do so, with or without walking aids, as required by each subject. The exercises performed in Class 1 and Class 2 were for a duration of approximately one hour, twice weekly. The exercises were standardized, and particulars of the exercise programs may be found in Appendix I.

3.8 Non-Exercise Period

Following the 12-week exercise class study subjects did not participate in any organized exercise program for the subsequent 12 weeks' time. Many subjects participated in one or more of the recreational activities offered to residents of SAH. Some subjects went on

TABLE 1: Data Collection

Professional	Duties	Timing	Blinding
Primary Researcher (physiotherapist)	Obtained informed consent	September 2003	-Blinded to attendance in class
	MDS assessments	-Sept 2003 -Dec 2003 -March 2004 -June 2004	-Blinded to attendance in class -Blinded to results of physical measures tests
	Recording of activities while not in class	9 months from September 2003 to end of May 2004	
Research Assistant (physiotherapist)	MDS assessments	-Sept 2003 -Dec 2003 -March 2004 -June 2004	-Blinded to attendance in class -Blinded to results of physical measures tests
Class Leaders (rehabilitation therapists)	Physical measures testing	-Sept 2003 -Dec 2003 -March 2004 -June 2004	-Blinded to subjects in study among participants of class -Blinded to results of MDS testing
	Administration of the exercise classes	-12 weeks from September 2003 to December 2003 -12 weeks from March 2004 to end of May 2004	

TABLE 1: Professionals responsible for the collection of data, its timing and relevant blinding conditions are listed above. Evaluations took place on or around four times during the unfolding of the study. These times were identified as T1 (prior to training, at the beginning of September 2003), T2 (after training, in mid-December 2003), T3 (after cessation, at the beginning of March 2004) and T4 (after re-training, at the end of May to beginning of June 2004). Blinding refers to the absence of knowledge on the part of the listed professional as to the status of the subject in a different area. For example, the Primary Researcher was blinded (did not know) the rate of attendance in the exercise class of the subject, and the Class Leaders were blinded (did not know) which of their class participants were taking part in the study.

outings to neighbouring malls, outings for meals, or visits to family, as had been their custom during the time of the exercise class session.

3.9 Data Analysis

Responses of the subjects to exercise cessation in terms of physical and bio-psychosocial characteristics were examined. The physical measures were separated by class because they differed between the classes, and the bio-psychosocial measures were analysed as one group, because they were common to all subjects. The size of the classes offered some potential to group the outcome measures. To observe the effects of exercise cessation, the benefits of exercise had to be quantified at the outset, as well as the benefits of re-training subsequent to cessation. The specific objective for the High Level Group (Class 1) was to examine the effects of exercise cessation on the distance walked in 2 minutes (2-MWT). The equivalent analysis for the Intermediate Level Group (Class 2) was to examine the effects of exercise cessation on physical performance as measured by a physical mobility test (PFMP). In addition to these primary measures, secondary physical measures were monitored in the participants of both classes (gait speed and ADLs, respectively). To evaluate whether the changes identified were greater than that expected by chance, the means of the two classes were analysed with a paired *t*-test, with the use of the SPSS software program (SPSS 2002). Paired *t*-tests were used to determine if means from a within-subject test group varied over the two test conditions; in this study, the exercise period and the period of cessation of exercise. The paired *t*-test is used when the independent variable has only two levels (exercise period and cessation of exercise) and where there is a large variation among subjects, with a relatively small

variation expected as a result of the intervention (Prism 1999; Dawson *et al.* 2001), as is traditionally the case in a within-subject analysis. A p value of less than .05 was considered statistically significant.

Participants of both classes were also examined relative to exercise cessation with respect to the four bio-psychosocial measures. As previously discussed, the bio-psychosocial characteristics that were monitored were the Index of Social Engagement (ISE), the Aggressive Behavior Scale (ABS), the Depression Rating Scale (DRS) and a pain scale (MDS Pain Scale). To address this second objective, single-subject analysis was performed on the chief bio-psychosocial variable of each subject. Single-subject design refers to the observation, in an individual subject, of changes over time through repeated measures of one or more dependent variables when systematically applying and withdrawing an independent variable. The dependent variables are quantifiable, and in this study were represented by bio-psychosocial characteristics. The independent variable was the exercise program and its cessation. Single-subject, also referred to as "N-of-1," is an analytical technique well-suited to situations where there is no clear single choice as to the most appropriate outcome measure for all subjects, when it is difficult to ensure adequate power, and when it is likely that clinically meaningful change is individual-specific (Tripodi 1994; Poling *et al.* 1995; Backman *et al.* 1999; Miller 2001). Single-subject design relates directly to clinical practice: it tracks the effect of an exercise intervention and withdrawal of an exercise intervention in individual cases, which was precisely the situation at SAH.

Individual bio-psychosocial variables were identified for each subject, based on problematic bio-psychosocial variables as tested at baseline, because no one bio-psychosocial variable was identified as being a common problematic issue for the whole sample or even within each class. For each subject, this was then considered their chief bio-psychosocial variable. For some subjects, all four bio-psychosocial variables were problematic at baseline, while other subjects had one or two. A consensus panel of two physical therapists and one biostatistician identified the chief bio-psychosocial characteristic of interest for each subject. The exception was the one subject who had no problematic bio-psychosocial characteristics at baseline; his chief bio-psychosocial variable was therefore identified as the variable which became the most problematic during the course of the study. Graphs of the bio-psychosocial data from each subject were drawn and visual analysis/comparison was performed (Tripodi 1994; Backman *et al.* 1999). The bio-psychosocial variables were examined to ascertain if they followed the expected pattern of response to exercise cessation; a visual assessment of trends and levels of the values of the chief bio-psychosocial variable was performed between consecutive exercise and non-exercise periods. Trends refer to changes in direction of the values of the dependent variables, whereas levels refer to the magnitude of the dependent variable (Backman *et al.* 1999; Miller 2001).

The ability of the subjects to maintain their capacities with the "on/off" pattern of exercise programming was evaluated by examining the changes in value of physical function measures from the beginning of the study to its conclusion 36 weeks later as well as with changes for each 12-week period. The changes in the different measures

were examined at the appropriate times and were assessed as to whether they followed the anticipated pattern of deterioration with exercise cessation and overall decline across the 36-week time period of the study. To address this third objective, paired *t*-tests were performed on the primary and secondary physical measures in both classes. In Class 1 the paired *t*-test was performed on the 2-MWT scores and gait speed. In Class 2 the paired *t*-test was performed on the PFMP scores as well as on ADL scores.

CHAPTER 4

RESULTS

The specific objective of this study was to examine the effects of cessation of exercise on the physical performance of residents of SAH as measured by the 2-MWT (Class 1) and the PFMP (Class 2). The second objective was to examine the effects of exercise cessation on bio-psychosocial indicators pertinent to each subject at baseline (e.g. mood, behaviour, pain, etc) as assessed in a single-subject design. The third objective was to examine the overall effects on physical performance of the 12 week on/12 week off/12 week on program of exercise offered at SAH as measured by the 2-MWT (Class 1) and the PFMP (Class 2) at the start of the program and at the end of the program, 36 weeks later.

We expected that participants would deteriorate in physical performance and bio-psychosocial dimensions of functioning following the 12-week cessation period. Furthermore, we were interested in examining the effect of the entire program; whether the maintenance of function through this type of non-continuous program was meeting its objective.

4.1 Subject Characteristics

Twenty-nine subjects were eligible for the exercise program at SAH in September 2003. They were enrolled in one of two exercise groups based on their ambulation status and

their ability to work autonomously within the exercise class. Twenty-five subjects completed testing; in total, eight of the subjects were participants in Class 1 and 17 of them were participants in Class 2. Baseline characteristics of the subjects who completed testing are detailed in Table 2.

The participants of the two classes differed in baseline characteristics as anticipated given the inclusion criteria for each class. The eight subjects in Class 1 were marginally younger than the 17 subjects in Class 2 (Class 1 mean 80.7 yrs ± 2.4; Class 2 mean 84.3 yrs ± 4.0). The participants in Class 1 showed fewer signs of frailty such as ADLs (12.5% of Class 1 subjects required physical assistance in ADLs; 29.4% of Class 2 required physical assistance), and decision making (none of the subjects in Class 1 had moderate or severe impairments in daily decision making, whereas 23.5% of Class 2 were ranked in these categories). There were no women in Class 1, but three in Class 2, and presence of sores differed in the two classes (the only partial thickness sore was identified in a Class 2 subject) (Table 2).

There were four non-completers among the study participants at the end of the 36-week study period. Reasons for non-completion were death (n=3, Class 2) and acute psychotic episode (n=1, Class 1). In general these subjects were similar to the other members of their classes, although the gentleman from Class 1 was slightly younger than the mean of his class (75.8 yrs, class mean 80.7 yrs ± 2.4) and the three subjects from Class 2 were slightly older than their class (87.1 yrs ± 3.7, Class 2 mean age 84.3 yrs ± 4.0).

TABLE 2: Baseline Characteristics of Study Subjects

	Class 1 (n=8)		Class 2 (n=17)	
	mean	(S.D.)	mean	(S.D.)
Age (years)	80.67	(2.36)	84.31	(3.96)
	n	(%)	n	(%)
Gender (male)	8	(100.0)	14	(82.4)
Body-Mass Index [a]				
at risk (=< 23.9)	3	(37.5)	4	(23.5)
healthy range (24.0 - 27.0)	2	(25.0)	8	(47.1)
overweight (=> 27.1)	3	(37.5)	5	(29.4)
Presence of Sores				
redness	1	(12.5)	1	(5.9)
partial thickness loss	0	(0.0)	1	(5.9)
History of Falls [b]				
none in the past 180 days	7	(87.5)	11	(64.7)
fell within the past 30 days	0	(0.0)	5	(29.4)
fell between 1 and 6 months ago	1	(12.5)	1	(5.9)
Physical Measures at Baseline	**mean**	**(S.D.)**	**mean**	**(S.D.)**
2-Minute Walk Test (m)	85.9	(25.2)	n/a	n/a
Physiotherapy Functional Mobility Profile [c] (x/63= %)	n/a	n/a	74.2	(15.2)
Gait Speed (m/s)	0.7	(0.2)	n/a	n/a
Timed-Up-and-Go (sec)	17.6	(4.9)	n/a	n/a
Berg Balance Scale (x/56)	45.8	(4.8)	n/a	n/a
Activities of Daily Living (scale 0 - 28) [b]	n	(%)	n	(%)
0	3	(37.5)	5	(29.4)
1 to 3	3	(37.5)	5	(29.4)
4 to 7	1	(12.5)	1	(5.9)
8 to 21	1	(12.5)	5	(29.4)
22 to 28	0	(0.0)	1	(5.9)
Bio-Psychosocial Measures at Baseline	**n**	**(%)**	**n**	**(%)**
Pain [b]				
0 = no pain	5	(62.5)	11	(64.7)
1 = pain not daily	0	(0.0)	3	(17.6)
2 = daily pain but not severe	2	(25.0)	1	(5.9)
3 = severe daily pain	1	(12.5)	2	(11.8)
Mood Indicators [d]				
0 = no mood indicators	4	(50.0)	12	(70.6)
1 or 2 mood indicators	3	(37.5)	4	(23.5)
3 or more mood indicators	1	(12.5)	1	(5.9)
Daily decision making [e]				
0 = independent	3	(37.5)	2	(11.8)
1- 2 = modified independence	5	(62.5)	11	(64.7)
3 - 4 = moderately impaired	0	(0.0)	3	(17.6)
5 - 6 = severely impaired	0	(0.0)	1	(5.9)

a - from Landi, Onder 2000, Kergoat 1998; low BMI indicates higher risk for morbidities
b - from MDS: lower scores indicate less problematic results
c - Physiotherapy Functional Mobility Profile (PFMP) actual score x/63, clinically converted to a percent (%)
d - from MDS: fewer mood indicators indicates lower risk for depressed state
e - from MDS:
0: decisions consistent and reasonable
1,2: some difficulty in new situations only
3,4: decisions poor; cues or supervision required
5,6: never/rarely made decisions

Attendance rates were problematic in Class 2 (Table 3). While the mean attendance rate of subjects in Class 1 remained unchanged between the two exercise sessions, (session 1: mean 73.3% ± 13.9, session 2: mean 73.0% ± 18.8), those in Class 2 plummeted from a mean of 63.6% ± 24.1 in the first session, to 46.7% ± 37.0 in the second session. There appeared to be no single direct cause for the decline in attendance.

TABLE 3: Attendance of Subjects to the Exercise Sessions

Class 1 (High Function)		
Attendance (%)	First exercise session N = 8	Second exercise session N = 8
100	0	1
80 – 99.9	2	1
60 – 79.9	5	5
40 – 59.9	1	0
0 – 39.9	0	1
Mean	73.3%	73.0%
Standard Deviation	13.9	18.8
Class 2 (Intermediate Function)		
Attendance (%)	First exercise session N = 17	Second exercise session N = 17
100	1	1
80 – 99.9	5	4
60 – 79.9	3	1
40 – 59.9	6	3
0 – 39.9	2	8
Mean	63.6%	46.7%
Standard Deviation	24.1	37.0

TABLE 3: Attendance of the subjects to the two exercise sessions

4.2 Examining the Effects of Exercise Cessation and the Pattern of Exercise Programming on Physical Performance and Bio-Psychosocial Characteristics

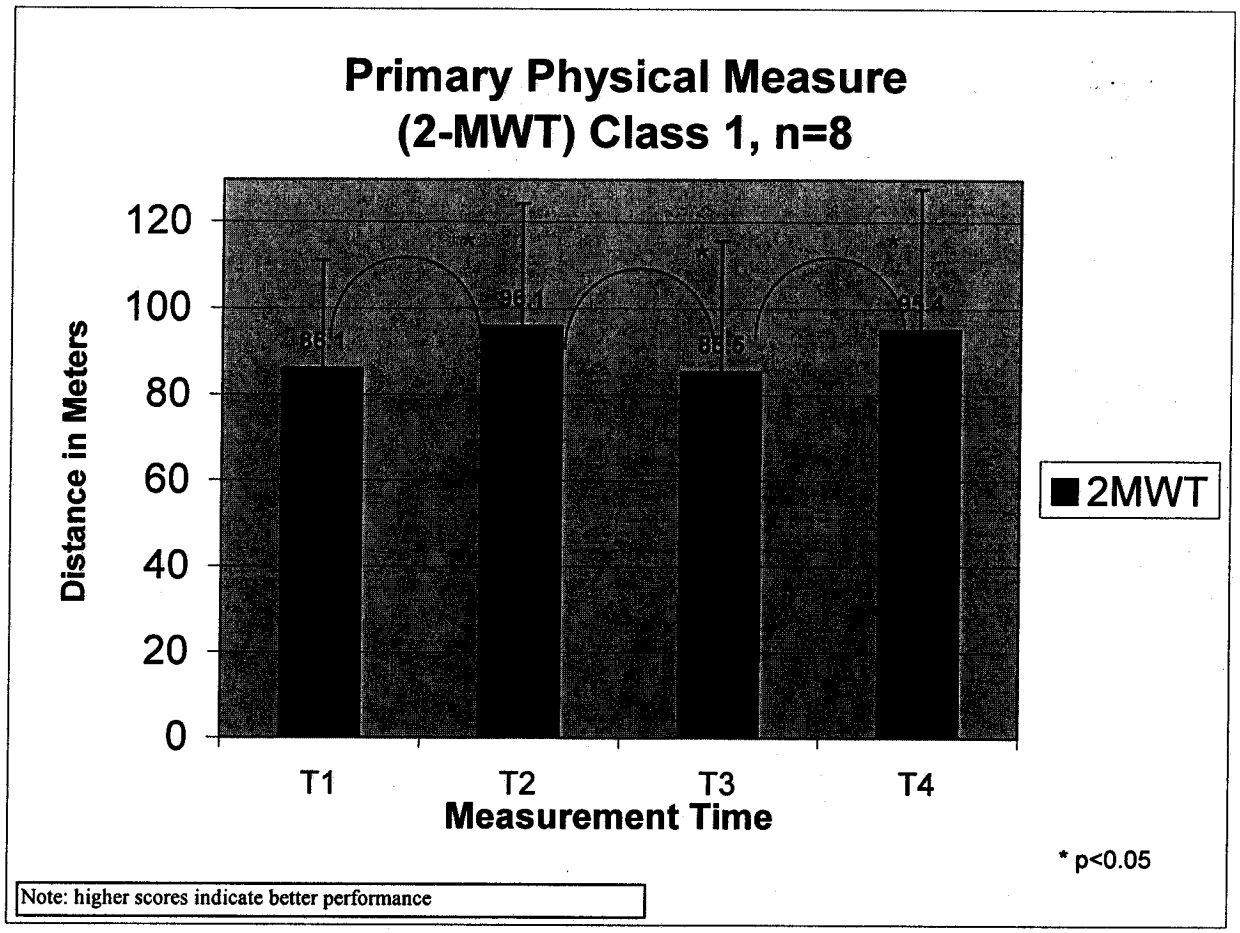
The findings of this study illustrate the effects of cessation of exercise and of the non-continuous exercise programming on physical and bio-psychosocial characteristics in the study population. The physical function measures were grouped by class for examination of statistical effect (to evaluate if the magnitude of change was greater than that expected by chance). The bio-psychosocial variables were examined by nature of the variable (mood, behaviour, pain, etc) to ascertain the response to the intervention.

4.2.1 The Effects of Exercise Cessation on Physical Performance

Class 1 (High Level Exercise Group)

Study participants in Class 1 were monitored on their functional ambulation abilities as measured by the distance walked in two minutes (2-MWT) and by walking speed over a distance of 15 meters. At the outset of the study, a distance of 10m was determined to be of clinical significance. Upon the completion of the first 12-week exercise session, Class 1 participants walked, on average 96.1m (±28.3, range 58m to 150m) while performing the 2-MWT (Figure 2). The average gait speed was recorded as 0.74 m/s (±0.19, range 0.47m/s to 1.10m/s) (Figure 3). Following the 12-week cessation period, they experienced a significant deterioration in each aspect of physical performance to a greater extent than was expected by chance ($p<0.05$).

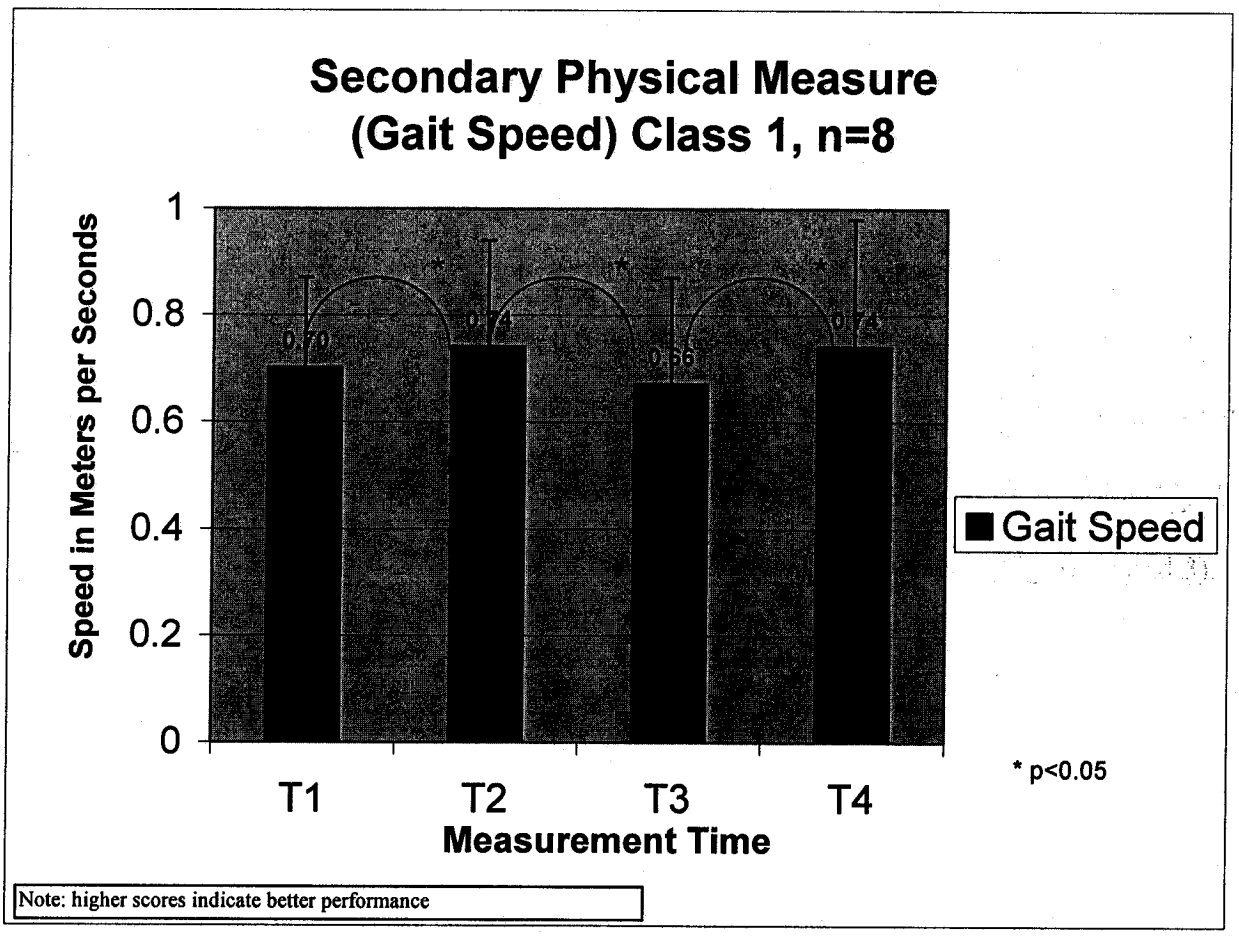
FIGURE 2: Primary Physical Measure (2-MWT), Class 1, n=8



T1: measured at baseline, T2: measured after first exercise session, T3: measured after cessation, T4: measured after second exercise session.

FIGURE 2: Results of measurement testing of participants of Class 1, with statistical significance to $p<0.05$

FIGURE 3: Secondary Physical Measure (Gait Speed), Class 1, n=8



T1: measured at baseline, T2: measured after first exercise session, T3: measured after cessation, T4: measured after second exercise session.

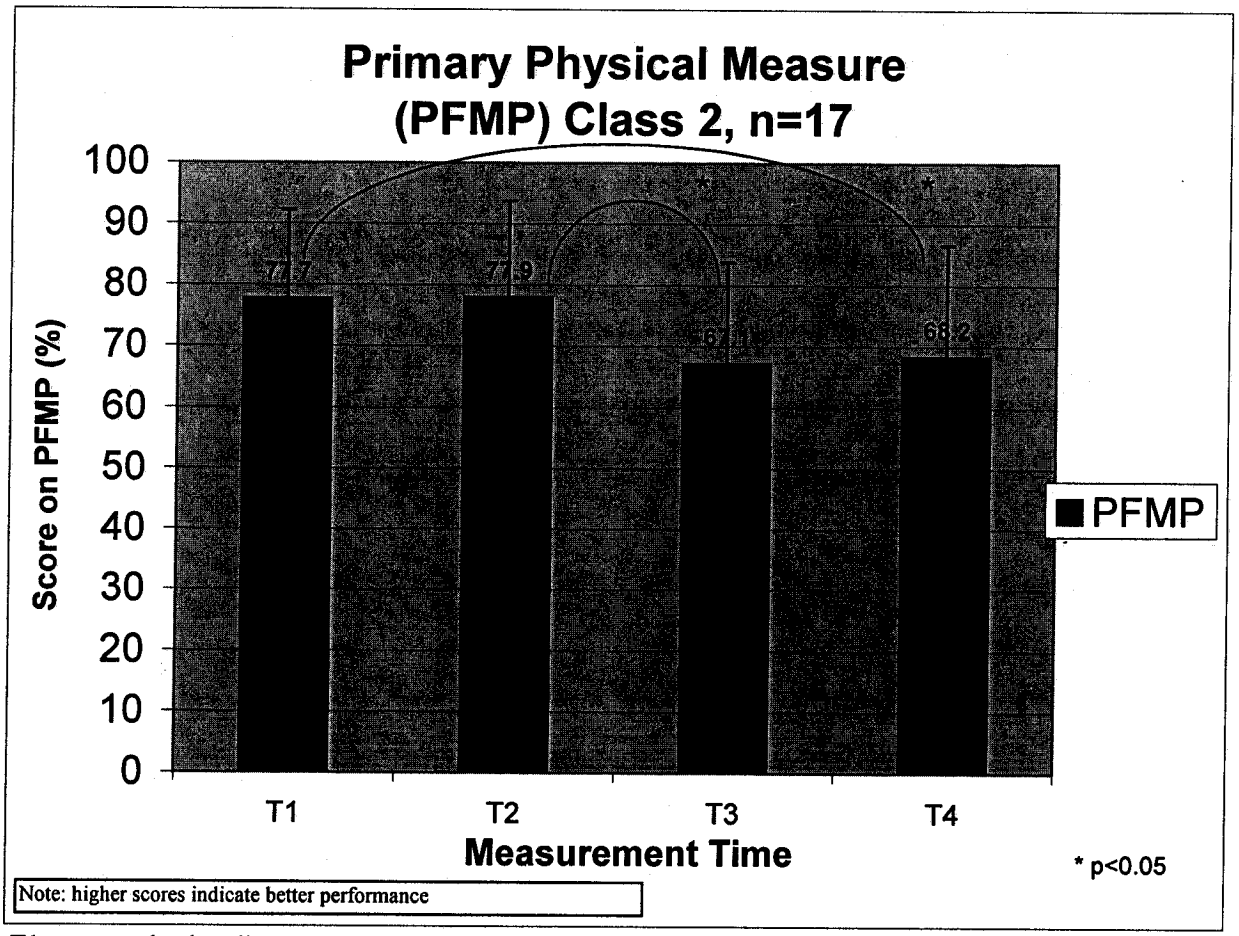
FIGURE 3: Results of measurement testing of participants of Class 1, with statistical significance to $p<0.05$

Specifically, the average distance walked decreased from 96.1m to 85.5m (±30.3) and the average gait speed decreased from 0.74 m/s to 0.66 m/s (±0.19, range 0.41m/s to 1.00m/s). The degree of change in the distance walked corresponded to the predetermined level of clinically meaningful change, as 10m is the distance between bed and toilet in two-thirds of the residents of SAH. The change in walking speed was also clinically relevant as it approached 0.6m/s, identified in the literature as indicating greater frailty and risk for functional decline (Studenski *et al.* 2003). The strength of the relationship between cessation and decline in physical performance is augmented by the consistency of the results in both physical performance parameters and the fact that the change was clinically relevant. In addition, participants' positive response to exercise during the first 12 weeks, then their decline during cessation and the positive response to the second exercise period supports the causal relationship between exercise and cessation of exercise and physical performance (Figures 2 and 3).

Class 2 (Intermediate Level Exercise Group)

The physical performance of participants of Class 2 was monitored with a functional mobility scale, the PFMP. As previously discussed, a change of 6 points on the scale of 63 (a change of 6/63, or 9.5%) was determined to be clinically important. At the end of the first 12-week exercise program, participants' average score on the PFMP was 77.9% ± 15.8 (range 49.2% to 98.4%) (Figure 4). The scores deteriorated in response to the cessation of exercise. PFMP scores as calculated as a percentage out of 100, averaged 67.1% ± 16.6 (range from 42.9% to 87.3%) following cessation of exercise.

FIGURE 4: Primary Physical Measure (PFMP), Class 2, n=17

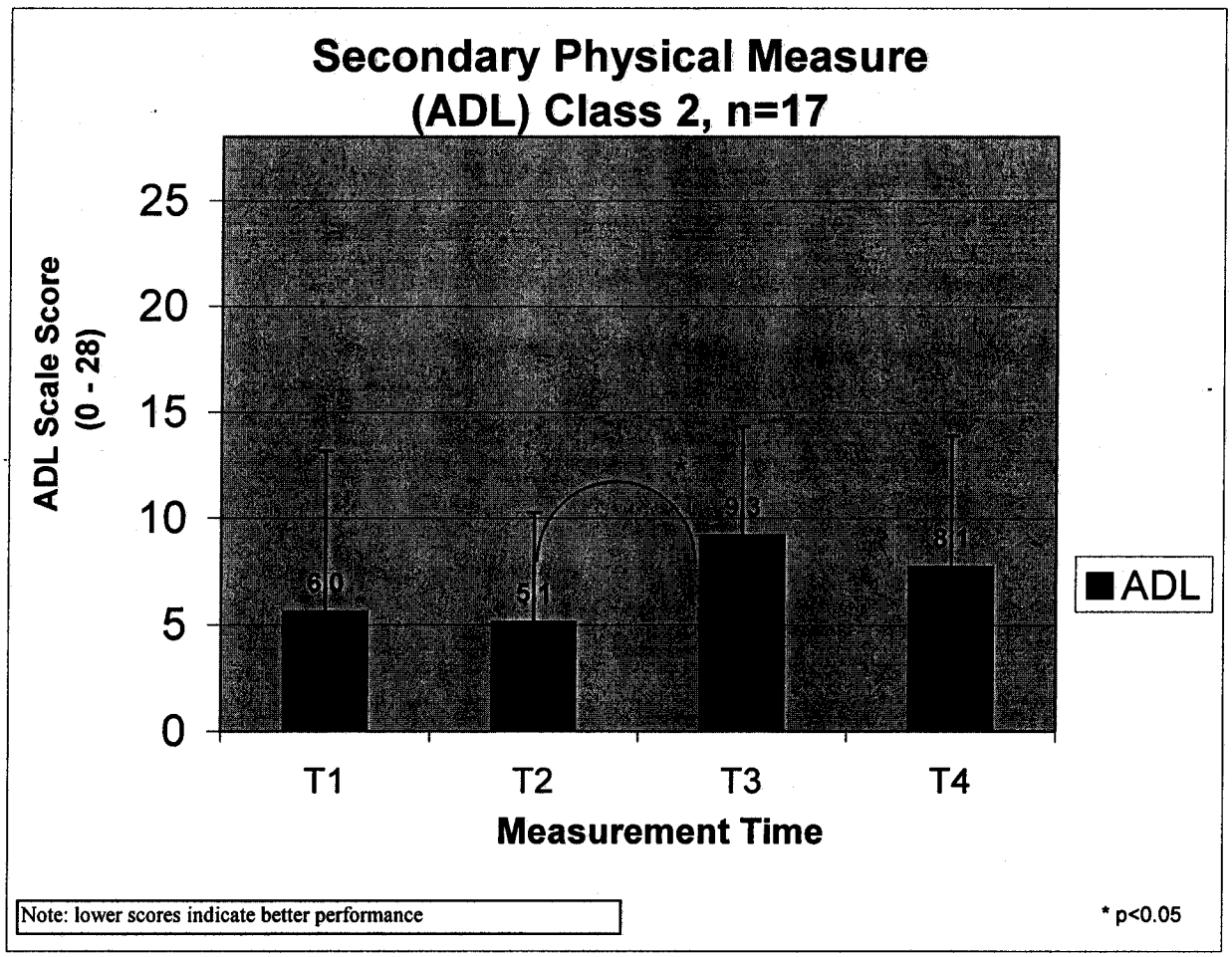


T1: measured at baseline, T2: measured after first exercise session, T3: measured after cessation, T4: measured after second exercise session.

FIGURE 4: Results of measurement testing of participants of Class 2, with statistical significance to $p<0.05$

These change scores were clinically important as they represented a deterioration of 10.8%, which was greater than that identified at the outset of the study and was greater than expected by chance ($p<0.05$). The class's secondary physical measure (ADL) is a summative scale from the MDS, which measures seven activities of daily living and the amount of assistance required by the resident for each task (Morris *et al.* 1999b). Each of the seven items is scored from 0 (independent) to 4 (fully dependent), resulting in a total score where low integers indicate relative independence, and higher scores represent more dependence. Class 2's ADL scores supported the findings of the PFMP, to a degree that was greater than expected by chance (Figure 5). After training, the mean score was 5.1, (±5.0, range 0 to 16); after cessation, mean score had deteriorated to 9.3 (±5.0, range 0 to 19). The decline in physical performance measures in the second class further supports the finding in Class 1 that cessation of exercise results in a decline in physical function.

FIGURE 5: Secondary Physical Measure (ADL), Class 2, n=17



T1: measured at baseline, T2: measured after first exercise session, T3: measured after cessation, T4: measured after second exercise session.

FIGURE 5: Results of measurement testing of participants of Class 2, with statistical significance to $p<0.05$

4.2.2 The Effects of Exercise Cessation on Bio-Psychosocial Attributes

Subjects in Class 1 and Class 2 were monitored regarding their bio-psychosocial function using the MDS assessments every three months during the study period. While the choice of physical measures differed between the two classes, both classes were measured on the same bio-psychosocial variables and therefore for the single-subject analysis, no distinction was made between classes. The displays of the chief bio-psychosocial measure of each of the 25 study subjects may be consulted in Appendix V. The distribution of bio-psychosocial variables among subjects is illustrated in Table 4.

TABLE 4: Distribution of Bio-Psychosocial Variables among Subjects

Bio-Psychosocial Variable	Number of Subjects	Subject Codes
DRS	5	4, 19, 23, 26, 27
ABS	3	12, 15, 28
MDS Pain Scale	5	7, 16, 18, 20, 25
ISE	12	1, 3, 5, 6, 8, 10, 11, 13, 14, 21, 22, 29

DRS: Depression Rating Scale
ABS: Aggressive Behavior Scale
MDS Pain Scale: Pain Scale from the Minimum Data Set
ISE: Index of Social Engagement

Depression Rating Scale

Five participants were noted to have indicators of a mood or anxiety problem at baseline. The mean of the baseline scores was 1.6 ± 0.9 (range 1 to 3), indicating that the mood problems were not severe. Nonetheless, we monitored the one subject from Class 1 and the 4 subjects from Class 2 who were positive for any mood indicators, using the DRS.

The DRS codes seven indicators to create a score from 0-14 with low scores indicating few or no mood items (a better outcome), while high scores indicate more numerous or more frequent mood indicators (a poorer outcome). A score of three or higher indicates the possibility of a depressive disorder (Burrows *et al.* 2000). Four of the five subjects (80%) exhibited deterioration in scores following cessation of exercise (from mean of 0.3 ± 0.5 to 3.3 ± 1.7). Subject #26 was the one participant whose mood status did not deteriorate during the period of cessation of exercise. His DRS at baseline was 3 out of 14 (indicating a possible depressive disorder). His attendance to the classes was 13% and 0%, resulting in very little effect of the exercise class, thus less room to deteriorate as a result of cessation. Additionally, this gentleman went for his annual week-long visit to his only son at Christmas-time, which coincided with the period of exercise cessation. His DRS scores improved following that visit (period of cessation), and subsequently deteriorated in the months after the Christmas holidays, which coincided with the second exercise period. These extraneous variables likely influenced his mood more than the exercise class or cessation of the exercise class.

Aggressive Behavior Scale

The ABS is a sum of MDS items quantifying frequency and persistence of behaviour that is disruptive or intrusive, such as yelling or going into other residents' personal effects. The scale (from 0 to 12) illustrates an absence of such behaviour with low scores. The ABS was selected at baseline for three subjects (1 from Class 1, 2 from Class 2). The mean of the baseline scores was 1.3 ± 0.6 (range 1 to 2). Although overall, study participants did not have marked behavioural problems, any such aggressive behaviour is

disruptive and represents a burden to staff. The mean at the end of the first exercise session was 1.7 ± 1.5 (range 0 to 3). One subject's aggressive behaviour increased with cessation of the exercise program (Subject #28), thus following the expected pattern of response, whereas the behaviour of the other two did not (Subjects #12 and 15). The ABS scores of Subjects #12 and #15 at baseline were 1/12 and 2/12, respectively. Subject #12 responded in the physical measures to exercise cessation (deterioration of greater than 10m walked in two minutes; from 90m after training, to 75m after cessation), whereas the physical measure of Subject #15 remained stable. Although problematic for staff, this behaviour may not be modifiable through exercise.

MDS Pain Scale

Pain was selected at baseline as the bio-psychosocial measure of interest for five subjects (2 from Class 1, 3 from Class 2). The MDS Pain Scale uses two questions on the MDS to create a score from 0 to 3, with low numbers reflecting little or no pain, and higher numbers indicating severe and/or frequent pain. The mean at baseline was 2.2 ± 0.8 (range from 1 to 3), which represents daily pain that is mild or moderate. Mean at the end of the first exercise session was 1.0 ± 0.0 (all scores were 1). Three subjects demonstrated worsened pain following the 12-week cessation period, whereas two subjects (Subjects #18 and #25) showed no change in their pain symptoms. These two subjects' baseline scores had been 2 and 3 (the maximum score), respectively. Both subjects' scores following the exercise session had decreased to 1/3. Maintenance of these diminished pain levels could have been a result of other factors besides the cessation of exercise. Both gentlemen were participants in Class 1, and their physical

abilities may have reached a point where they were able to keep active enough to limit the onset of pain. Threshold values for function and mobility have been discussed in the literature (Young 1986; Guralnik *et al.* 2003) and appear to have played a part in the outcomes of these two subjects; they were both very active on outings and activities inside and outside SAH. Subject #18's physical measures improved and deteriorated with exercise and cessation; the absence of deterioration in his pain symptoms during the period of cessation may have been due to other factors, such as medication usage. The other gentleman (Subject #25) was exceptionally motivated to improve in regards to physical function: he walked independently inside and outside the institution (weather permitting) and his physical measures showed a steady improvement the length of the study period. It is suggested that the absence of the exercise class during the period of cessation had no real effect on the actual amount of exercise taken by this subject, therefore had no detrimental effect on the control of his pain symptoms.

Index of Social Engagement

The final target bio-psychosocial variable selected was the ISE. It was identified as the chief characteristic in 12 subjects (mean 3.3 ± 1.9; 4 in Class 1, 8 in Class 2). The ISE is a scale from 0 to 6, based on the sum of the scores of six items in the MDS. These items reflect the ease with which a resident interacts with family, neighbours and staff and his ability to set and pursue his own goals. Higher scores indicate a higher level of involvement and social engagement of the resident. Mean at the end of the first exercise session was 2.9 ± 1.6 (range 0 to 5). Six subjects' ISE scores deteriorated with exercise cessation; the balance of the class did not experience deterioration in ISE with cessation

of exercise (two subjects' scores improved over the cessation period, while four subjects' scores remained unchanged). This group, whose scores did not deteriorate with exercise cessation, had a mean baseline score of 2.5 ± 2.1. Of these six who did not deteriorate with cessation, for various reasons, four subjects did not participate fully in the exercise class. It was therefore postulated that the impact of the exercises and of cessation was less than optimal. Subject #10 was a female Veteran who was very fearful and although her attendance to the classes was adequate (attended 73.9% of the classes in the first exercise session and 94.7% in the second); she was unable to fully participate in actively performing the exercises due to her anxiety levels (her physical measures indicated a steady decline throughout the time period of the study). Subject #21 was resistant to exercising, and required nearly continual verbal stimulation for active participation, therefore, as the effect of exercises may have been less, the response to cessation may also have been less. His physical measure showed no change through the time period of the study. Subjects #11 and #14 attended less than two-thirds of the exercise classes in each of the two sessions (Subject #11 attended 43.5% and 57.9% of the two sessions and Subject #14 attended 52.2% and 57.9% of the two sessions respectively). Subject #11 progressively deteriorated in his physical measures over the time of the study, and Subject #14 remained stable with respect to physical mobility measures, but required much more assistance with regards to ADLs during the course of the study. Because of poor attendance during the exercise sessions, there may not have been an effect on the ISE with cessation of exercise.

The two other subjects who did not deteriorate with cessation were socially active enough outside the class that it was postulated that the absence of the exercise class in the period of cessation not result in an effect. Subject #8 was a female Veteran who had her own routine from the beginning of the first exercise session until the end of the study period. This routine centred on her reading the daily newspaper, completing the crossword puzzle, attending bingo sessions, the weekly social club and other activities which enabled her to be socially active with or without the exercise group. Her physical measures remained unchanged throughout the length of the study. Subject #13 had a diagnosis of Parkinson's Disease and due to a deterioration of his condition during the first exercise period, he was seen on a 1:1 basis for individual physical therapy treatments during the cessation period. He effectively had no period of cessation of exercise, thus nullifying the planned cessation period and impacting on his ISE scores.

The overall effect on bio-psychosocial variables of the cyclical nature of exercise programming was illustrated by the calculation of mean cumulative scores of bio-psychosocial variables. At baseline the mean of a cumulative score of variables was 4.6 (± 3.4), while the mean at the end of the 36-week study was 6.1 (± 2.7). Higher scores indicated poorer scoring on bio-psychosocial assessments, thus the bio-psychosocial scores appeared to further support the physical findings.

4.2.3 The Effects of Non-Continuous Exercise Programming on Physical Performance

Participants of the two classes responded differently to the overall pattern of exercise provision for the 36-week length of the study with respect to their physical measures. Subjects in Class 1 improved and deteriorated with exercise and cessation in physical performance as measured by 2-MWT scores and gait speed scores. The comparison between physical performance scores at baseline and scores at the end of the second 12-week exercise session showed no change, suggesting that the program was successful in maintaining physical function in this relatively higher functioning group. However, it is of concern that physical performance was not consistently maintained throughout the time of the study; rather it fluctuated over time. Such inconsistency raises concerns about possible activity restrictions during periods of decline, or liability to fall because subjects may misjudge ability levels.

In contrast, participants of Class 2 did deteriorate from start to finish of the 36-week time period of the study, with respect to the primary physical measure (PFMP) (Figure 4). A comparison of scores of the PFMP following the first and second exercise sessions illustrates a decline of 9.7%, a clinically relevant change indicating that the exercise program was not effective in the maintenance of physical function in this population. Although the ADL scale (from 0–independent, to 28–dependent) did not improve significantly with exercise, the deterioration with cessation was greater than that expected by chance alone. Similarly to the PFMP, the ADL values from the end of the first exercise session (5.1) were not achieved by the end of the second exercise session (8.1),

indicating an inability of this frail group to maintain ADLs throughout the length of the study.

In summary, the effectiveness of the 12-week on and 12-week off exercise programming was not supported. The results suggest SAH's policy should be revisited.

CHAPTER 5

DISCUSSION

At the time of the study, the SAH Physiotherapy Department offered a supervised group exercise program that appeared to have some obstacles to its efficacy. It was felt by the author (and supported in the literature) that several features of the exercise programming were of questionable merit. These features included its non-continuous nature (12-week period of exercise cessation between two 12-week exercise periods), its exercise intensities (was the intensity of the planned exercise program adequate to elicit a training effect?), and the different abilities of the participants of the two classes (were those in both groups able to maintain their capacities with the exercise programming as it existed?).

The main finding of this study provides preliminary evidence supporting the rejection of the null hypothesis: a 12-week period of exercise cessation may be detrimental to the physical functional abilities of institutionalized older populations. Participants in both the higher functioning and the non-ambulatory classes deteriorated in terms of physical function following exercise cessation. Available literature (Vorhies *et al.* 1993; Häkkinen *et al.* 2000; Ivey *et al.* 2000b; Hauer *et al.* 2001; Elliott *et al.* 2002; Smith *et al.* 2003), which for the most part was performed on younger-old community-dwelling individuals, support this finding. This deterioration in functional status of institutionalized older adults was both statistically significant and clinically important. The higher-functioning

Class 1 participants exhibited this response to cessation of exercise by walking an average of 10 meters less during two minutes. This distance represents the distance between bed and toilet for two-thirds of the residents of SAH. Class 1 participants also declined in their walking speed. On average, the gait speed deteriorated from 0.74m/s at the end of training, to 0.67m/s at the end of the cessation period. This value was worrisome as it approached the cut-point of 0.60m/s, a figure cited in the literature as a marker of frailty (Studenski *et al.* 2003).

The decline in Class 2, the lower-functioning group, was measured by close to a 7-point drop in functional mobility (PFMP) scores (converted to a change of 10.8%). A drop of six points represents a decrease of one point on two-thirds of the items of the test. Additionally, following cessation, the ability to perform activities of daily living was nearly twice as bad as after training (the deterioration was from 5.12 to 9.18 on the ADL scale of 0-28, with higher scores representing the need for more assistance).

The participants of the two classes did not respond in the same way to the overall non-continuous nature of the exercise program. Class 1 participants appeared able to recover from the cessation of exercise. However, despite the fact that the physical function of Class 1 individuals was roughly the same at the end of both exercise sessions, their values did not remain static. The decline that followed exercise cessation remains of concern; it suggested that individuals had lower strength or performance abilities at times during the 36-week period; fluctuations in ability may lead to falls or other adverse events. This appeared to be supported with incidents in two individuals whose physical function did

fluctuate and who did sustain falls. An alternative strategy may be for some individuals to restrict their activities to compensate for not feeling as strong, which is a strategy to be avoided because of its detrimental effects on functional decline (Gill *et al.* 2003; Gill *et al.* 2004).

The participants of Class 2 appeared unable to recover from exercise cessation; this frailer group deteriorated in physical performance following the cessation period and the decline did not seem to be prevented by exercise, as training in the second session did not improve their physical function. This implies that exercise is critical to maintain physical abilities in the lower-functioning class. While maintenance of function rather than outright improvement in physical measures has been postulated as a valid goal in frail populations of elders (Brill *et al.* 2000; Trappe *et al.* 2002; Tucker *et al.* 2004), this pattern of no improvement with exercise combined with deterioration following cessation needs to be addressed. Any cessation of physical exercise is inconsistent with emerging literature in physical activity health promotion literature that encourages regular exercise (Surgeon-General 1996; Health-Canada 1999). These findings suggest that a cessation period of 12 weeks may be too long for this population, because subjects were unable to return to their previous level of physical functioning after the second exercise session. Overall, the existing exercise program did not appear adequate to maintain the physical function of this frailer group.

The lack of improvement in physical measures of Class 2 participants may relate to the content of the class, or attendance levels, or other factors. As a whole, the Class 2

exercise program did not deliver a large dose; it was scheduled twice weekly (well below recommended norms), did not incorporate standing exercises or balance drills [suggested as key to success of exercise programs in at-risk populations (Shumway-Cook *et al.* 1997b; Guelich 1999)], and had a low staff to participant ratio (1:10), precluding progressions to more challenging exercises in gait and balance. These factors, combined with the subjects' requirement for more supervision, stimulation, and assistance, may have resulted in a sub-maximal training effect. The trainability of frail institutionalized elderly populations has been well established in the literature (Fiatarone *et al.* 1990; Buchner 1993; Fiatarone *et al.* 1994; Connelly 2000; Ivey *et al.* 2000a; Fielding *et al.* 2002; Buchner 2003; Seguin *et al.* 2003; Brouwer *et al.* 2004; Latham *et al.* 2004), therefore there was no reason to believe that our study participants would respond differently. Although the precise amount of how much exercise is needed remains unclear, it is believed that more complex and demanding tasks in exercise interventions are preferable (Galindo-Ciocon *et al.* 1995; Shumway-Cook *et al.* 1997b; Guelich 1999; Timonen *et al.* 2000).

Attendance rates of Class 2 may have contributed as a mitigating factor to the lack of training effect in participants of this class. Generally, non-adherence has been attributed to many causes, such a beliefs and attitudes of both subject and staff as well as institutional policy (Jensen *et al.* 1992; Mellilo *et al.* 1996; Morris *et al.* 1999a; Brawley *et al.* 2003; Dergance *et al.* 2003; Ory *et al.* 2003). As previously discussed, the frequency of the class (twice weekly), the dependence of the participants on caregivers for timely preparation, and even the time of day of the Class 2 exercise session (10:00am), are factors that may need to be addressed to improve adherence by patients as

well as buy-in by staff. Solutions may include offering the exercise class at a later time of day in order to give staff more ample time to prepare the residents, offering more than two classes per week, so patients and staff can take advantage of more suitable or favourable timing, and supplying the classes with more staff to allow for improved variety, challenge and progression in the exercises under closer supervision. The physical function of frail populations of institutionalized elderly has been shown to be modifiable (Fiatarone *et al.* 1990; Fiatarone *et al.* 1994; Galindo-Ciocon *et al.* 1995; Connelly 2000; Buchner 2003), but as illustrated in this study, more flexible and adaptable opportunities must exist for adequate attendance and exercise stimulus in order for residents to reach their full potential.

This study was one of the few to examine the benefits in other domains besides the physical in older residents, of exercising in a group setting (Bennett 2000; Rantanen *et al.* 2000; Timonen *et al.* 2002; Sheppard *et al.* 2003). A novel approach to quantifying the role that bio-psychosocial variables play in response to exercise and its cessation was to measure them through a readily available tool, such as the MDS. The bio-psychosocial measures illustrated large heterogeneity among study participants, making it difficult to select one variable that was common to all subjects. Therefore, as discussed, one bio-psychosocial variable was identified for each individual, reflecting the most problematic area for that subject, at baseline.

Mood has been found to be affected by exercise (Bennett 2000; Kino-Québec 2002; Timonen *et al.* 2002). Although these subjects were not very problematic at baseline, nevertheless, of those who had problematic DRS scores, 80% (4 out of 5) exhibited the

expected pattern with response to exercise cessation. There appeared to be a mild to moderate association between exercise cessation and the three other bio-psychosocial variables. Pain status deteriorated with cessation of exercise in 60% of the subjects whose chief bio-psychosocial variable at baseline had been determined as pain. Social engagement (ISE) was identified as the chief bio-psychosocial variable in 12 subjects; one half of these subjects experienced deterioration in their social engagement during cessation of exercise. One-third of the subjects with problematic ABS (behaviour) scores at baseline deteriorated with cessation of exercise. Overall, this pattern of response to exercise cessation, measured in bio-psychosocial factors warrants further study.

The examination of bio-psychosocial variables was made challenging inasmuch as participants in the exercise class were not selected on the basis of demonstrated behavioural or mood problems; hence they exhibited a limited number of potential problem areas; there was not a lot of room for improvement. It was therefore a tough test to examine whether they would demonstrate change in response to cessation of exercise. As previously discussed, it is interesting that overall participants did demonstrate deterioration in bio-psychosocial attributes: a trend of overall decline in bio-psychosocial status among participants over the course of the study period. In retrospect, it appears that this method of selecting the bio-psychosocial variable may not have consistently elicited the most appropriate and responsive one, though this method was consistent with how problem variables would be chosen in a clinical situation or in a prospective study.

5.1 Challenges to the Study

The selection of the subjects for this study was practical, and reflected the real participants of, and participation in, an existing exercise program intervention. We examined potential confounding variables to the relationship of interest; however, the small number of subjects did not permit multivariate analysis. Unit of residence would influence physical performance consistency over time. The effects of living on certain nursing units may have influenced the degree of physical activity and hence physical performance. Some of the units that were represented in the study had walking programs; some nursing units were more proactive than others with respect to the exercise intervention in terms of patient preparation. These multiple factors that were beyond the scope of this study may have resulted in less deterioration following cessation of exercise classes. Secondly, the fact that all subjects were residents of one institution (SAH), and that the proportion of male residents was high [response of males to exercise differs from the response of females (Buchner 1993)] may influence the applicability and generalizability of the findings of this study.

This study was completed using testing protocols and equipment that are readily available in most clinical settings. This permitted a degree of applicability that was of interest to the research team, as practicing clinicians (Guralnik *et al.* 2003). However, the challenge to this convenience and clinical approach was that the protocols and equipment used might have lacked the refinement and precision of tools available in a non-clinical setting such as a laboratory. Additionally, the primary researcher had no influence on the content of the exercise program or on its frequency. Therefore it was rewarding that a

decline was actually measured in both the high functioning class and the intermediate level class.

Evaluating the clinical implications of this pilot study was rendered challenging by the ethereal nature of standards of clinical change in physical and bio-psychosocial domains. Psychometric data regarding clinically important change on physical performance measures have been published in similar populations to that of this study. Thus relevant values for change in physical performance were based on evidence in the literature as well as clinical experience of the author in consultation with the clinicians who administered the classes. However, norms and cut-off values for the bio-psychosocial variables had not been published at the time of this study. While the degree of change on variables in the bio-psychosocial areas was not known, it can be argued, however that any decline in bio-psychosocial areas result in greater burden on nursing staff. Even one or two problems in aggressive behaviour or depressed mood can make it harder to care for the resident. These are factors to be used in discussions with nursing and administration in order to find solutions including more continuous exercise possibilities. The procedure for selection of the most appropriate characteristic for monitoring the bio-psychosocial domains warrants further examination.

Another limitation was that the single-subject assessments were far apart. Traditionally, single-subject assessments are performed at more frequent intervals than every three months. This limited our ability to identify an appropriate duration for the cessation period.

This study gives therapists cause to reflect on the examination of broader or more comprehensive assessments relative to the effects of their exercise programs. In many settings, therapists have access to computerized data outputs that include bio-psychosocial characteristics, which can add to the portrait of change beyond traditional physical measures. The results of this study are somewhat surprising given the small sample size, but they are consistent, and they support the causal relationship between physical performance and exercise and its cessation. The results have implications for the therapists at Ste-Anne's Hospital, for the Rehabilitation Department at SAH, its administrators and its relationships with national organizations such as Vetlink, for potential future research initiatives.

CHAPTER 6

CONCLUSION

This study provides preliminary evidence that the cessation of exercise is detrimental to the physical and bio-psychosocial function of elderly institutionalized male Veterans. The examination of physical function in this population has added some data to the growing pool of scientific evidence supporting the value of exercise in vulnerable populations. The examination of bio-psychosocial characteristics was a novel approach to address the gains and losses of function as linked with the phases of an exercise program. An exercise class is a multi-featured approach, which may have more effects than simply the physical effects, as currently accepted. The use of practical and accessible evaluation tools will facilitate both formal and informal clinical replication.

The current practice of non-continuous exercise programming, especially in the frailer of the two subject groups, needs to be addressed. It also appears that the content, timing and staffing of the exercise intervention for Class 2 should be modified to further enhance possible gains. The findings should be considered somewhat tentative, and should be interpreted in light of the small sample size. This study, although a pilot study, has illustrated that possibilities exist for populations of elderly and very elderly residents in long-term care to benefit from exercise interventions in measurable ways. It is hoped that this small study may begin a deeper examination in the relationships that exist between the physical and bio-psychosocial domains in this fragile population.

GLOSSARY

± Standard Deviation (s.d.)

ABS Aggressive Behavior Scale

ADL Activities of Daily Living

BMI Body-Mass Index

CNS Central Nervous System

COPD Chronic Obstructive Pulmonary Disease

DRS Depression Rating Scale

DVA Department of Veterans' Affairs, Government of Canada

ICF International Classification of Functioning, Disability and Health

ISE Index of Social Engagement

PFMP Physiotherapy Functional Mobility Profile

PHYSIOTHERAPY / PHYSIOTHERAPIST Physical Therapy / Physical Therapist

SAH Ste-Anne's Hospital, Ste-Anne de Bellevue, Québec, Canada

T.R.P. Thérapeute en réadaptation physique (Rehabilitation Therapist)

2-MWT Two-Minute Walk Test

WHO World Health Organization

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APPENDICES

APPENDIX I
EXERCISE PROGRAM

Class 1 (High Level)

Warm-up
Warm-up

- Lower extremity and cardio-vascular
  - Stationary bicycle with minimal resistance for 10 minutes (pulse under 100 bpm)
  - Treadmill with speed adjusted to comfortable and safe walk, 3 - 5 minutes
- Upper extremity pulleys
  - Shoulder flexion/extension
  - Shoulder horizontal adduction/abduction at 90° shoulder flexion

Strengthening
Simultaneously and bilaterally, trunk well supported, progression based on 1RM, allowing 8-10 repetitions for 2 sets each.

Lower extremity

- Knee extension ("quadriceps") through 90° range of motion in sitting
- Hip and knee extension ("leg press")

Upper extremity

- Horizontal adduction ("pectorals")
- Horizontal press ("pectorals and triceps")
- Horizontal abduction ("posterior deltoid and rhomboids")

Functional exercises

Sit-to-stand manoeuvre: start with 1 x 10 reps, progress number of sets, then progress to lower starting position.

Stair-climbing: start with 3 x flight of stairs (4 stairs), progress number of sets.

Balance drills: within parallel bars, perform single-leg stance, walking straight line.

Cool-down
Cool-down

- stretching exercises of the upper and lower extremities.

APPENDIX I
EXERCISE PROGRAM

Class 2 (Intermediate Level)

Warm-up
Warm-up period
- upper extremity warm-up exercises
- lower extremity warm-up exercises
- general mobility work

Strengthening
Muscular endurance work

Lower extremity strengthening
- Knee extension through 90° range of motion in sitting

Upper extremity strengthening
- Horizontal adduction

Functional exercises
Trunk stabilization work and weight-shifting drills

Respiratory expansion exercises

Cool-down
Cool-down period
- stretching exercises of the upper and lower extremities

McGill

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APPENDIX II

CERTIFICATION OF ETHICAL ACCEPTABILITY FOR RESEARCH INVOLVING HUMAN SUBJECTS

The Faculty of Medicine Institutional Review Board consisting of:

NEIL MACDONALD, M.D.	MICHAL ABRAHAMOWICZ, PHD
ARTHUR CANDIB, MED	PATRICIA DOBKIN, PHD
CATHERINE GARDNER, BSC	LAWRENCE HUTCHISON, MD
CELESTE JOHNSTON, DED	WILSON MILLER, PHD M.D.
ROBERTA PALMOUR, PHD	MARGARET SWAINE, BA

has examined the research project **A09-B27-03A** entitled **"In an Elderly Institutionalized Population, to What Extent are Gains from an Exercise Program Maintained Upon Cessation, and do Certain Factors Predicts the Degree of Maintenance of Physical Function?"**

as proposed by: Katherine Berg (Applicant) to _____ (Granting Agency, if any)

and consider the experimental procedures to be acceptable on ethical grounds for research involving human subjects.

September 9, 2003
Date

Neil MacDonald
Chair, IRB

M. Mackenzie
Dean of Faculty

Institutional Review Board Assurance Number: FWA 00004545

APPENDIX II

McGILL UNIVERSITY

SCHOOL OF PHYSIOTHERAPY AND OCCUPATIONAL THERAPY

Consent to Participate in a Research Study

I, _____, consent to participate in this research study.

A) Purpose and design of the study

Some patients at Ste-Anne's Hospital follow an exercise program in a group for 12 weeks, and then are left on their own to do their exercising by themselves for 12 weeks. The purpose of this study is to see whether patients get weaker, or have mood changes, weight gain/loss, or other changes during the 12 weeks when they do not exercise in the group.

I understand that I will be asked to answer some questions and that I may be observed doing some regular day to day activities, at a time that is convenient to me, three times for approximately 15 minutes each. My medical dossier will be examined and details of my care routine on the ward will be explored by the investigator or a trained assistant over the course of the duration of the study (approximately 24 weeks). My information will be used and stored anonymously. Strict confidentiality will be kept with regards to the information in my dossier, and at no time will I be identified.

B) Advantages of participation in this study

Although there are no direct benefits to me to be gained from participation in this study, the results from this research will contribute to the understanding of how exercise and not exercising, with other factors, affect physical function and well-being in the older adult.

C) Disadvantages of participation in this study

I will be required to be interviewed three times, and I may be observed during activities at three different times over the course of approximately 24 weeks. These interviews will take no longer than 15 minutes each. The main disadvantage will be the time commitment on my part.

APPENDIX II

D) Enquiries concerning the study

I understand that any enquiries that I may have will be answered by Sarah Marshall, in the Physiotherapy Department, Ste-Anne's Hospital at (514) 457-3440 extension 2210.

E) Withdrawal from the study

I understand that my participation in this study is voluntary. Whether or not I participate in this study will not influence my participation in the exercise group or any further treatment in the Physiotherapy Department or any other department at Ste-Anne's Hospital.

F) Permission to use information

I give permission to the investigator(s) to keep and utilize the information from the study as long as my identity is kept confidential.

Signed the _____day of _____, 200___.

Signature: _____

Witness: _____

I, Sarah Marshall, hereby certify that I have explained to the above-mentionned subject the nature of the study, the known risks involved in participating in the study and that he has the option of withdrawing from the study at any time.

Signature: _____

APPENDIX II

UNIVERSITÉ McGILL

ÉCOLE DE PHYSIOTHÉRAPIE ET D'ERGOTHÉRAPIE

Consentement à participer à une étude scientifique

Je, _____, accepte de participer à cette étude.

A) But et objet de cette étude

Certains patient de l'Hôpital Ste-Anne participe à un groupe d'exercices d'une durée de 12 semaines. Par la suite, ils poursuivent leurs activités habituelles sur une base individuelle pour les 12 semaines suivantes. Le but de cette étude est de prendre conscience de l'effet d'un programme d'exercices en groupe sur certains paramètres comme la force musculaire, l'humeur, la prise ou perte de poids, ainsi que les autres changements notés après la fin du groupe.

Je comprends que des questions me seront posées et que je puisse être observé lors de mes activités de la vie courante, lorsque mon horaire le permettra, à trois reprises pour des périodes maximales de quinze minutes. Mon dossier médical et les détails entourant les soins reçus seront investigués par la chercheuse ou un(e) assistant(e) formé(e) à cet effet pour la durée totale de l'étude (24 semaines). L'information retenue sera traitée et entreposée de façon anonyme. La confidetialité le plus stricte sera assurée. Mon identité n'apparaîtra nulle part et en aucun moment.

B) Avantage lors de la participation à cette étude

Quoiqu'il n'y ait pas de bénéfice monétaire ou personnel pour les participants de cette étude, les résultats de cette recherche vont contribuer à mieux comprendre l'impact de plusieurs facteurs sur la maintien des capacités physiques et sur le bien-être de l'aîné.

C) Désavantages lors de la participation à cette étude

Le désavantage principal sera le temps investi lors des trois entrevues auxquelles je devrai me soumettre. La durée estimée de ces rencontres est de 15 minutes chacune.

APPENDIX II

D) Questions concernant cette étude

Je comprends que les questions que je pourrais avoir vont être répondues par Sarah Marshall, au service de physiothérapie à l'Hôpital Ste-Anne au (514) 457-3440 poste 2210.

E) Retrait de cette étude

Ma participation à cette étude est volontaire. Je peux me retirer à n'importe quel moment, sans préjudice pour ma participation au groupe, lors de futurs traitements au service de physiothérapie ou pour tout autre service de l'Hôpital Ste-Anne.

F) Permission d'utiliser de l'information

Je permets à l'enquêteur de garder et d'utiliser l'information résultant de cette étude tout en ne divulgant pas mon indentité.

Signé le _____ de _____, 200___.

Signature : _____

Témoin : _____

Je, Sarah Marshall, certifie par la présente que j'ai expliqué à la personne mentionnée plus haut, le but de cette étude, les risques connus résultant de sa participation à cette étude, et qu'elle a l'option d'un retrait de cette étude en tout temps.

Signature : _____

APPENDIX III

PHYSIOTHERAPY FUNCTIONAL MOBILITY PROFILE (PFMP): **Total Score =** /63 = %

	7 independent	6 slow / device	5 supervision	4 min. assist	3 mod. assist	2 max assist	1 total assist
Bed mobility rolling bridging		uses bedrail					
Lie to sit at side of bed							
Sitting balance feet supported side of bed	protective reflexes normal	tolerates external displacement	self displacement outside base	self displacement within base	maintains balance with no displacement		
Sit to stand	from any height chair						
Standing balance double stance	protective reflexes normal	external displacement	self displacement outside base	self displacement within base	maintains balance with no displacement		
Transfers bed, chair wheelchair toilet			supervised	minimal assistance	pivot with 1 assist	pivot with 2 assist	lift (2-3 person) or mechanical
Wheelchair regular or motorized		50 meters in 5 mins, doorsills 3% grade	15 meters indep. or 50 m. with cueing	15 meters with supervision	15 meters with occasional assist	15 meters with constant assist	less than 15 meters
Ambulation indoors	50 m. turns 180° backward 3 steps		15m indep or 50 m. with supervision	50 m. with 1 person steadying	50 m. with 1 person assist	min 15 m. with 1 person assist	2 person assist or <15 m.
Stairs up / down with rail		uses hand rail	6 steps indep or supervision for 12 steps	12 steps with min. assist	12 steps with 1 person assist	4 steps with 1 person assist	2 assistants or is carried

37652

Minimum Data Set (MDS) 2.0

APPENDIX IV

SECTION AA & A. IDENTIFICATION INFORMATION

AA1. CLIENT IDENTIFICATION NUMBER ☐☐☐☐☐☐☐

A2. SEX ○ Male ○ Female

A3A. ASSESSMENT REFERENCE DATE ☐☐☐☐ ☐☐ ☐☐
a. Year b. Month c. Day

A3B. BIRTH DATE ☐☐☐☐ ☐☐ ☐☐
a. Year b. Month c. Day

A3C. ESTIMATED BIRTH DATE? Birthdate is estimated
○ No ○ Yes

A4. TREATY/BAND ☐☐☐ ☐☐☐☐☐ ☐☐
a. Band b. Treaty c. Placement

A5. MARITAL STATUS ○ Never Married ○ Married ○ Widowed ○ Separated ○ Divorced ○ Unknown

A7. RESPONSIBILITY FOR PAYMENT
Check all that apply in **LAST 30 DAYS**

○ a. Provincial/territory government plan (for resident of province/territory)
○ b. Other province/territory (resident of Canada)
○ c. Federal government - Department of Veteran Affairs (DVA)
○ d. Federal government - First Nations and Inuit Health Branch (FNIHB)
○ e. Federal government - other (RCMP, Canadian Armed Forces, federal penitentiary inmate, refugee)
○ f. Worker's compensation board (WCB/WSIB)
○ g. Canadian resident, private insurance pay
○ h. Canadian resident, public trustee pay
○ i. Canadian resident, self pay
○ j. Other country resident, self pay
○ k. Responsibility for payment unknown/unavailable
○ None of the above

AA8. PRIMARY REASON FOR ASSESSMENT

○ Admission assessment (before day 14)
○ Full annual assessment
○ Significant change in status assessment
○ Significant correction of prior full assessment

A9. RESPONSIBILITY/LEGAL GUARDIAN
Check all that apply

○ a. Legal guardian
○ b. Durable power of attorney/financial
○ c. Other legal oversight
○ d. Family member responsible
○ e. Endurable power of attorney/health care
○ f. Resident responsible for self
○ g. None of the above

A10. ADVANCED DIRECTIVES
(For those items with supporting documentation in the medical record, check all that apply.

○ a. Living will
○ b. Do not resuscitate
○ c. Do not hospitalize
○ d. Organ donation
○ e. Autopsy requested
○ f. Feeding restrictions
○ g. Medication restrictions
○ h. Other treatment restrictions
○ i. None of the above

SECTION AB. DEMOGRAPHIC INFORMATION

AB1. ADMISSION DATE ☐☐☐☐ ☐☐ ☐☐
a. Year b. Month c. Day

Resident Name/ID

APPENDIX IV

SECTION B. COGNITIVE PATTERNS

B1. COMATOSE (Persistent vegetative state or no discernable consciousness)

○ No ○ Yes (Skip to item G1)

B2. Memory (Recall of what was learned or

	Memory OK	Memory problem
a. Short-term memory OK Seems or appears to recall after 5 minutes	○	○
b. Long-term memory OK Seems or appears to recall long past	○	○

B3. MEMORY/RECALL ABILITY
(Check all that resident was normally able to recall during the last 7 days)

○ a. Current season
○ b. Location of own home
○ c. Staff names/faces
○ d. That he/she is in a facility
○ e. None of the above are recalled

B4. COGNITIVE SKILLS FOR DAILY DECISION MAKING
Making decisions regarding tasks of daily life

○ INDEPENDENT - decisions consistent and reasonable
○ MODIFIED INDEPENDENCE - some difficulty in new situations only
○ MODERATELY IMPAIRED - decisions poor; cues or supervision required
○ SEVERELY IMPAIRED - never/rarely made decisions

B5. INDICATORS OF DELIRIUM - PERIODIC DISORDERED THINKING/AWARENESS (Code for behaviour in last 7 days)
Accurate assessment requires conversations with staff and family who have direct knowledge of patient's behaviour over this time

Coding: 0=Behaviour not present
1=Behaviour present, not of recent onset
2=Behaviour present, appears different from patient's usual functioning (e.g., new onset or worsening)

	0	1	2
a. Easily distracted (e.g., difficulty paying attention; gets sidetracked)	○	○	○
b. Periods of altered perceptions or awareness of surroundings (eg., moves lips, talks to someone not present; believes is somewhere else; confuses night and day)	○	○	○
c. Episodes of disorganized speech (e.g., speech is incoherent, nonsensical, irrelevant, or rambling from subject to subject; loses train of thought)	○	○	○
d. Periods of Restlessness (eg., fidgeting, picking at clothing, napkins, skin, air; frequent position changes, repetitive physical movements or calling out)	○	○	○
e. Periods of Lethargy (e.g., sluggishness, staring into space, difficult to arouse, little body movement)	○	○	○
f. Mental Function varies over the course of the day (e.g., sometimes better, sometimes worse; behaviours sometimes present, sometimes not)	○	○	○

B6. CHANGE IN COGNITIVE STATUS (Resident's cognitive status, skills or abilities have changed as compared to status of **90 days ago**, or since last assessment if less than 90 days)

○ No change ○ Improved ○ Deteriorated

SECTION C. COMMUNICATION/HEARING PATTERNS

C1. HEARING (With hearing appliance, if used)
○ HEARS ADEQUATELY - normal talk, TV, phone
○ HEARS IN SPECIAL SITUATION ONLY - speaker has to adjust tonal quality/speak distinctly
○ HIGHLY IMPAIRED or absence of useful hearing

C2. COMMUNICATION DEVICES/TECHNIQUES (Check all that apply during last 7 days)
○ a. Hearing aid, present and used regularly
○ b. Hearing aid, present and not used regularly
○ c. Other receptive communication techniques used (e.g., lip reading)
○ None of the above

C3. MODES OF EXPRESSION
(Check all used by resident to make needs known)
○ a. Speech
○ b. Writing messages to express or clarify needs
○ c. American sign language or Braille
○ d. Signs or gestures or sounds
○ e. Communication board
○ f. Other
○ g. None of the above

C4. MAKING SELF UNDERSTOOD (Expressing information content - however able)
○ UNDERSTOOD
○ USUALLY UNDERSTOOD - difficulty finding words or finishing thoughts
○ SOMETIMES UNDERSTOOD - ability is limited to making concrete requests
○ RARELY OR NEVER UNDERSTOOD

C5. SPEECH CLARITY (Code for speech in last 7 days)
○ CLEAR SPEECH - distinct, intelligible words
○ UNCLEAR SPEECH - slurred, mumbled words
○ NO SPEECH - absence of spoken words

C6. ABILITY TO UNDERSTAND OTHERS
(Understanding verbal information content - however able)
○ UNDERSTANDS
○ USUALLY UNDERSTANDS - may miss some part or intent of message
○ SOMETIMES UNDERSTANDS - responds adequately to simple/direct communication
○ RARELY OR NEVER UNDERSTANDS

C7. CHANGE IN COMMUNICATION/HEARING
○ No change
○ Improved
○ Deteriorated

SECTION D. VISION PATTERNS

D1. VISION (Able to see in adequate light and with glasses, if used)

- ○ ADEQUATE - sees fine detail, including regular print in newspapers or books
- ○ IMPAIRED - sees large print, but not regular print in newspapers or books
- ○ MODERATELY IMPAIRED - limited vision; not able to see newspaper headlines, but can identify objects
- ○ HIGHLY IMPAIRED - object identification in question, but eyes appear to follow objects
- ○ SEVERELY IMPAIRED - no vision or sees only light, colours or shapes; eyes do not appear to follow objects

D2. VISUAL LIMITATIONS/DIFFICULTIES

a. **Side vision problems** - decreased peripheral vision (e.g., leaves food on one side of tray, difficulty travelling, bumps into people and objects, misjudges placement of chair when seating self)
○ No ○ Yes

b. **Experiences any of the following** - sees halos or rings aorund lights, sees flashes of light, sees "curtains" over eyes
○ No ○ Yes

D3. VISUAL APPLIANCES

Glasses; contact lenses; magnifying glass ○ No ○ Yes

SECTION E. MOOD AND BEHAVIOUR PATTERNS

E1. INDICATIORS OF DEPRESSION, ANXIETY, SAD MOOD (Code for indicators observed in **last 30 days**, irrespective of the assumed cause)

CODING: 0=Indicator not exhibited in last 30 days 1=Indicator of this type exhibited up to 6 days a week
2=Indicator of this type exhibited daily or almost daily (6-7 days)

VERBAL EXPRESSIONS OF DISTRESS

a. Resident made negative statements (e.g., "Nothing matters; Would rather be dead; What's the use; Regrets having lived so long; Let me die")

b. Repetitive questions (e.g., "Where do I go? What do I do?)"

c. Repetitive verbalizations (e.g., Calling out for help; "God help me")

d. Persistent anger with self or others (e.g., easily annoyed, anger at placement in facility; anger at care received)

e. Self depreciation (e.g., "I am nothing, of no use to anyone")

f. Expressions of what appear to be unrealistic fears (e.g., fear of being abandoned, left alone, being with others)

g. Recurrent statements that something terrible is about to happen (e.g., believes is about to die, have a heart attack)

h. Repetitive health complaints (e.g., persistently seeks medical attention, obsessive concern with body functions)

i. Repetitive anxious complaints or concerns - non-health (e.g., persistently seeks attention or reassurance regarding schedules, meals, laundry or clothing, relationship issues)

SLEEP-CYCLE ISSUES

j. Unpleasant mood in morning

k. Insomnia or change in usual sleep pattern

SAD, APATHETIC, ANXIOUS APPEARANCE

l. Sad, pained, worried facial expressions (e.g., furrowed brows)

m. Crying, tearfulness

n. Repetitive physical movements (e.g., pacing, hand wringing, restlessness, fidgeting, picking)

LOSS OF INTEREST

o. Withdrawal from activities of interest (e.g., no interest in longstanding activities or being with familiy, friends)

p. Reduced social interaction

E2. MOOD PERSISTENCE

One or more indicators of depressed, sad or anxious mood were not easily altered by attempts to "cheer up", console, or reassure the resident in last 7 days
○ No mood indicators ○ Indicators present, easily altered ○ Indicators present, not easily altered

E3. CHANGE IN MOOD

Resident's mood status has changed as compared to status of **90 days ago** (or since last assessment if less than 90 days)
○ No change ○ Improved ○ Deteriorated

E4. BEHAVIOURAL SYMPTOMS (Code for behaviour in last 7 days)

CODING FOR 'A'
Behavioural frequency in last 7 days
0=Behaviour not exhibited in last 7 days
1=Behaviour of this type occurred on 1 to 3 days in last 7 days
2=Behaviour of this type occurred 4 to 6 days or less than daily
3=Behaviour of this type occurred daily

CODING FOR 'B'
Behavioural symptom variability in last 7 days
0=Behaviour not present OR behaviour was easily altered
1=Behaviour was not easily altered

	A	B
a. WANDERING (moved with no rational purpose, seemingly oblivious to needs or safety		
b. VERBALLY ABUSIVE BEHAVIOURAL SYMPTOMS (others were threatened, screamed at, cursed at)		
c. PHYSICALLY ABUSIVE BEHAVIOURAL SYMPTOMS (others were hit, shoved, scratched, sexually abused)		
d. SOCIALLY INAPPROPRIATE or DISRUPTIVE BEHAVIOURAL SYMPTOM (made disruptive sounds, noisiness, screaming, self-abusive acts, sexual behaviour or disrobing in public, smeared or threw food or feces, hoarding, rummaged in others' belongings)		
e. RESISTS CARE (resisted taking meds or injections, ADL assistance, or eating)		

E5. CHANGE IN BEHAVIOURAL SYMPTOMS

Resident's behavioural status has changed as compared to status of **90 days ago** (or since last assessmen if less than 90 days)
○ No change ○ Improved ○ Deteriorated

SECTION F. PSYCHOSOCIAL WELL-BEING

F1. SENSE OF INITIATIVE/INVOLVEMENT (Check all that apply)

- ○ a. At ease interacting with others
- ○ b. At ease doing planned or structured activities
- ○ c. At ease doing self-initiated activities
- ○ d. Establishes own goals
- ○ e. Pursues involvement in life of facility (e.g., makes and keeps friends; involved in group activities; responds positively to new activities; assists at religious services)
- ○ f. Accepts invitations into most group activities
- ○ g. None of the above

F2. UNSETTLED RELATIONSHIPS (Check all that apply)

- ○ a. Covert/open conflict with or repeated criticism of staff
- ○ b. Unhappy with roommate
- ○ c. Unhappy with residents other than roommate
- ○ d. Openly expresses conflict/anger with family/friends
- ○ e. Absence of personal contact with family or friends
- ○ f. Recent loss of close family member or friend
- ○ g. Does not adjust easily to change in routines
- ○ h. None of the above

F3. PAST ROLES

a. Strong identification with past roles and life status
- ○ No
- ○ Yes
- ○ Unknown (admission only)

b. Expresses sadness, anger or empty feeling over lost roles or status
- ○ No
- ○ Yes
- ○ Unknown (admission only)

c. Resident perceives that daily life (customary routine, activities) is very different from prior pattern in the community
- ○ No
- ○ Yes
- ○ Unknown (admission only)

SECTION G. PHYSICAL FUNCTIONING AND STRUCTURAL PROBLEMS

G1A. ADL SELF-PERFORMANCE
Code for resident's performance over all shifts during last 7 days, not including setup.

CODING for "A":
0 = INDEPENDENT - No help or oversight OR help/oversight provided only 1 or 2 times during last 7 days
1 = SUPERVISION - Oversight, encouragement or cueing provided 3 or more times during last 7 days OR supervision plus physical assistance provided only 1 or 2 times during last 7 days
2 = LIMITED ASSISTANCE - Resident highly involved in activity; received physical help in guided maneuvering of limbs or other non-weight bearing assistance 4 or more times OR more help provided only 1 or 2 times during last 7 days
3 = EXTENSIVE ASSISTANCE - Although resident performed part of activity over last 7 days, consistent help of another person was provided 3 or more times for weight bearing support OR full staff performance during part (but not all) of last 7 days
4 = TOTAL DEPENDENCE - Full staff performance of activity during entire 7 days
8 = ACTIVITY DID NOT OCCUR during entire 7 days

G1B. ADL SUPPORT PROVIDED (Code for most support provided over all shifts during last 7 days. Code regardless of resident's self-performance classification)

CODING FOR "B":
0 = No setup or physical help from staff
1 = Setup help only
2 = One-person physical assist
3 = Two+ person physical assist
8 = ADL activity did not occur during entire 7 days

G1A. ADL SELF-PERFORMANCE AND G1B. ADL SUPPORT PROVIDED

	A	B
a. BED MOBILITY - How resident moves to and from lying position, turns from side to side, and positions body while in bed		
b. TRANSFER - How resident moves between surfaces-to and from: bed, chair, wheelchair, standing position (EXCLUDE to and from bath and toilet)		
c. WALK IN ROOM - How resident walks between locations in own room		
d. WALK IN CORRIDOR - How resident walks in corridor on unit		
e. LOCOMOTION ON UNIT - How resident moves between locations in own room and adjacent corridor on same floor. If in wheelchair, self-sufficiency once in chair		
f. LOCOMOTION OFF UNIT - How resident moves to and returns from off-unit locations (e.g., areas set aside for dining, activities or treatments). If facility has only one floor, how resident moves to and from distant areas on the floor. If in wheelchair, self-sufficiency once in chair		
g. DRESSING - How resident puts on, fastens, and takes off all items of street clothing, including donning and removing prosthesis		
h. EATING - How resident eats and drinks (regardless of skill). Includes intake of nourishment by other means (e.g., tube feeding, total parenteral nutrition)		
i. TOILET USE - How resident uses the toilet room (or commode, bedpan, urinal); transfers on/off toilet, cleanses, changes pad, manages ostomy or catheter, adjusts clothing		
j. PERSONAL HYGIENE - How resident maintains personal hygiene, including combing hair; brushing teeth; shaving; applying makeup; washing and drying face, hands, and perineum (EXCLUDE baths and showers)		

APPENDIX IV

G2. BATHING
Code for most dependent

a. **SELF-PERFORMANCE**
How resident takes full-body bath or shower, sponge bath, and transfers in and out of tub or shower (EXCLUDE washing of back and hair)

- ○ Independent - No help provided
- ○ Supervision - Oversight help only
- ○ Physical help limited to transfer only
- ○ Physical help in part of bathing activity
- ○ Total dependence
- ○ Bathing did not occur during the entire 7 days

b. **ADL SUPPORT PROVIDED**
Code for most support provided over all shifts during last 7 days. Code regardless of resident's self-performance classification.

- ○ No setup or physical help from staff
- ○ Setup help only
- ○ One-person physical assist
- ○ Two + persons physical assist
- ○ Bathing did not occur during entire 7 days

G3. TEST FOR BALANCE Code for ability during test in the last 7 days

a. **BALANCE WHILE STANDING**

- ○ Maintained position as required in test
- ○ Unsteady, but able to rebalance self without physical support
- ○ Partial physical support during test or doesn't follow directions
- ○ Not able to attempt test without physical help

b. **BALANCE WHILE SITTING - POSITION, TRUNK CONTROL**

- ○ Maintained position as required in test
- ○ Unsteady, but able to rebalance self without physical support
- ○ Partial physical support during test or doesn't follow directions
- ○ Not able to attempt test without physical help

G4. FUNCTIONAL LIMITATION IN RANGE OF MOTION
Code for limitations during last 7 days that interfered with daily functions or put resident at risk of injury

A. RANGE OF MOTION CODING: 0=No limitation 1=Limitation on 1 side 2=Limitation on both sides	B. VOLUNTARY MOVEMENT CODING: 0=No loss 1=Partial loss 2=Full loss

	A	B
a. Neck		
b. Arm - including shoulder or elbow		
c. Hand - including wrist or fingers		
d. Leg - including hip or knee		
e. Foot - including ankle or toes		
f. Other limitation or loss		

G5. MODES OF LOCOMOTION
Check all that apply during last 7 days

- ○ a. Cane, walker or crutch
- ○ b. Wheeled self
- ○ c. Other person wheeled
- ○ d. Wheelchair primary mode of locomotion
- ○ e. None of the above

G6. MODES OF TRANSFER
Check all that apply during last 7 days

- ○ a. Bedfast all or most of the time
- ○ b. Bed rails used for bed mobility or transfer
- ○ c. Lifted manually
- ○ d. Lifted mechanically
- ○ e. Transfer aid (e.g., slide board, trapeze, cane, walker, brace)
- ○ f. None of the above

G7. TASK SEGMENTATION
Some or all of ADL activities were broken into sub-tasks during last 7 days so that resident could perform them

- ○ No
- ○ Yes

G8. ADL FUNCTIONAL REHAB. POTENTIAL
Check all that apply during last 7 days

- ○ a. Resident believes self to be capable of increased independence in at least some ADLs
- ○ b. Direct care staff believe resident is capable of increased independence in at least some ADLs
- ○ c. Resident able to perform tasks/activities but is very slow
- ○ d. Difference in ADL self-performance or ADL support, comparing mornings to evenings
- ○ e. None of the above

G9. CHANGE IN ADL FUNCTION
Resident's ADL self-performance status has changed as compared to status of **90 days ago** (or since last assessment if less than 90 days)

○ No change ○ Improved ○ Deteriorated

SECTION H. CONTINENCE IN LAST 14 DAYS

H1. CONTINENCE SELF-CONTROL CATEGORIES
Code for performance over all shifts

CODING:
0=CONTINENT - Complete control
1=USUALLY CONTINENT - BLADDER: Incontinent episodes once a week or less; BOWEL: less than weekly
2=OCCASIONALLY INCONTINENT - BLADDER: 2+ times a week but not daily; BOWEL: once a week
3=FREQUENTLY INCONTINENT - BLADDER: tended to be incontinent daily, but some control present (e.g., on day shift); BOWEL: 2 or 3 times a week
4=INCONTINENT - Had inadequate control; BLADDER: multiple daily episodes; BOWEL: all (or almost all) of the time

a. **BOWEL CONTINENCE**
Control of bowel movement, with appliance or bowel continence program, if used ☐

b. **BLADDER CONTINENCE**
Control of urinary bladder function (if dribbles, volume insufficient to soak through underpants), with appliances (e.g., foley) or continence programs, if used ☐

H2. BOWEL ELIMINATION PATTERN
Check all that apply in **last 14 days**

- ○ a. Bowel elimination pattern regular - at least 1 movement every 3 days
- ○ b. Constipation
- ○ c. Diarrhea
- ○ d. Fecal impaction
- ○ e. None of the above

H3. APPLIANCES AND PROGRAMS
Check all that apply in **last 14 days**

- ○ a. Any scheduled toileting plan
- ○ b. Bladder retraining program
- ○ c. External (condom) catheter
- ○ d. Indwelling catheter
- ○ e. Intermittent catheter
- ○ f. Did not use toilet, commod, urinal
- ○ g. Pads or briefs used
- ○ h. Enemas, irrigation
- ○ i. Ostomy present
- ○ j. None of the above

H4. CHANGE IN URINARY CONTINENCE
Resident's urinary continence has changed as compared to status of **90 days ago** (or since last assessment if less than 90 days)

- ○ No change
- ○ Improved
- ○ Deteriorated

SECTION I. DISEASE DIAGNOSES

I1. DISEASES

Check only those diseases that have a relationship to current ADL status, cognitive status, mood and behaviour status, medical treatment, nurse monitoring, or risk of death. Do not list inactive diagnoses. If none of I1a to I1uu apply, check item I1vv.

ENDOCRINE/META-BOLIC/NUTRITIONAL

- O a. Diabetes mellitus
- O b. Hyperthyroidism
- O c. Hypothyroidism

HEART/CIRCULATION

- O d. Arteriosclerotic heart disease (ASHD)
- O e. Cardiac dysrhythmia
- O f. Congestive heart failure
- O g. Deep vein thrombosis
- O h. Hypertension
- O i. Hypotension
- O j. Peripheral vascular disease
- O k. Other cardiovascular disease

MUSCULOSKELETAL

- O l. Arthritis
- O m. Hip fracture
- O n. Missing limb (e.g., amputation)
- O o. Osteoporosis
- O p. Pathological bone fracture
- O q. Amyotrophic lateral sclerosis (ALS)

NEUROLOGICAL

- O r. Alzheimer's disease
- O s. Aphasia
- O t. Cerebral palsy
- O u. Cerebrovascular accident (stroke)
- O v. Dementia other than Alzheimer's disease
- O w. Hemiplegia/hemiparesis
- O x. Huntington's chorea
- O y. Multiple sclerosis
- O z. Paraplegia
- O aa. Parkinson's disease
- O bb. Quadriplegia
- O cc. Seizure disorder
- O dd. Transient ischemic attack (TIA)
- O ee. Traumatic brain injury

PSYCHIATRIC/MOOD

- O ff. Anxiety disorder
- O gg. Depression
- O hh. Manic depressive (bipolar disease)
- O ii. Schizophrenia

PULMONARY

- O jj. Asthma
- O kk. Emphysema/COPD

SENSORY

- O ll. Cataracts
- O mm. Diabetic retinopathy
- O nn. Glaucoma
- O oo. Macular degeneration

OTHER

- O pp. Alergies
- O qq. Anemia
- O rr. Cancer
- O ss. Gastrointestinal disease
- O tt. Liver disease
- O uu. Renal failure
- O vv. None of the above

I2. INFECTIONS If none apply, check "None of the above"

- O a. Antibiotic resistant infection (e.g., Methicillin resistant staph)
- O b. Cellulitis
- O c. Clostridium difficile
- O d. Conjunctivitis
- O e. HIV infection
- O f. Pneumonia
- O g. Respiratory infection
- O h. Septicemia
- O i. Sexually transmitted diseases
- O j. Tuberculosis (active)
- O k. Urinary tract infection in LAST 30 DAYS
- O l. Viral hepatitis
- O m. Wound infection
- O n. None of the above

I3. OTHER CURRENT DIAGNOSIS AND ICD-10 CODES

		ICD-10 CODES
a.		
b.		
c.		
d.		
e.		
f.		

SECTION J. HEALTH CONDITIONS

J1. PROBLEM CONDITIONS

Check all problems present in the last 7 days **unless other time frame is indicated**

INDICATORS OF FLUID STATUS

- O a. Weight gain or loss of 1.5 or more kilograms in last 7 days (3 lbs.)
- O b. Inability to lie flat due to shortness of breath
- O c. Dehydrated (e.g., output exceeds intake)
- O d. Insufficient fluid; did NOT consume all or almost all liquids provided during LAST 3 DAYS

OTHER

- O e. Delusions
- O f. Dizziness/vertigo
- O g. Edema
- O h. Fever
- O i. Hallucinations
- O j. Internal bleeding
- O k. Recurrent lung aspirations in LAST 90 DAYS
- O l. Shortness of breath
- O m. Syncope (fainting)
- O n. Unsteady gait
- O o. Vomiting
- O p. None of the above

J2. PAIN SYMPTOMS

Code for highest level of pain present in last 7 days

a. FREQUENCY with which resident complains or shows evidence of pain:

- O No pain (skip to J4)
- O Pain less than daily
- O Pain daily

b. INTENSITY of pain:

- O Mild pain
- O Moderate pain
- O Times when pain is horrible or excrutiating

APPENDIX IV

J3. PAIN SITE
Check all sites where pain was present in last 7 days

- ○ a. Back pain
- ○ b. Bone pain
- ○ c. Chest pain during usual activities
- ○ d. Headache
- ○ e. Hip pain
- ○ f. Incisional pain
- ○ g. Joint pain (other than hip)
- ○ h. Soft tissue pain (e.g., lesion, muscle)
- ○ i. Stomach pain
- ○ j. Other

J4. ACCIDENTS
Identify all that apply

- ○ a. Fell in PAST 30 DAYS
- ○ b. Fell in PAST 31 to 180 DAYS
- ○ c. Hip fracture in LAST 180 DAYS
- ○ d. Other fracture in LAST 180 DAYS
- ○ e. None of the above

J5. STABILITY OF CONDITIONS

- ○ a. Conditions or diseases make resident's cognitive, ADL, mood, or behaviour patterns unstable (fluctuating, precarious, or deteriorating)
- ○ b. Resident experiencing an acute episode or a flare-up of a recurrent or chronic problem
- ○ c. End-stage disease; 6 months or less to live
- ○ d. None of the above

SECTION K. ORAL/NUTRITIONAL STATUS

K1. ORAL PROBLEMS
Check all that apply in last 7 days

- ○ a. Chewing problem
- ○ b. Swallowing problem
- ○ c. Mouth pain
- ○ d. None of the above

K2. HEIGHT AND WEIGHT
a. Record height in centimeters (cm)

[ ][ ][ ]

b. Record weight in kilograms (kg)
Base weight on most recent measure in LAST 30 DAYS; measure weight consistently in accord with standard facility practice (e.g., in AM after voiding, before meal, with shoes off, and in nightclothes)

[ ][ ][.][ ]

K3. WEIGHT CHANGE

a. Weight loss - 5% or more in LAST 30 DAYS or 10% or more in LAST 180 DAYS
○ No ○ Yes ○ Unknown (admission only)

b. Weight gain - 5% or more in LAST 30 DAYS or 10% or more in LAST 180 DAYS
○ No ○ Yes ○ Unknown (admission only)

K4. NUTRITIONAL PROBLEMS
Check all that apply in last 7 days

- ○ a. Complains about the taste of many foods
- ○ b. Regular or repetitive complaints of hunger
- ○ c. Leaves 25% or more of food uneaten at most meals
- ○ d. None of the above

K5. NUTRITIONAL APPROACHES
Check all that apply in last 7 days

- ○ a. Parenteral/IV
- ○ b. Feeding tube
- ○ c. Mechanically altered diet
- ○ d. Syringe (oral feeding)
- ○ e. Therapeutic diet
- ○ f. Dietary supplement between meals
- ○ g. Plate guard, stabilized built-up utensil, etc.
- ○ h. On a planned weight change program
- ○ i. None of the above

K6. PARENTERAL OR ENTERAL INTAKE
SKIP to section "L" if neither K5a nor K5b is checked.

a. Code the proportion of total calories the resident received throug parenteral or tube feedings in the last 7 days
○ None ○ 1% to 25% ○ 26% to 50% ○ 51% to 75% ○ 76% to 100%

b. Code the average fluid intake per day by IV or tube in the last 7 days

- ○ None
- ○ 1 to 500 cc/day
- ○ 501 to 1000 cc/day
- ○ 1001 to 1500 cc/day
- ○ 1501 to 2000 cc/day
- ○ 2001 or more cc/day

SECTION L. ORAL/DENTAL STATUS

L1. ORAL STATUS AND DISEASE PREVENTION
Check all that apply in last 7 days

- ○ a. Debris (soft, easily removble substances) present in mouth prior to going to bed at night
- ○ b. Has dentures and/or removable bridge
- ○ c. Some or all natural teeth lost - does not have or does not use dentures (or partial plates)
- ○ d. Broken, loose, or carious teeth
- ○ e. Inflamed gums (gingiva); swollen or bleeding gums; oral abscesses, ulcers, or rashes
- ○ f. Daily cleaning of teeth or dentures, or daily mouth care - by resident or staff
- ○ g. None of the above

SECTION M. SKIN CONDITION

M1. ULCERS (due to any cause)
Record the **number** of ulcers at each ulcer stage - regardless of cause. If none present at a stage, record "0" (zero).
Code all that aply in last 7 days. Code "9" = 9 or more. Requires a full body exam.

a. Stage 1 - A persistent area of skin redness (without a break in the skin) that does not disappear when pressure is relieved [ ]

b. Stage 2 - A partial thickness loss of skin layers that presents clinically as an abrasion, blister or shallow crater [ ]

c. Stage 3 - A full thickness of skin is lost, exposing the subcutaneous tissues - presents as a deep crater with or without undermining adjacent tissue [ ]

d. Stage 4 - A full thickness of skin and subcutaneous tissue is lost, exposing muscle or bone [ ]

APPENDIX IV

M2. TYPE OF ULCER
For each type of ulcer, code for the **highest stage** in last 7 days using scale in item M1 i.e., **0**=None, stages 1, 2, 3, and 4.

a. Pressure ulcer - any lesion caused by pressure resulting in damage of underlying tissue
b. Stasis ulcer - open lesion caused by poor circulation in the lower extremities

M3. HISTORY OF RESOLVED ULCERS
Resident has had a pressure ulcer that was resolved or cured in LAST 90 DAYS

○ No ○ Yes

M4. OTHER SKIN PROBLEMS OR LESIONS PRESENT
Check all that apply during last 7 days

○ a. Abrasions, bruises
○ b. Burns (second or third degree)
○ c. Open lesions other than ulcers, rashes or cuts (e.g., cancer lesions)
○ d. Rashes (e.g., intertrigo, eczema, drug/heat rash, herpes)
○ e. Skin desensitized to pain or pressure
○ f. Skin tears or cuts (other than surgery)
○ g. Surgical wounds
○ h. None of the above

M5. SKIN TREATMENTS
Check all that apply during last 7 days

○ a. Pressure relieving device(s) for chair
○ b. Pressure relieving device(s) for bed
○ c. Turning or repositioning program
○ d. Nutrition or hydration intervention to manage skin problems
○ e. Ulcer care
○ f. Surgical wound care
○ g. Application of dressings (with/without topical medications) other than to feet
○ h. Application of ointments or medications (except to feet)
○ i. Other preventative or protective skin care (except to feet)
○ j. None of the above

M6. FOOT PROBLEMS AND CARE
Check all that apply during last 7 days

○ a. Resident has 1 or more foot problems (corns, callouses, bunions, hammer toes, overlapping toes, pain, structural problems)
○ b. Infection of the foot (e.g., cellulitis, purulent drainage)
○ c. Open lesions on the foot
○ d. Nails or callouses trimmed during LAST 90 DAYS
○ e. Received preventative or protective foot care (e.g., used special shoes, inserts, pads, toe separators)
○ f. Application of dressings (with or without topical medications)
○ g. None of the above

SECTION N. ACTIVITY PURSUIT PATTERNS

TIME AWAKE
Check appropriate time periods over last 7 days

Resident awake all or most of the time (i.e., naps no more than 1 hour per time period) in the:

○ a. Morning
○ b. Afternoon
○ c. Evening
○ d. None of the above

N2. AVERAGE TIME INVOLVED IN ACTIVITIES
When awake and not getting treatment or ADL care

○ Most - more than 2/3 of time
○ Some - from 1/3 to 2/3 of time
○ Little - less than 1/3 of time
○ None

N3. PREFERRED ACTIVITY SETTINGS
Check all settings in which activities are preferred

○ a. Own room
○ b. Day or activity room
○ c. Inside facility/off unit
○ d. Outside facility
○ e. None of the above

N4. GENERAL ACTIVITY PREFERENCES (adapted to resident's current abilities)
Check all PREFERENCES whether or not activity is currently available to resident

○ a. Cards, other games
○ b. Crafts or arts
○ c. Exercise or sports
○ d. Music
○ e. Reading, writing
○ f. Spiritual or religious activities
○ g. Trips or shopping
○ h. Walk/wheeling outdoors
○ i. Watching TV
○ j. Gardening or plants
○ k. Talking or conversing
○ l. Helping others
○ m. None of the above

N5. PREFERS CHANGE IN DAILY ROUTINE
Code for resident preferences in daily routine

a. Type of activities in which resident is currently involved
○ No change
○ Slight change
○ Major change

b. Extent of resident involvement in activities
○ No change
○ Slight change
○ Major change

SECTION O. MEDICATIONS

O1. NUMBER OF MEDICATIONS
Record the NUMBER of different medications used in the last 7 days. Enter "0" if none used

O2. NEW MEDICATIONS
Resident currently receiving medicaitons that were initiated during the last 90 days ○ No ○ Yes ○ Unknown (admission only)

O3. INJECTIONS
Record the NUMBER OF DAYS injections of any type were received during the last 7 days. Enter "0" if none used

O4. DAYS RECEIVED THE FOLLOWING MEDICATION
Record the NUMBER OF DAYS during the last 7 days; enter "0" if not used.
N.B. Enter "1" for long-acting medicaitons used less than weekly.

a. Antipsychotic
b. Antianxiety
c. Antidepressant
d. Hypnotic
e. Diuretic
f. Analgesic

Resident Name/ID

37652

APPENDIX IV

SECTION P. SPECIAL TREATMENTS AND PROCEDURES

P1A. SPECIAL CARE

Check treatments or programs received in LAST 14 DAYS

TREATMENTS

- ○ a. Chemotherapy
- ○ b. Dialysis
- ○ c. IV medication
- ○ d. Intake/output
- ○ e. Monitoring acute medical condition
- ○ f. Ostomy care
- ○ g. Oxygen therapy
- ○ h. Radiation
- ○ i. Suctioning
- ○ j. Trach. care
- ○ k. Transfusions
- ○ l. Ventilator or respirator

PROGRAMS

- ○ m. Alcohol or drug treatment
- ○ n. Alzheimer's or dementia special care unit
- ○ o. Hospice care
- ○ p. Pediatric care
- ○ q. Respite care
- ○ r. Training in skills to required return to the community (i.e., taking medications, housework, shopping, transportation, ADLs)
- ○ s. None of the above

P1B. THERAPIES

Record the number of days and total minutes each of the the following therapies was administered (for at least 15 minutes a day) in the last 7 days. Enter "0" if none or less than 15 minutes daily. *Note: Count only post-admission therapies.*

	BOX "A" NUMBER OF DAYS administered for 15 minutes or more	BOX "B" TOTAL NUMBER OF MINUTES provided in last 7 days
a. Speech - language pathology, audiology service		
b. Occupational therapy		
c. Physical therapy		
d. Respiratory therapy		
e. Psychological therapy (by any licensed mental health professional)		
f. Recreation therapy		

. INTERVENTION PROGRAMS FOR MOOD, BEHAVIOUR, COGNITIVE LOSS

Check all interventions or strategies used in the last 7 days, no matter where received

- ○ a. Special behaviour symptom evaluation program
- ○ b. Evaluation by a licensed mental health specialist in LAST 90 DAYS
- ○ c. Group therapy
- ○ d. Resident-specific deliberate changes in the environment to address mood or behaviour patterns (e.g., providing bureau in which to rummage)
- ○ e. Reorientation (e.g., cueing)
- ○ f. None of the above

P3. NURSING REHABILITATION/RESTORATIVE CARE

Record the NUMBER OF DAYS each of the following rehabilitation or restorative techniques or practice was provided to the resident for more than or equal to 15 minutes per day in the last 7 days. Enter "0" if none or less than 15 minutes daily.

- a. Range of motion (passive) ☐
- b. Range of motion (active) ☐
- c. Splint or brace assistance ☐

TRAINING AND SKILL PRACTICE IN:

- d. Bed mobility ☐
- e. Transfer ☐
- f. Walking ☐
- g. Dressing or grooming ☐
- h. Eating or swallowing ☐
- i. Amputation or prosthesis care ☐
- j. Communication ☐
- k. Other ☐

P4. DEVICES AND RESTRAINTS

CODING: 0=Not used 1=Used less than daily 2=Used daily

Use the following codes for the last 7 days:

	0	1	2
a. Full bed rails on all open sides of bed	○	○	○
b. Other types of side rails used (e.g., half rail, 1 side)	○	○	○
c. Trunk restraint	○	○	○
d. Limb restraint	○	○	○
e. Chair prevents from rising	○	○	○

P5. HOSPITAL STAY(S)

Record number of times resident was admitted to hospital in LAST 90 DAYS (or since last assessment). Enter "0" if no admission. ☐

P6. EMERGENCY ROOM (ER) VISIT(S)

Record number of times resident visited ER in the LAST 90 DAYS (or since last assessment). Enter "0" if no ER visits. ☐

P7. PHYSICIAN VISITS

In the LAST 14 DAYS (or since admission, if less than 14 days in facility), how many days has the physician (or authorized assistant or practitioner) examined the resident? Enter "00" if none. ☐☐

P8. PHYSICIAN ORDERS

In the LAST 14 DAYS (or since admission if less than 14 days in facility), on how many days has the physician (or authorized assistant or practitioner) changed the resident's orders? Do not include order renewals without change. Enter "00" if none. ☐☐

P9. ABNORMAL LAB VALUES

Has the resident had any abnormal lab values during the LAST 90 DAYS (or since admission)?

- ○ No
- ○ Yes

SECTION Q. DISCHARGE POTENTIAL AND OVERALL STATUS

Q1. DISCHARGE POTENTIAL

a. Resident expresses or indicates preference to return to the community ○ No ○ Yes

b. Resident has a support person who is positive towards discharge ○ No ○ Yes

c. Stay projected to be of a short duration - Discharge prjected WITHIN 90 DAYS. Do not include expected discharge due to death. ○ No ○ Within 30 days ○ Within 31-90 days ○ Discharge status uncertain

Q2. OVERALL CHANGE IN CARE NEEDS

Resident's overall level of self-sufficiency has changed significantly as compared to status of 90 DAYS AGO (or since last assessment if less than 90 days)

○ No change ○ Improved - receives fewer supports, needs less restrictive level of care ○ Deteriorated - receives more support

SECTION R. ASSESSMENT INFORMATION

R1. PARTICIPATION IN ASSESSMENT

a. Resident	b. Family	c. Significant other
○ No	○ No	○ No
○ Yes	○ Yes	○ Yes
	○ No family	○ None

R2A. SIGNATURES OF THOSE COMPLETING THE ASSESSMENT

Provider Type | Assessor ID #

Signature of RN Assessment Coordinator (sign above)

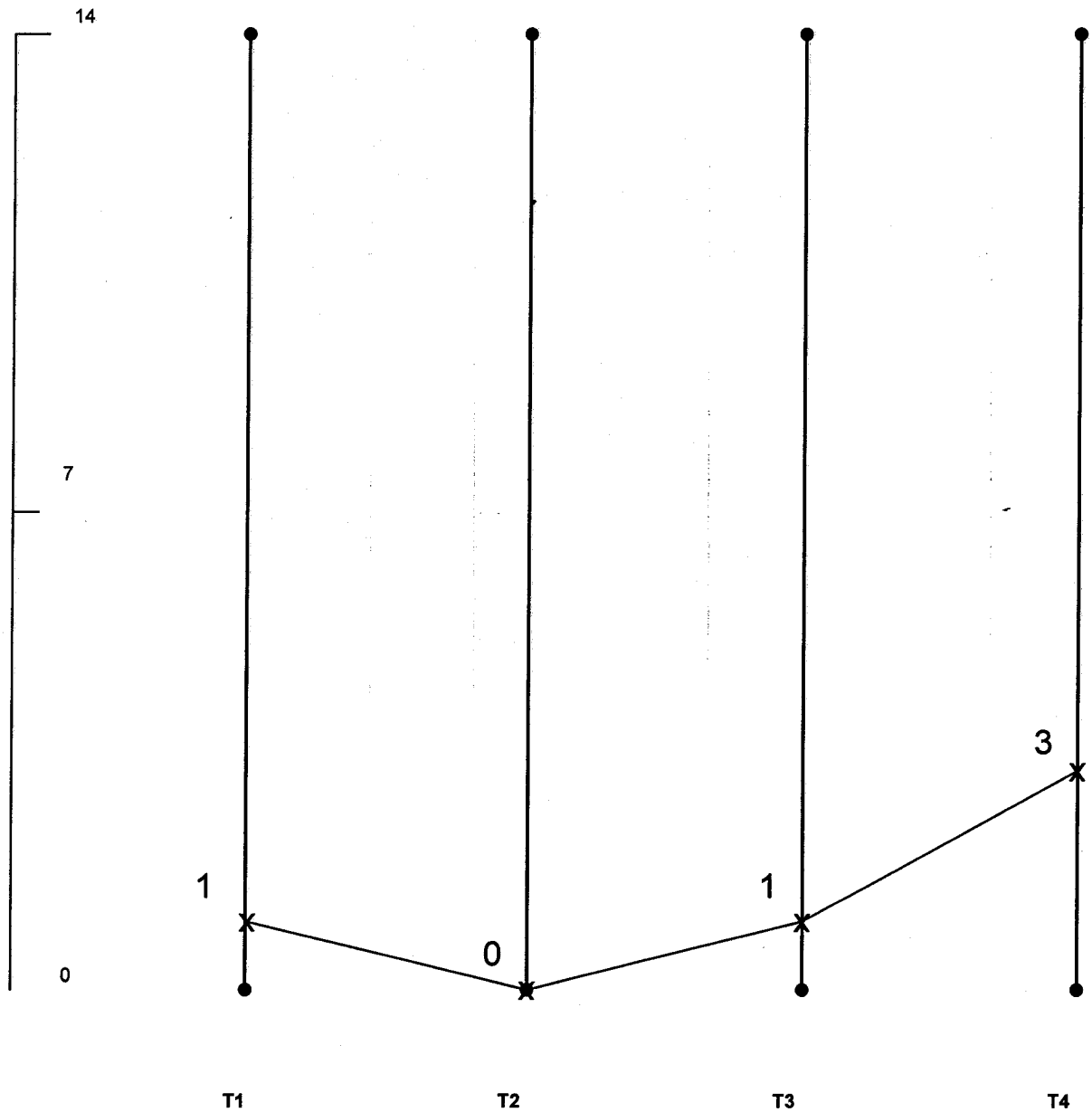
R2B. DATE RN ASSESSMENT COORDINATOR SIGNED AS COMPLETE

a. Year | b. Month | c. Day

Other signatures	Title	Sections	Date	a. Provider Type	b. Assessor ID #
A					
B					
C					
D					
E					
F					
G					

APPENDIX V

FIGURE 6: Subject # 4 - Depression Rating Scale

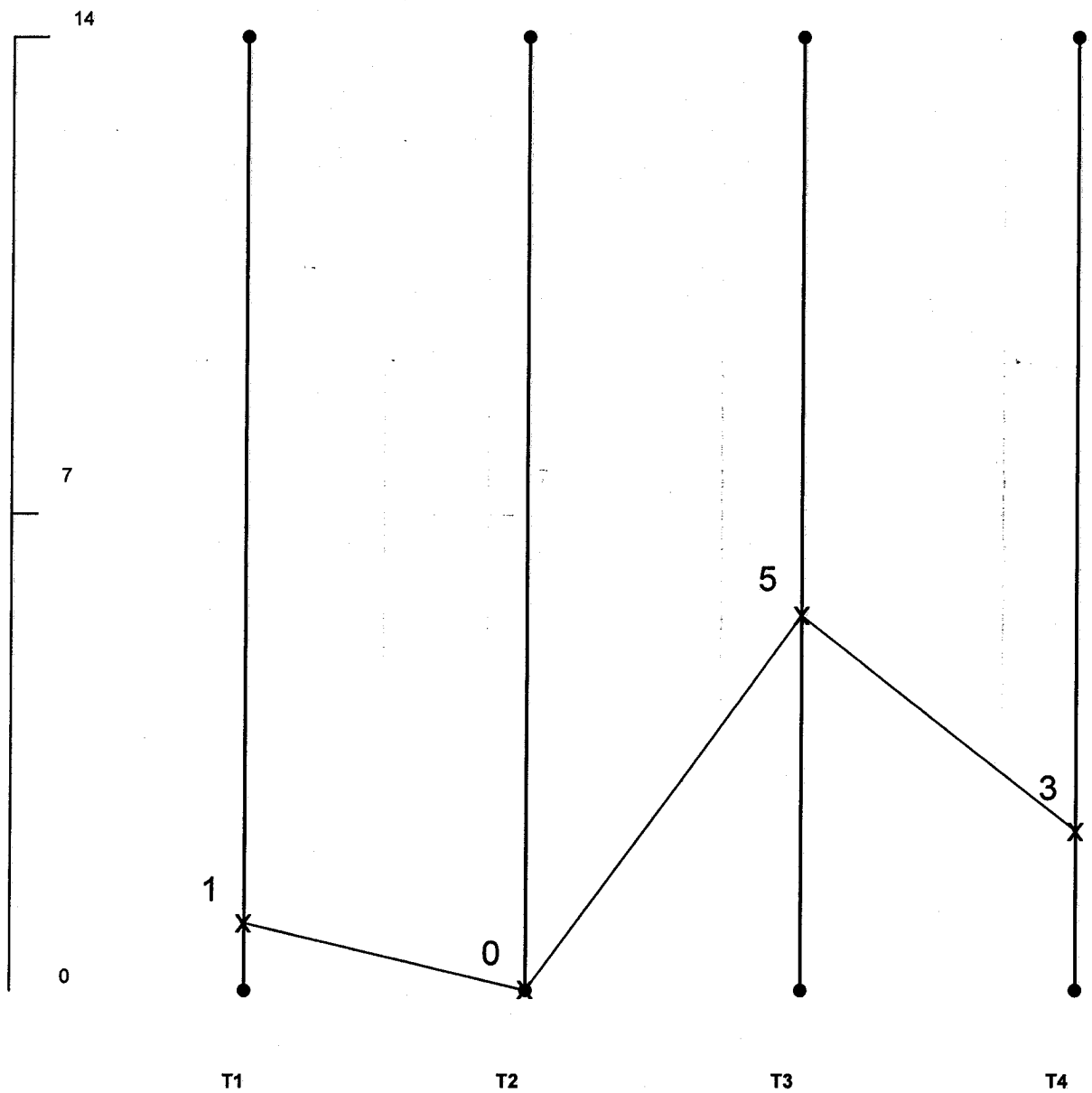


Scale: 0 - 14

Lower integers indicate improved status

APPENDIX V

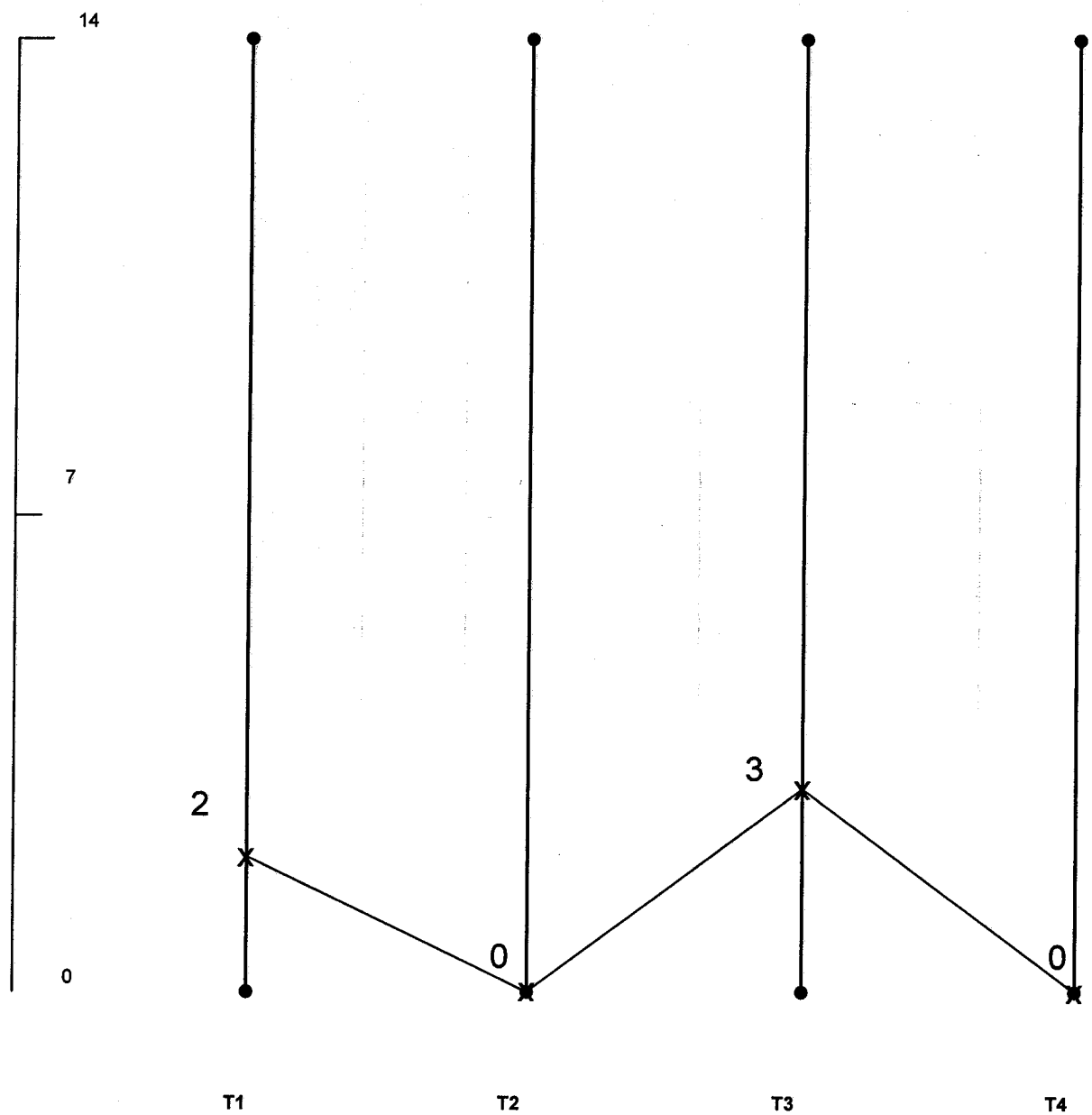
FIGURE 7: Subject # 19 - Depression Rating Scale



Scale: 0 - 14

Lower integers indicate improved status

FIGURE 8: Subject # 23 - Depression Rating Scale

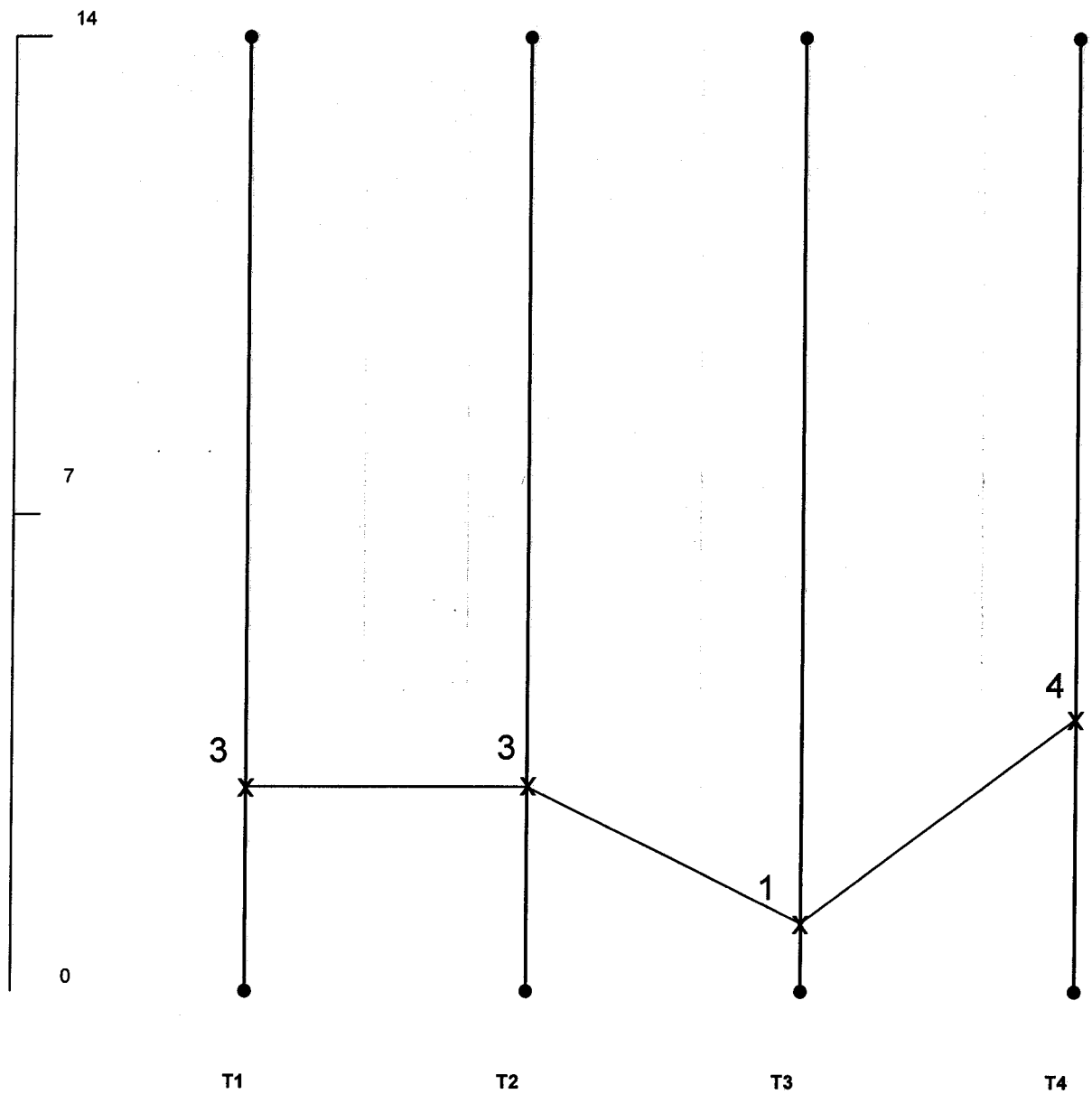


Scale: 0 - 14

Lower integers indicate improved status

APPENDIX V

FIGURE 9: Subject # 26 - Depression Rating Scale

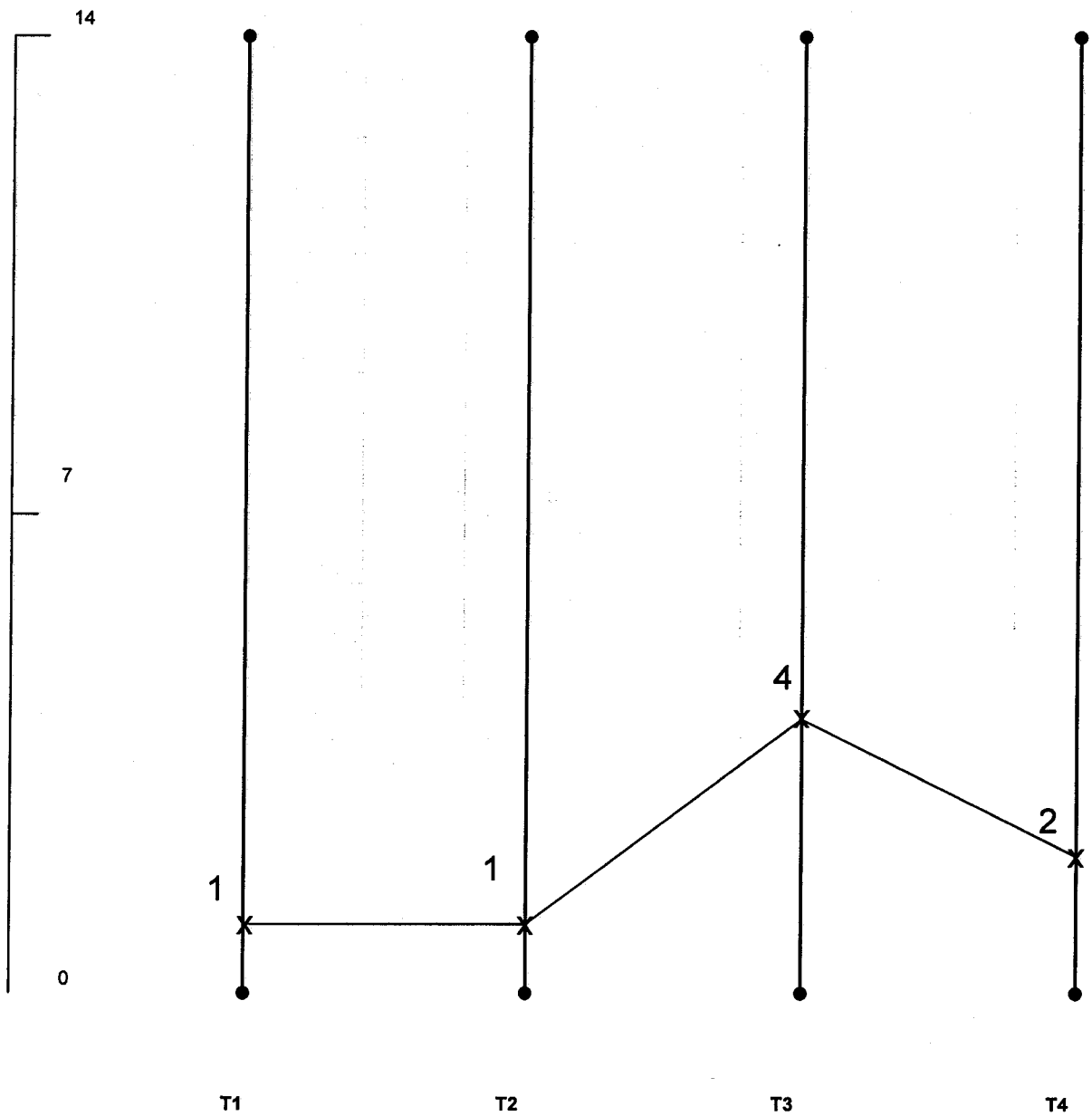


Scale: 0 - 14

Lower integers indicate improved status

APPENDIX V

FIGURE 10: Subject # 27 - Depression Rating Scale

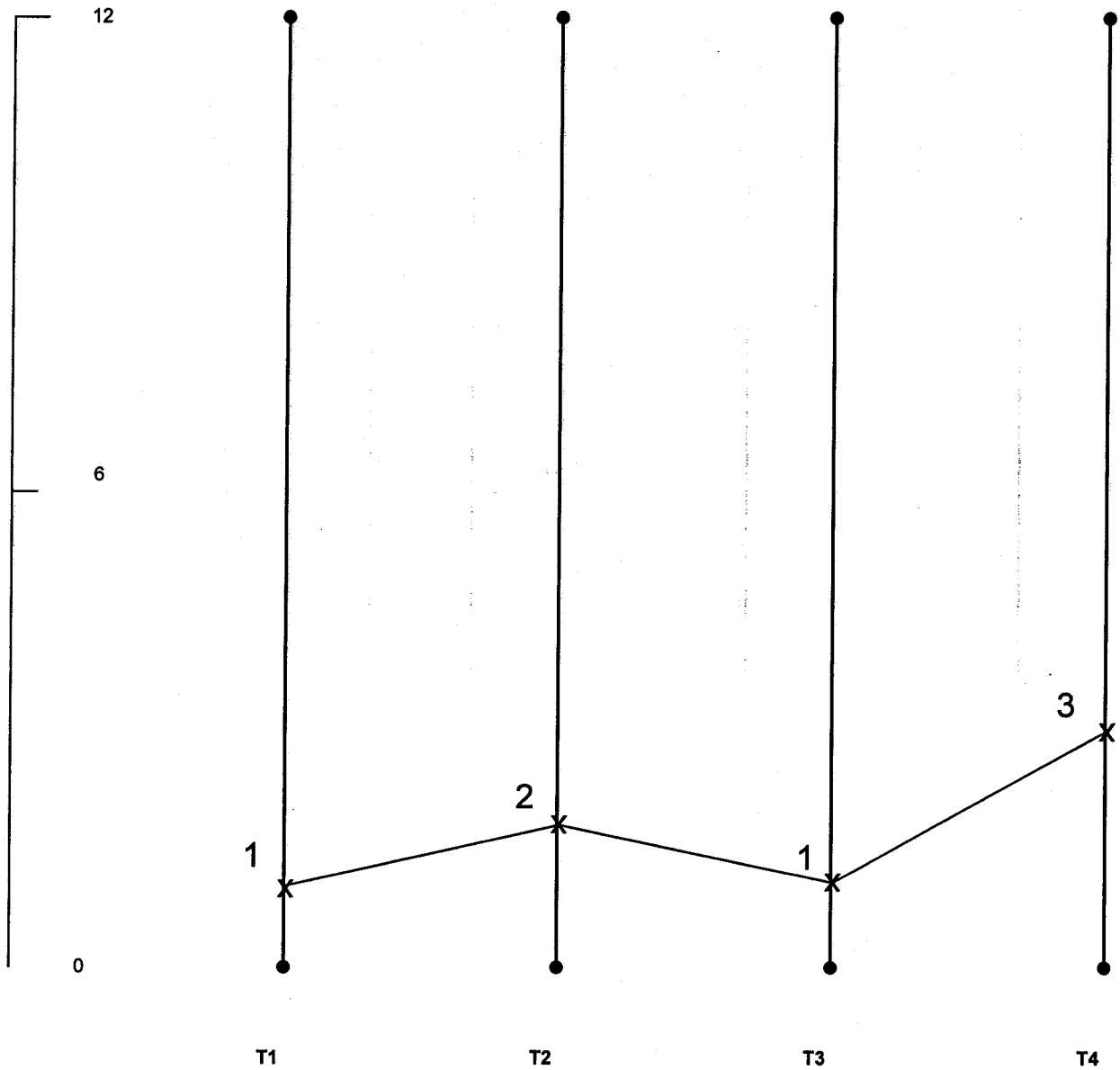


Scale: 0 - 14

Lower integers indicate improved status

APPENDIX V

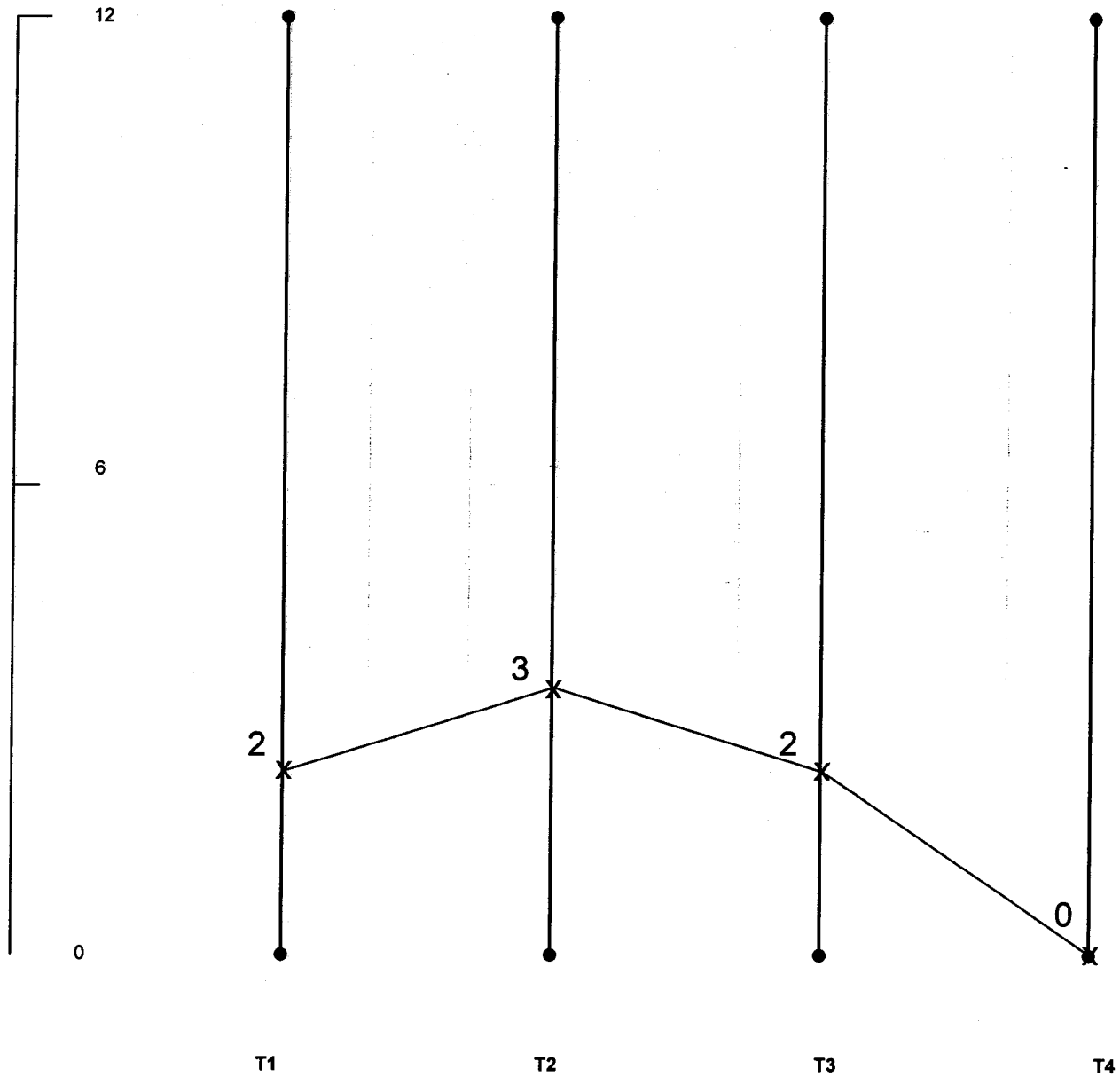
FIGURE 11: Subject # 12 - Aggressive Behavior Scale



Scale: 0 - 12

Lower integers indicate improved status

FIGURE 12: Subject # 15 - Aggressive Behavior Scale

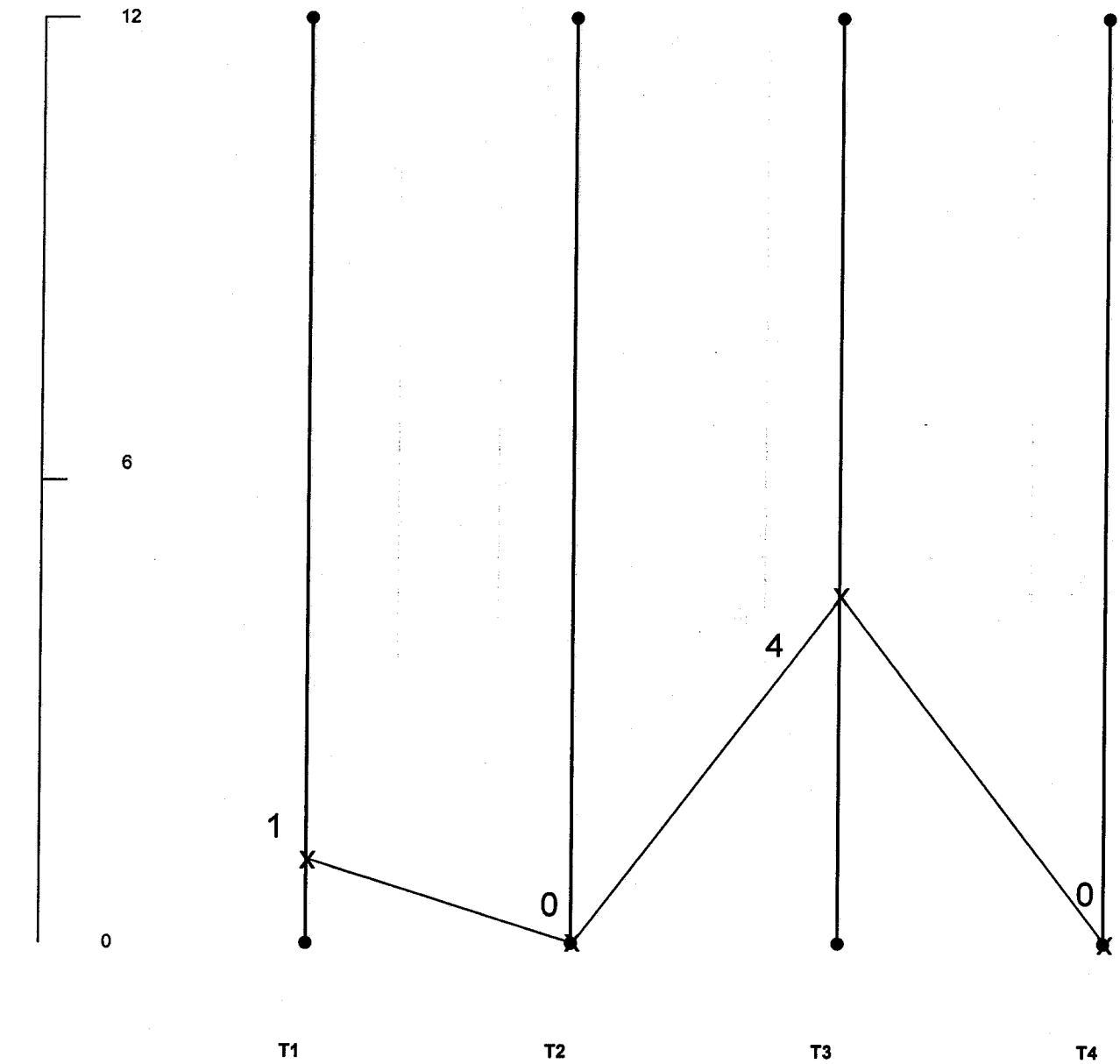


Scale: 0 - 12

Lower integers indicate improved status

APPENDIX V

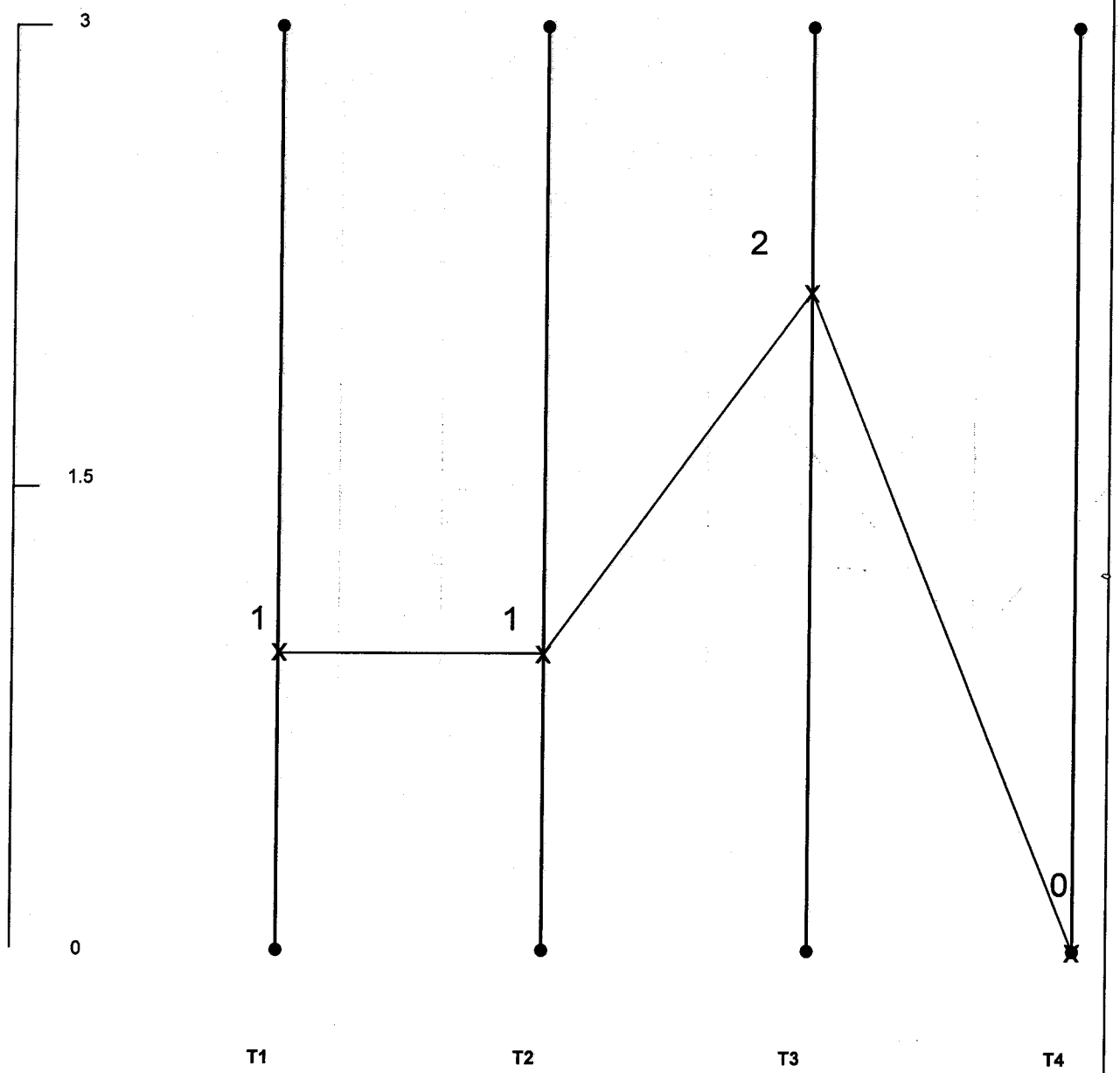
FIGURE 13: Subject # 28 - Aggressive Behavior Scale



Scale: 0 - 12

Lower integers indicate improved status

FIGURE 14: Subject # 7 - MDS Pain Scale

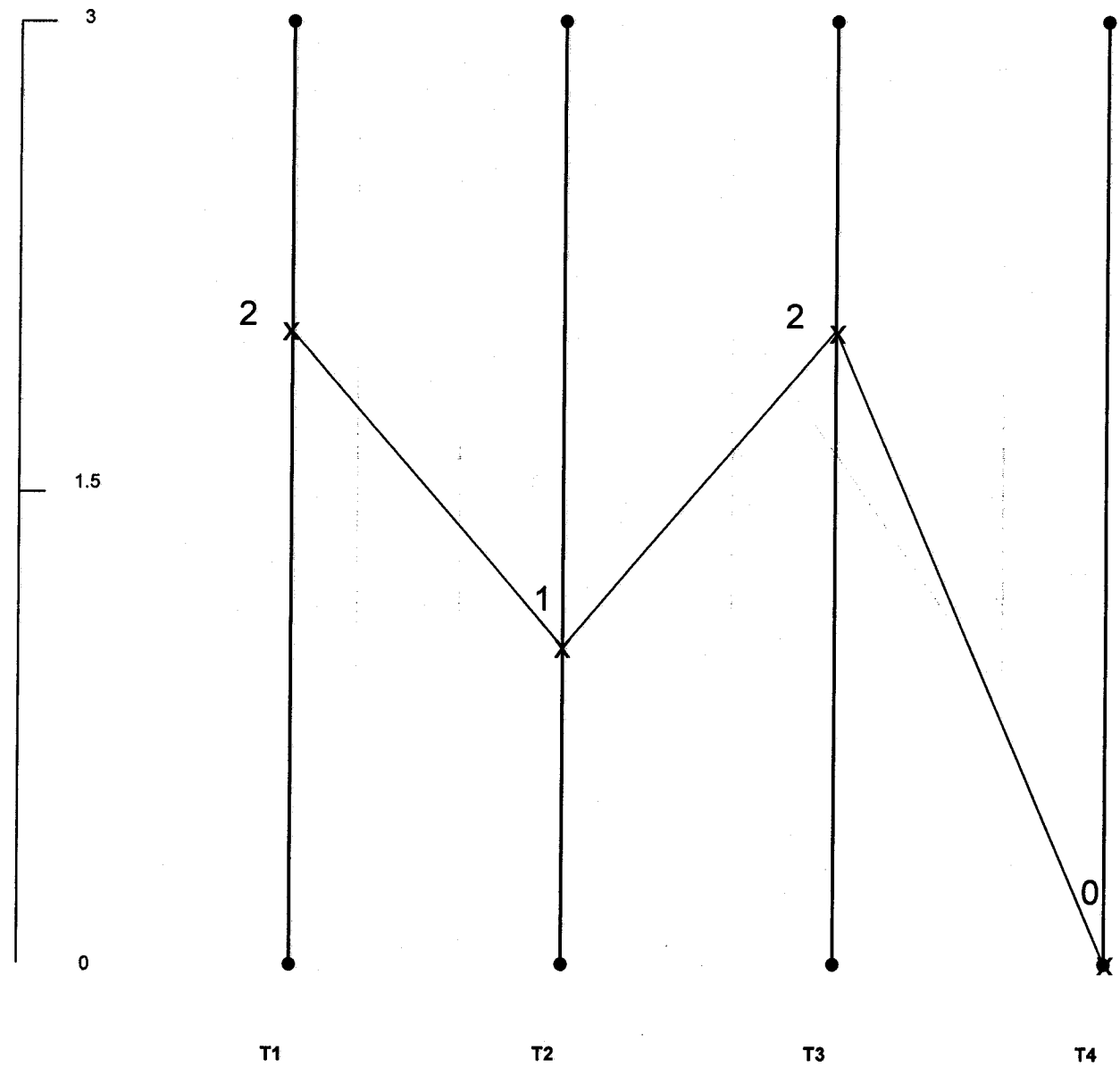


Scale: 0 - 3

Lower integers indicate improved status

APPENDIX V

FIGURE 15: Subject # 16 - MDS Pain Scale

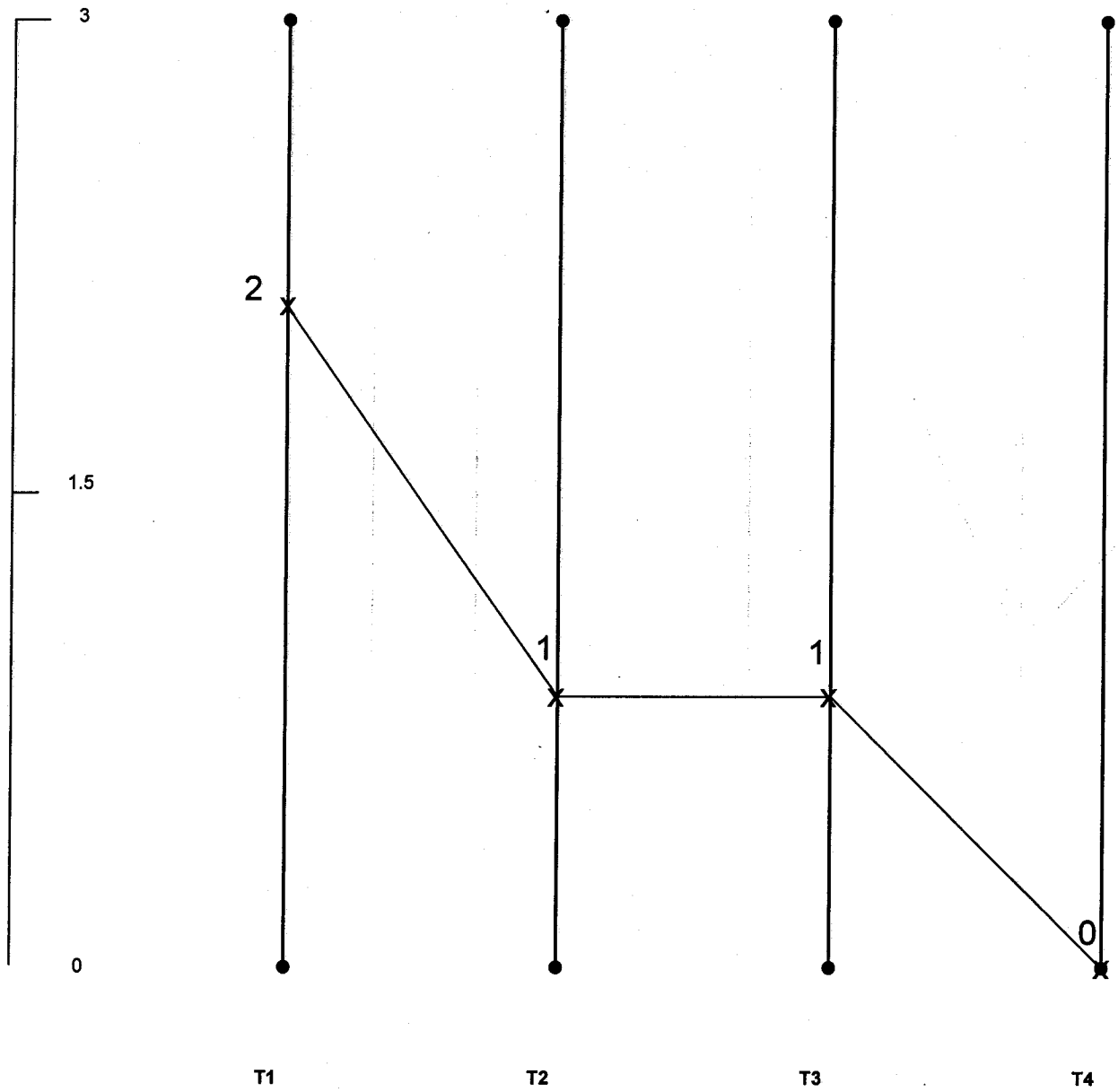


Scale: 0 - 3

Lower integers indicate improved status

APPENDIX V

FIGURE 16: Subject # 18 - MDS Pain Scale

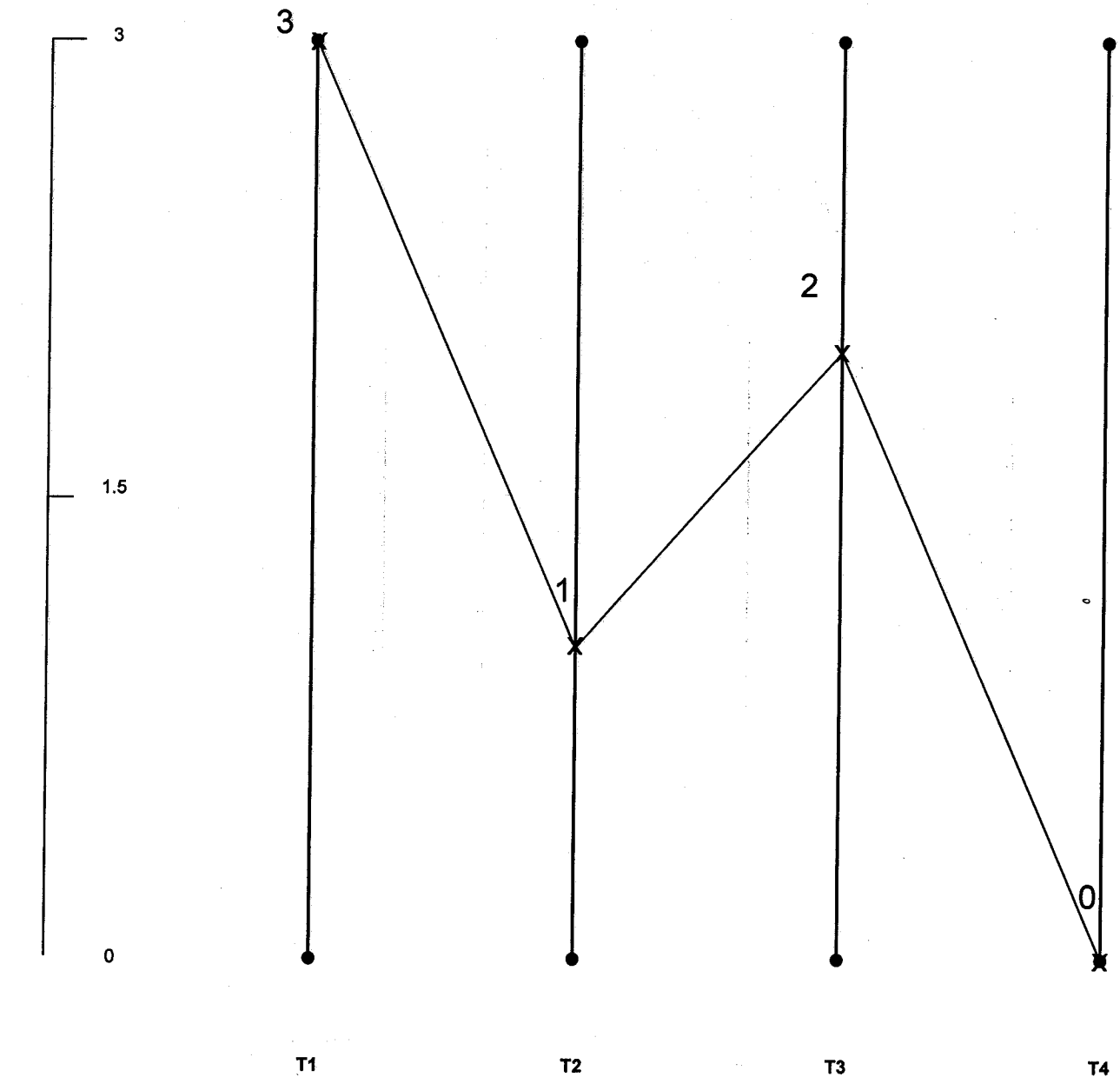


Scale: 0 - 3

Lower integers indicate improved status

APPENDIX V

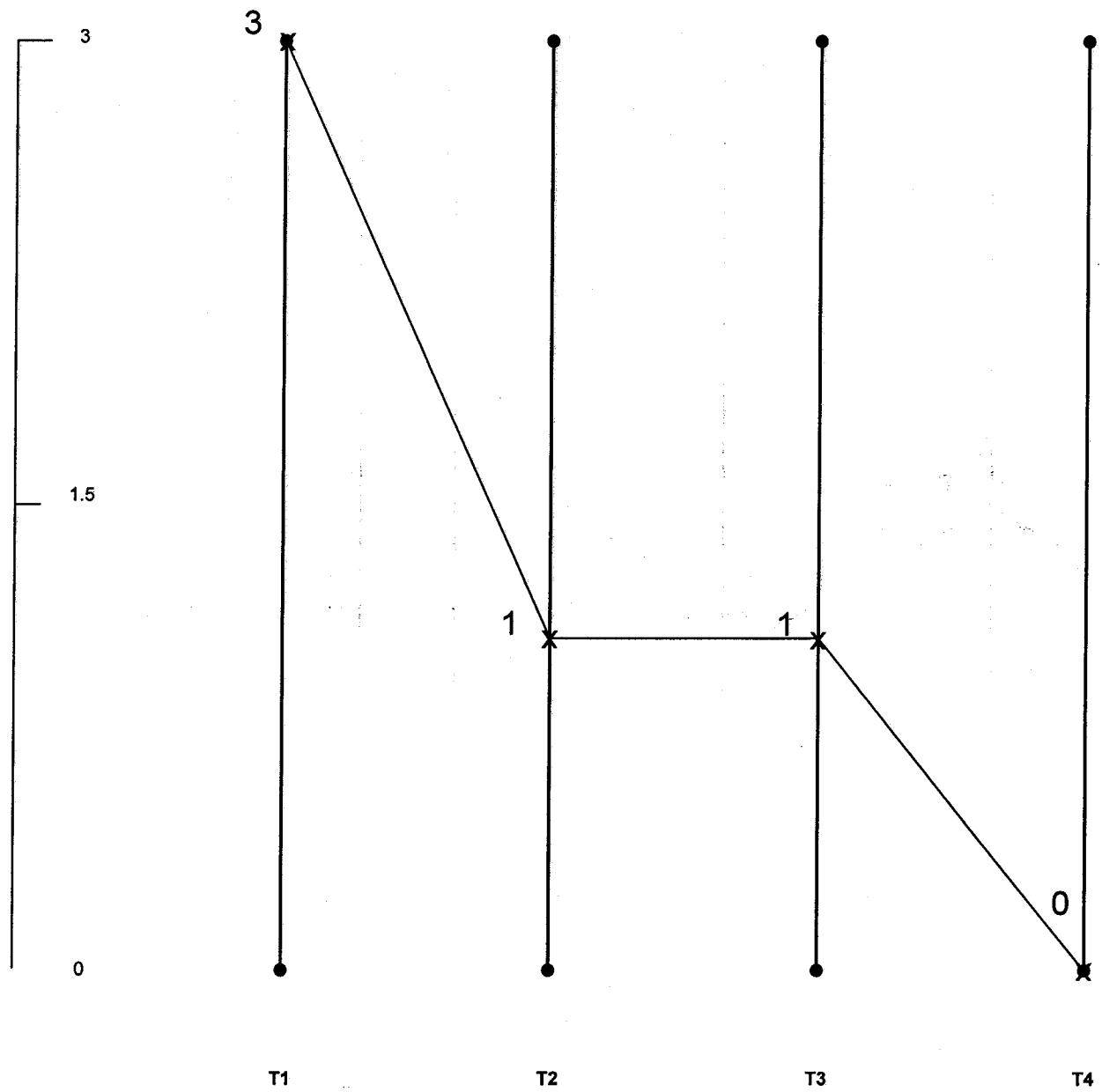
FIGURE 17: Subject # 20 - MDS Pain Scale



Scale: 0 - 3

Lower integers indicate improved status

FIGURE 18: Subject # 25 - MDS Pain Scale

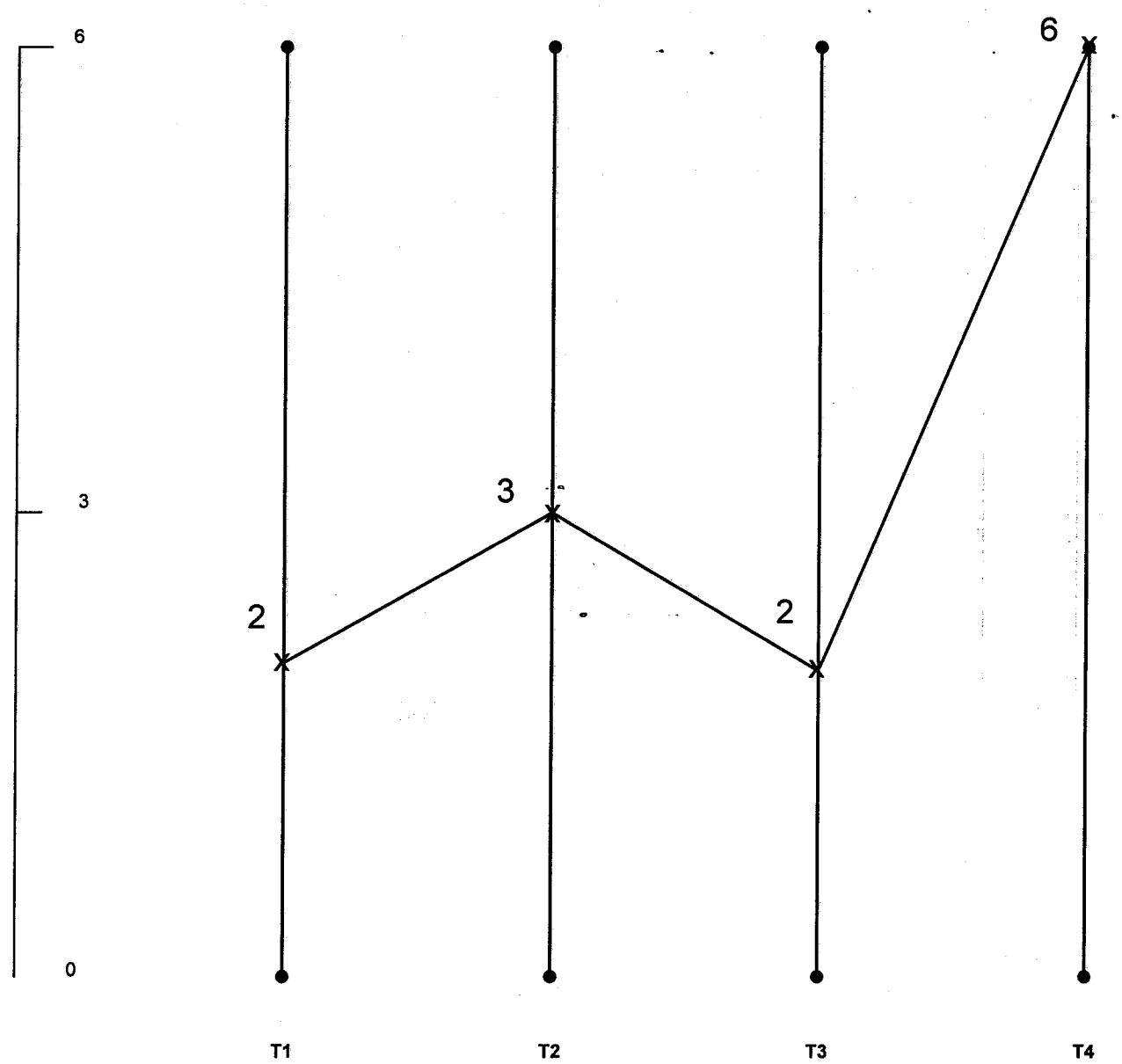


Scale: 0 - 3

Lower integers indicate improved status

APPENDIX V

FIGURE 19: Subject # 1 - Index of Social Engagement

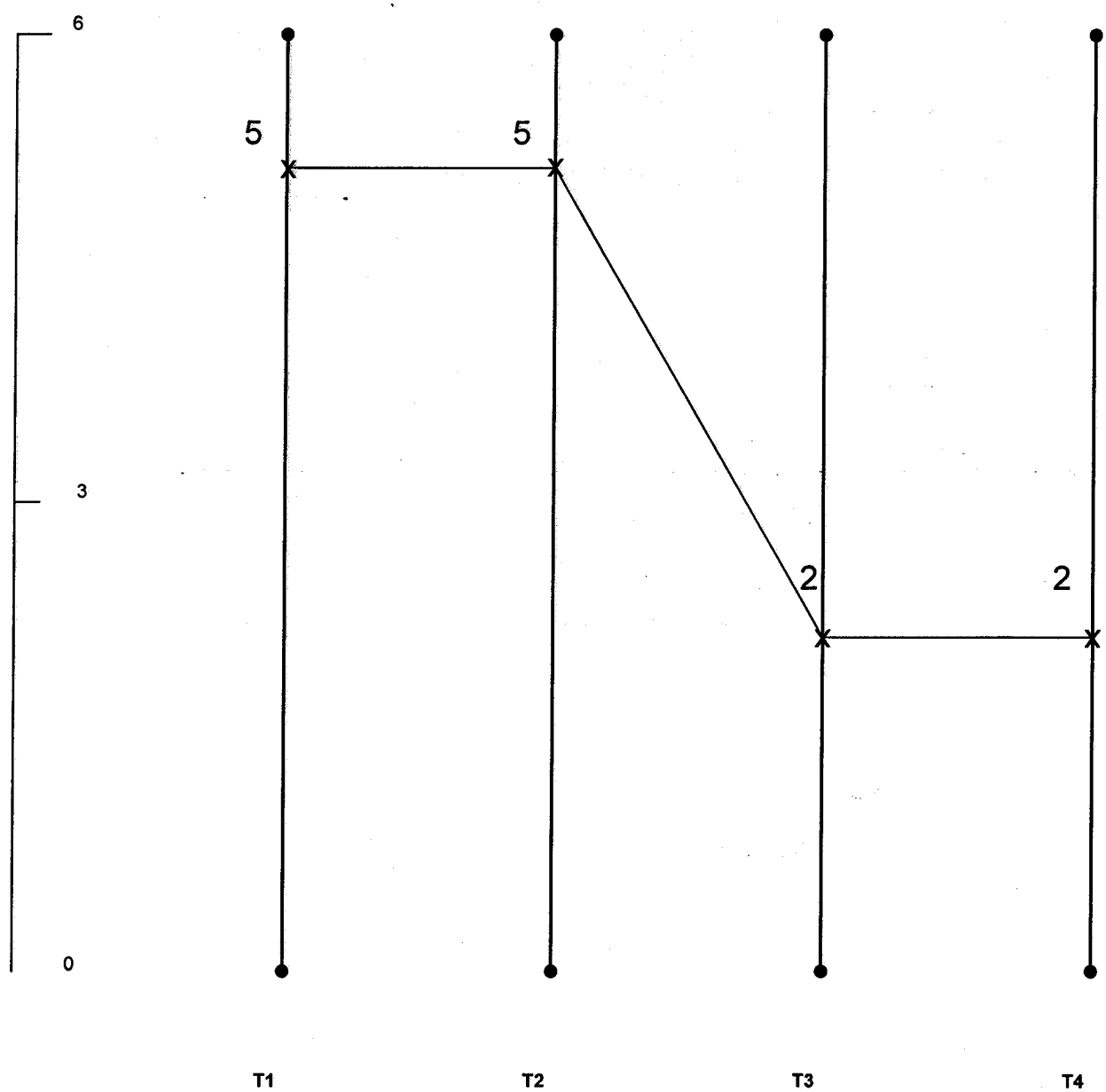


Scale: 0 - 6

Higher integers indicate improved status

APPENDIX V

FIGURE 20: Subject # 3 - Index of Social Engagement

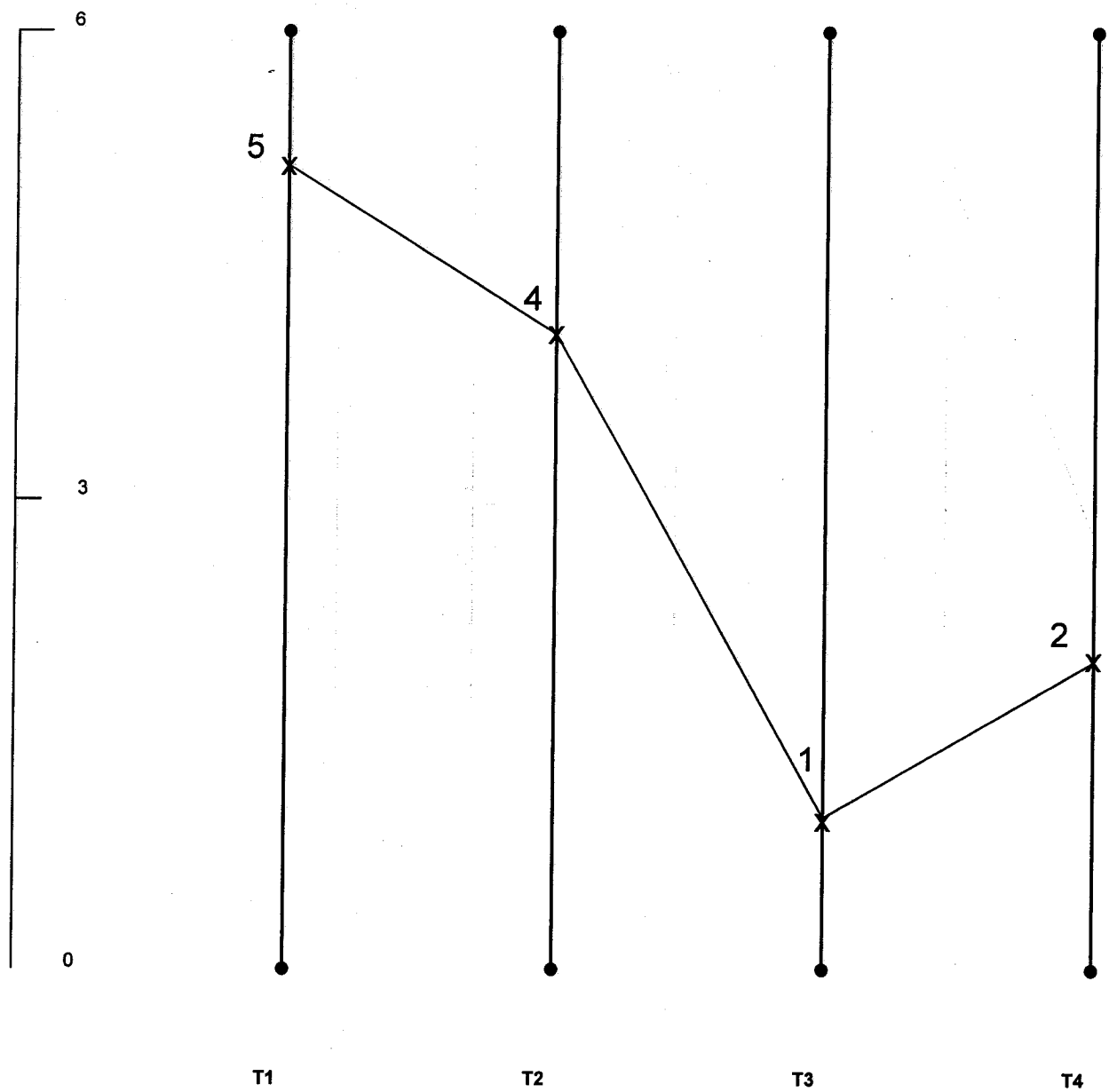


Scale: 0 - 6

Higher integers indicate improved status

APPENDIX V

FIGURE 21: Subject # 5 - Index of Social Engagement

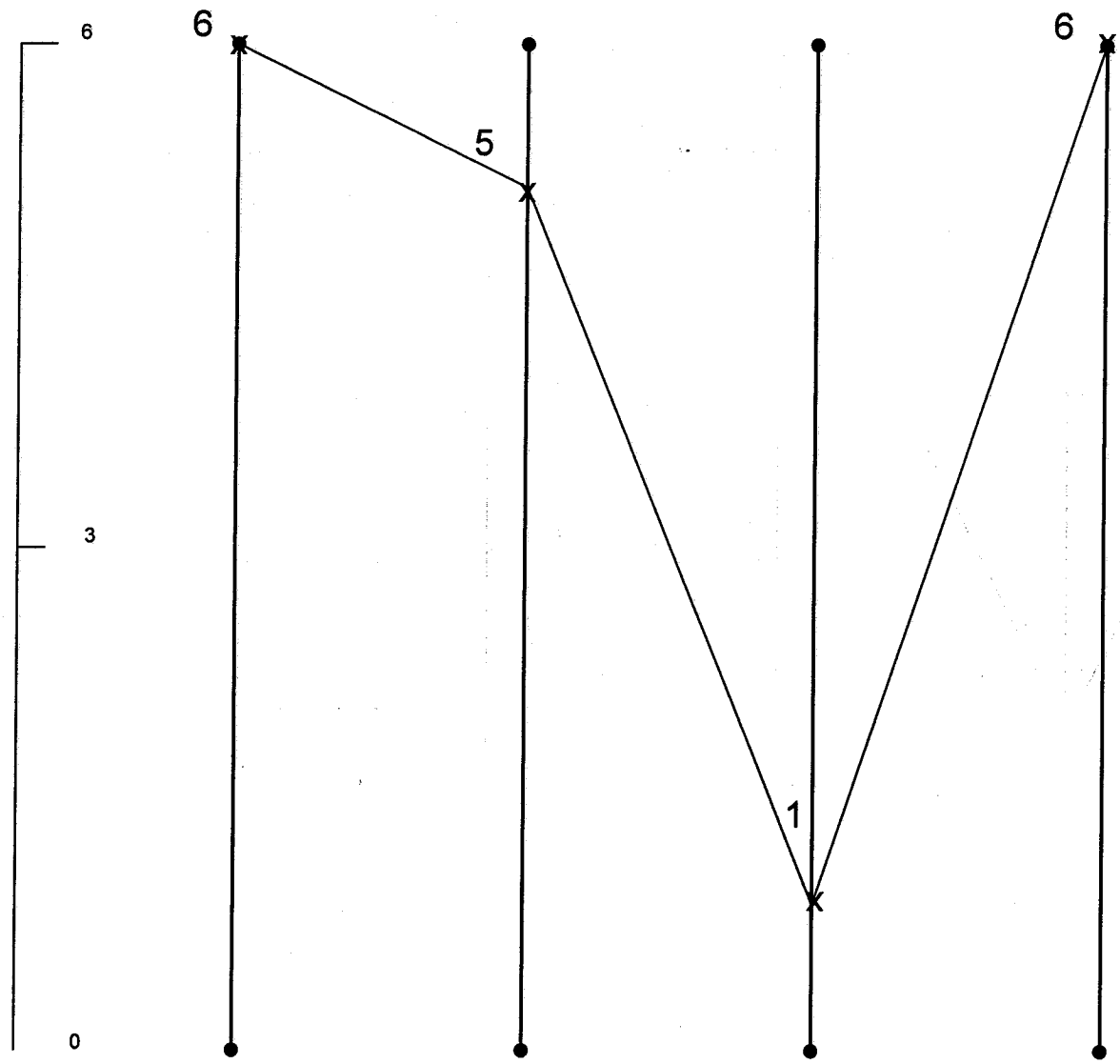


Scale: 0 - 6

Higher integers indicate improved status

APPENDIX V

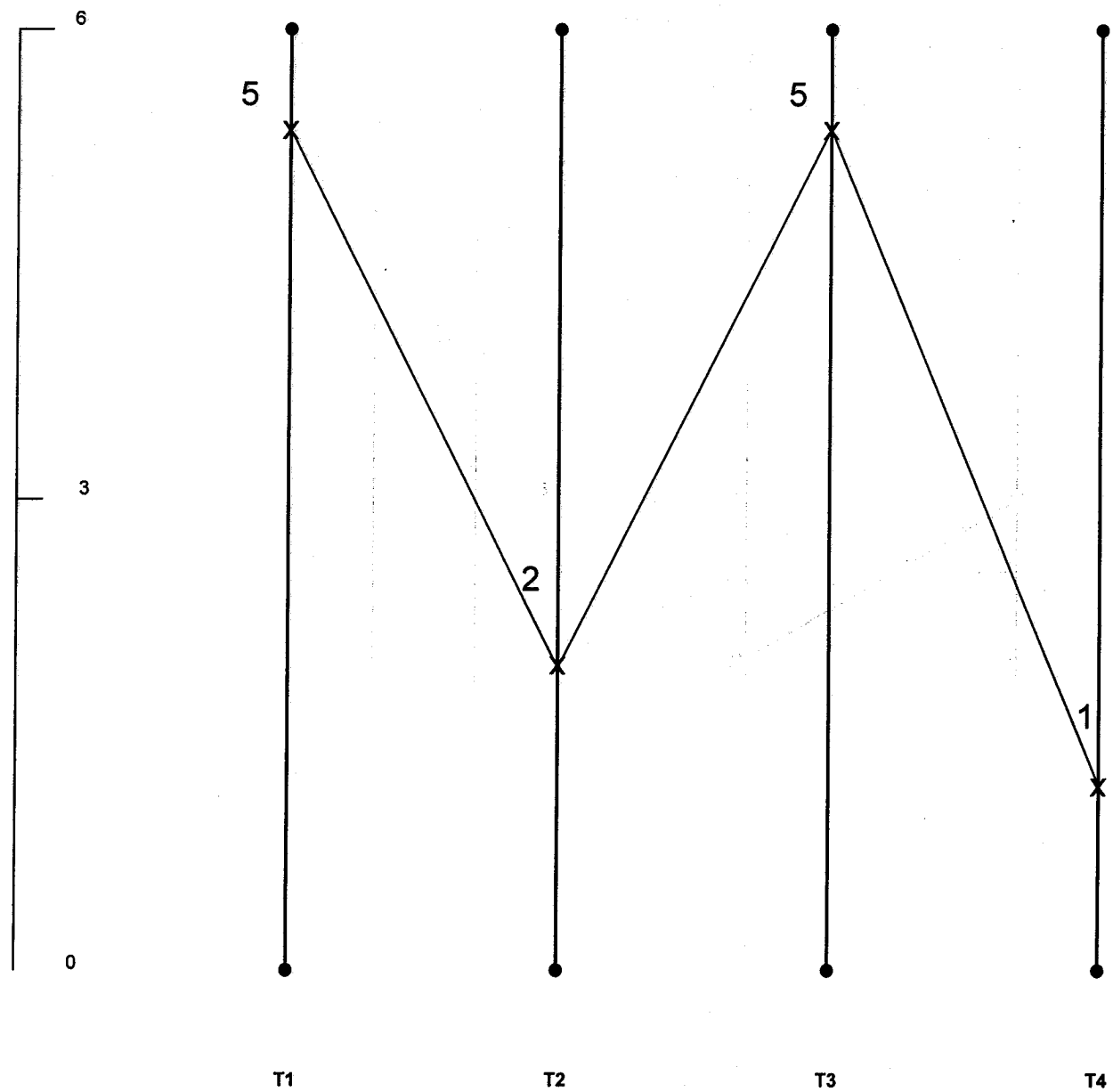
FIGURE 22: Subject # 6 - Index of Social Engagement



Scale: 0 - 6

Higher integers indicate improved status

FIGURE 23: Subject # 8 - Index of Social Engagement

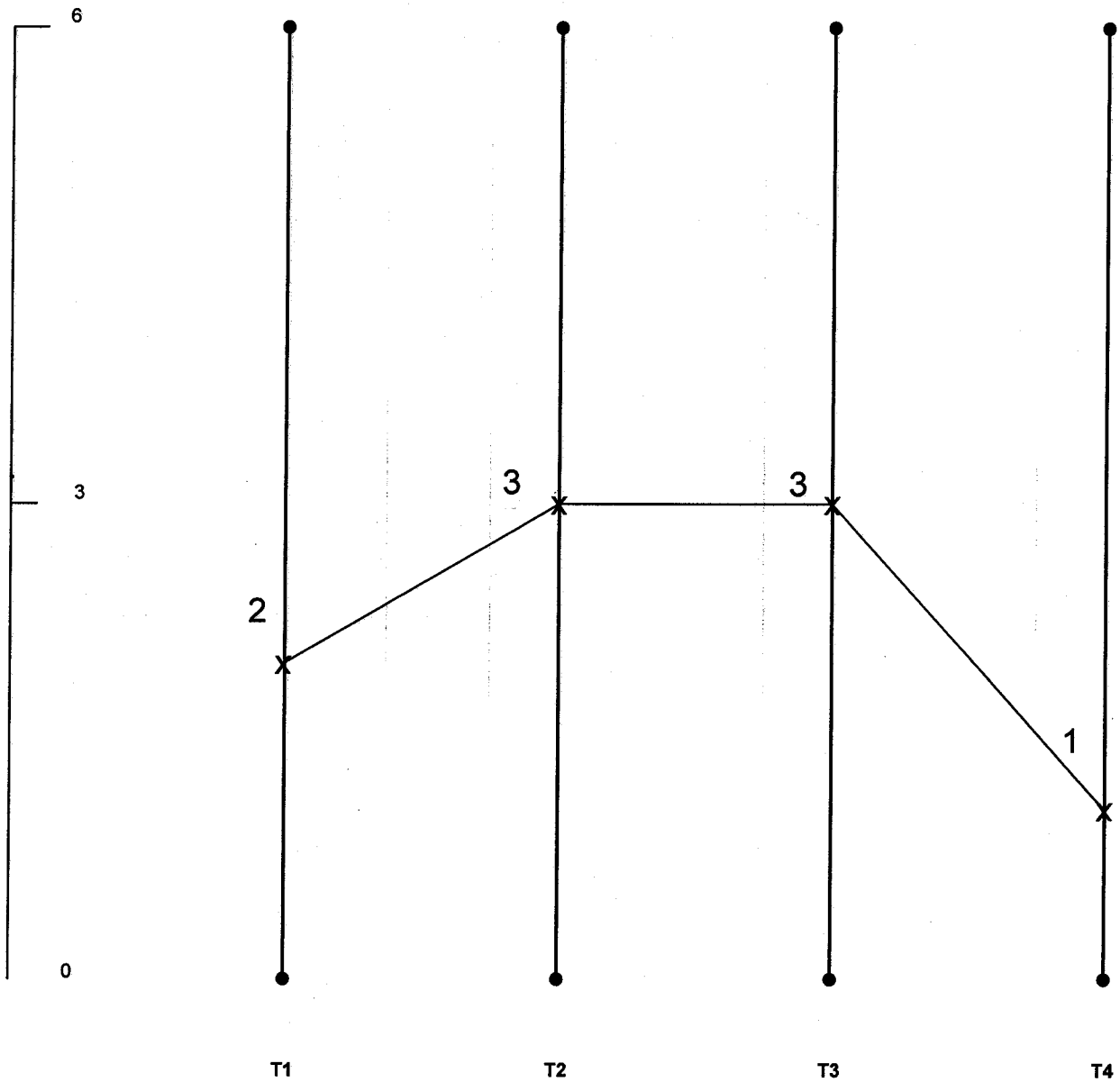


Scale: 0 - 6

Higher integers indicate improved status

APPENDIX V

FIGURE 24: Subject # 10 - Index of Social Engagement

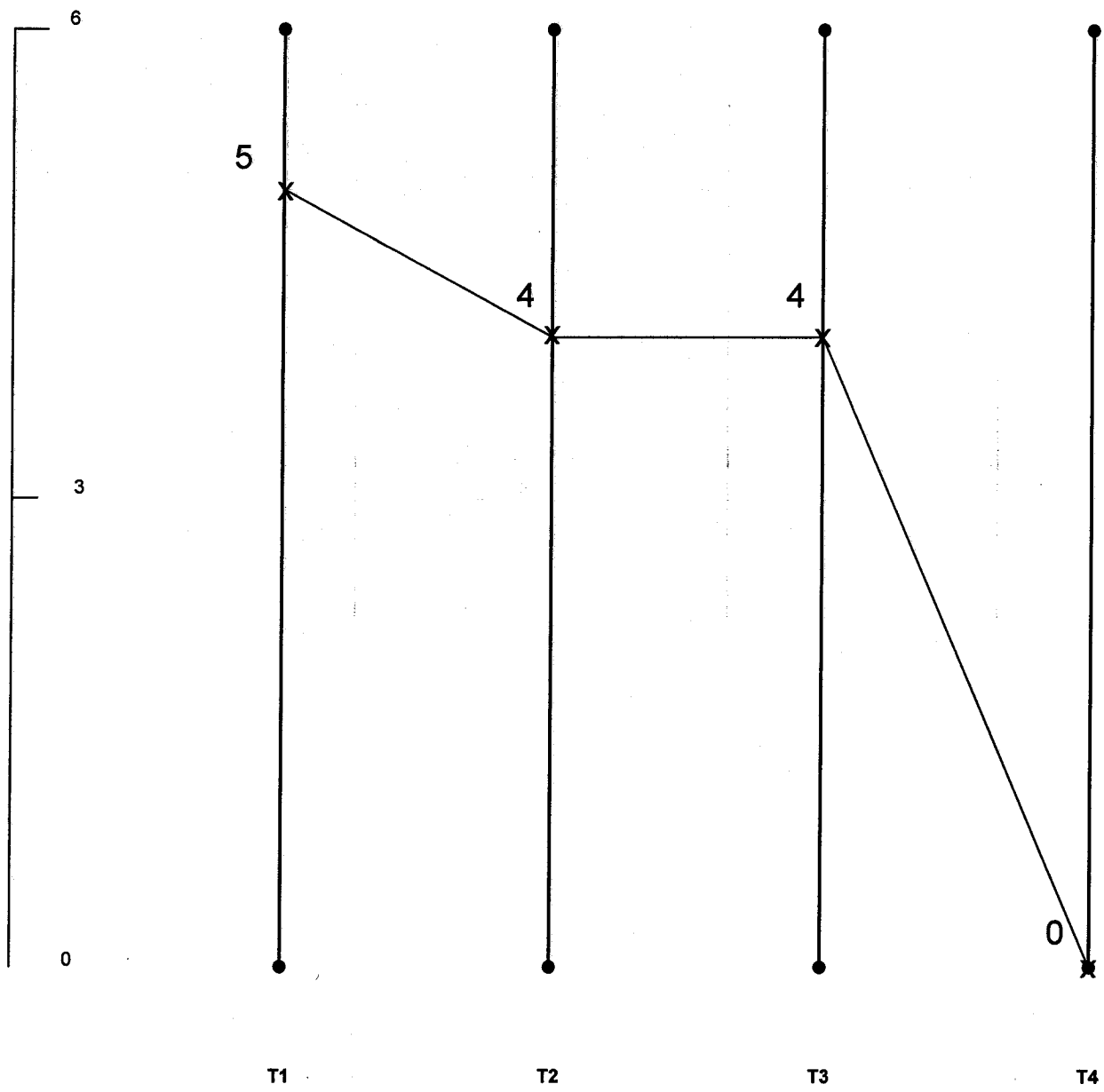


Scale: 0 - 6

Higher integers indicate improved status

APPENDIX V

FIGURE 25: Subject # 11 - Index of Social Engagement

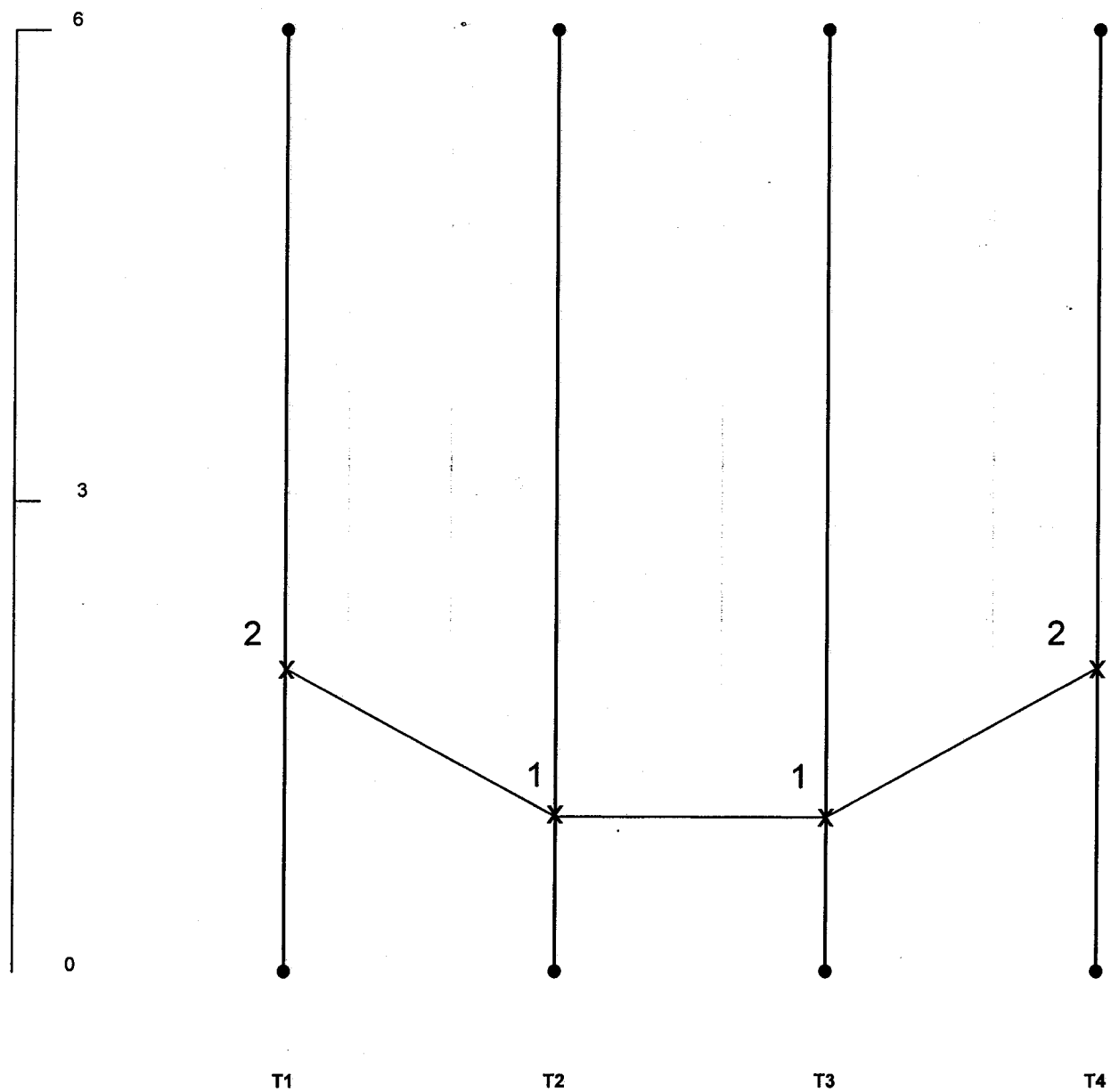


Scale: 0 - 6

Higher integers indicate improved status

APPENDIX V

FIGURE 26: Subject # 13 - Index of Social Engagement

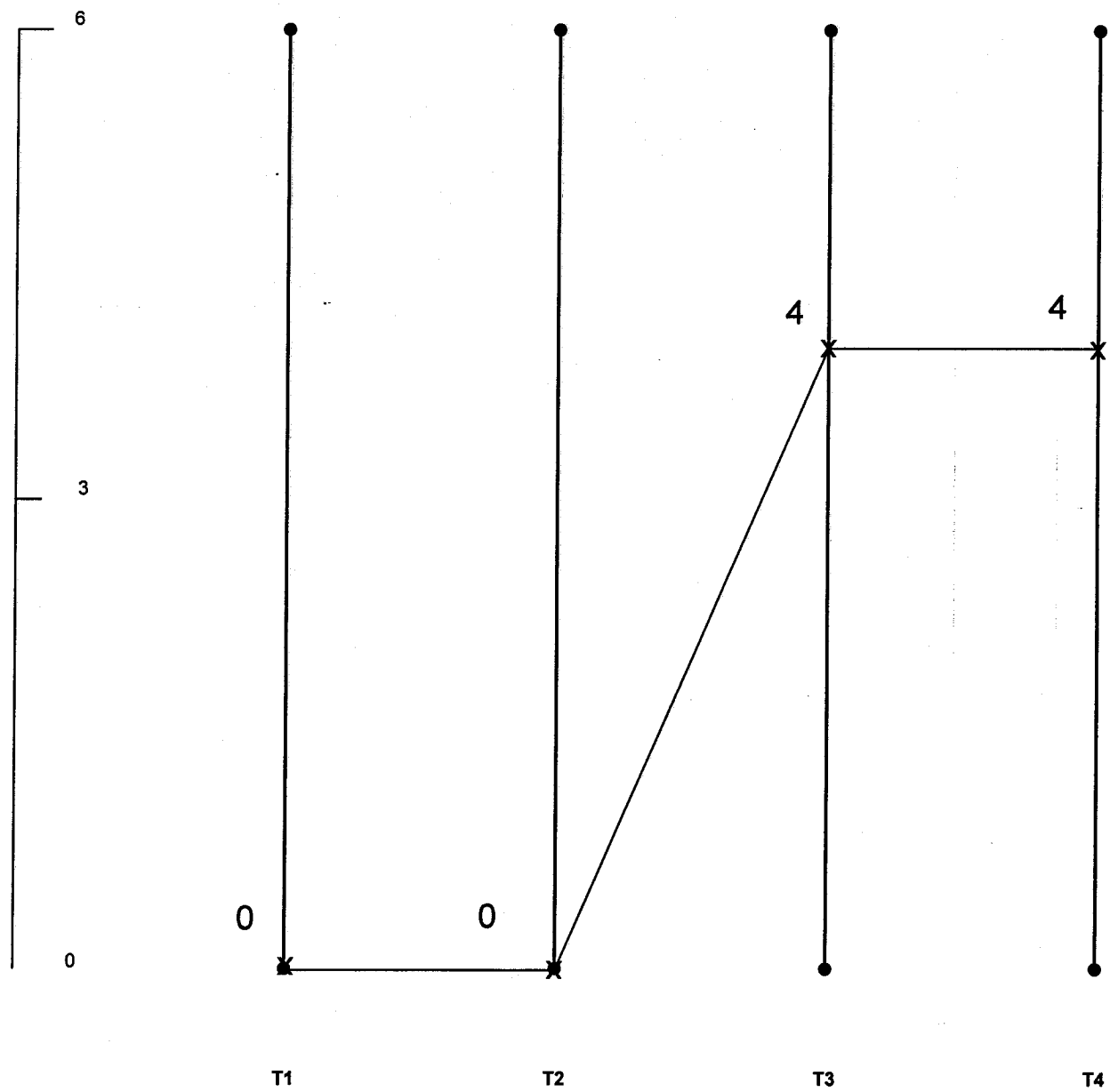


Scale: 0 - 6

Higher integers indicate improved status

APPENDIX V

FIGURE 27: Subject # 14 - Index of Social Engagement

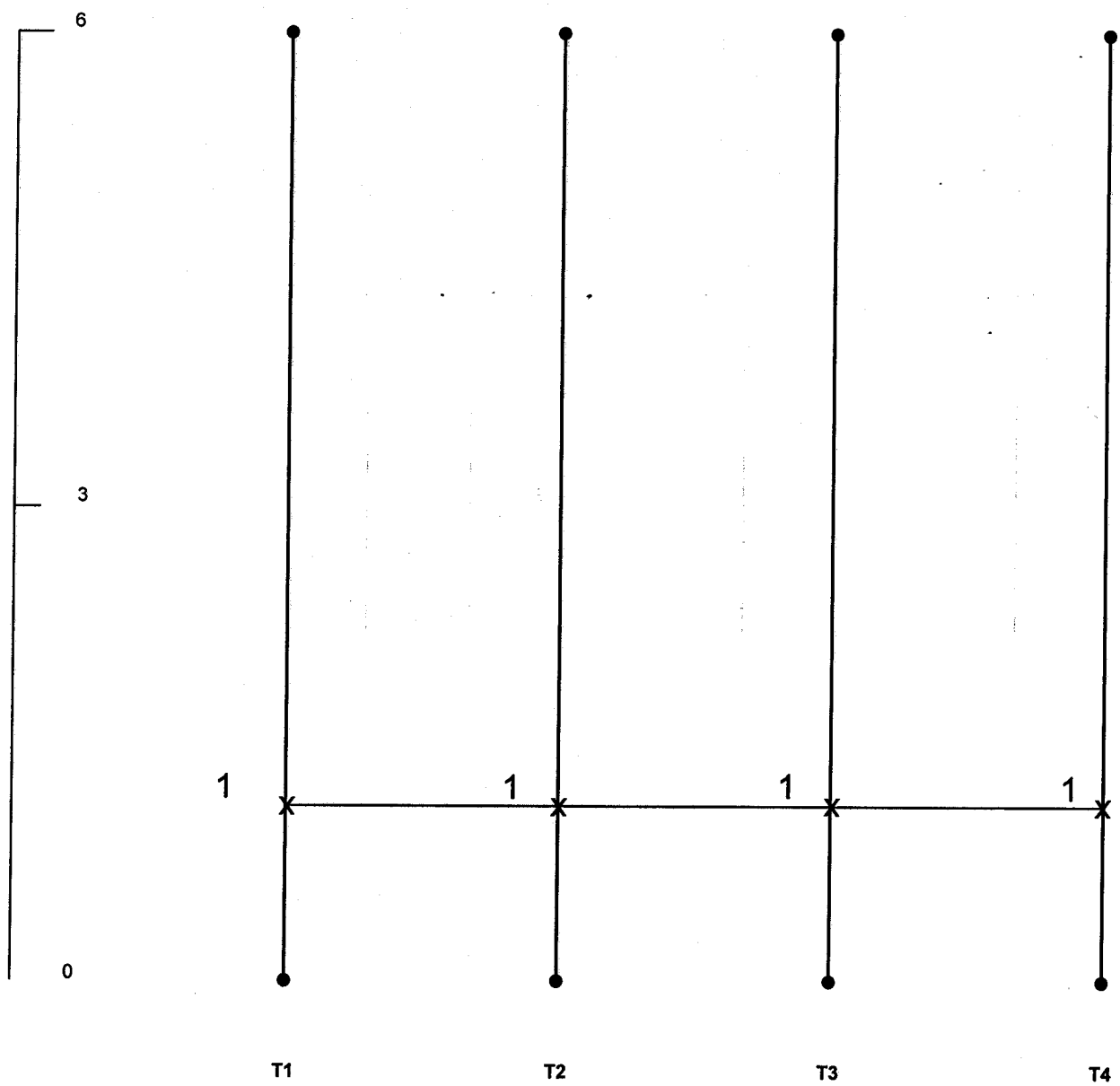


Scale: 0 - 6

Higher integers indicate improved status

APPENDIX V

FIGURE 28: Subject # 21 - Index of Social Engagement

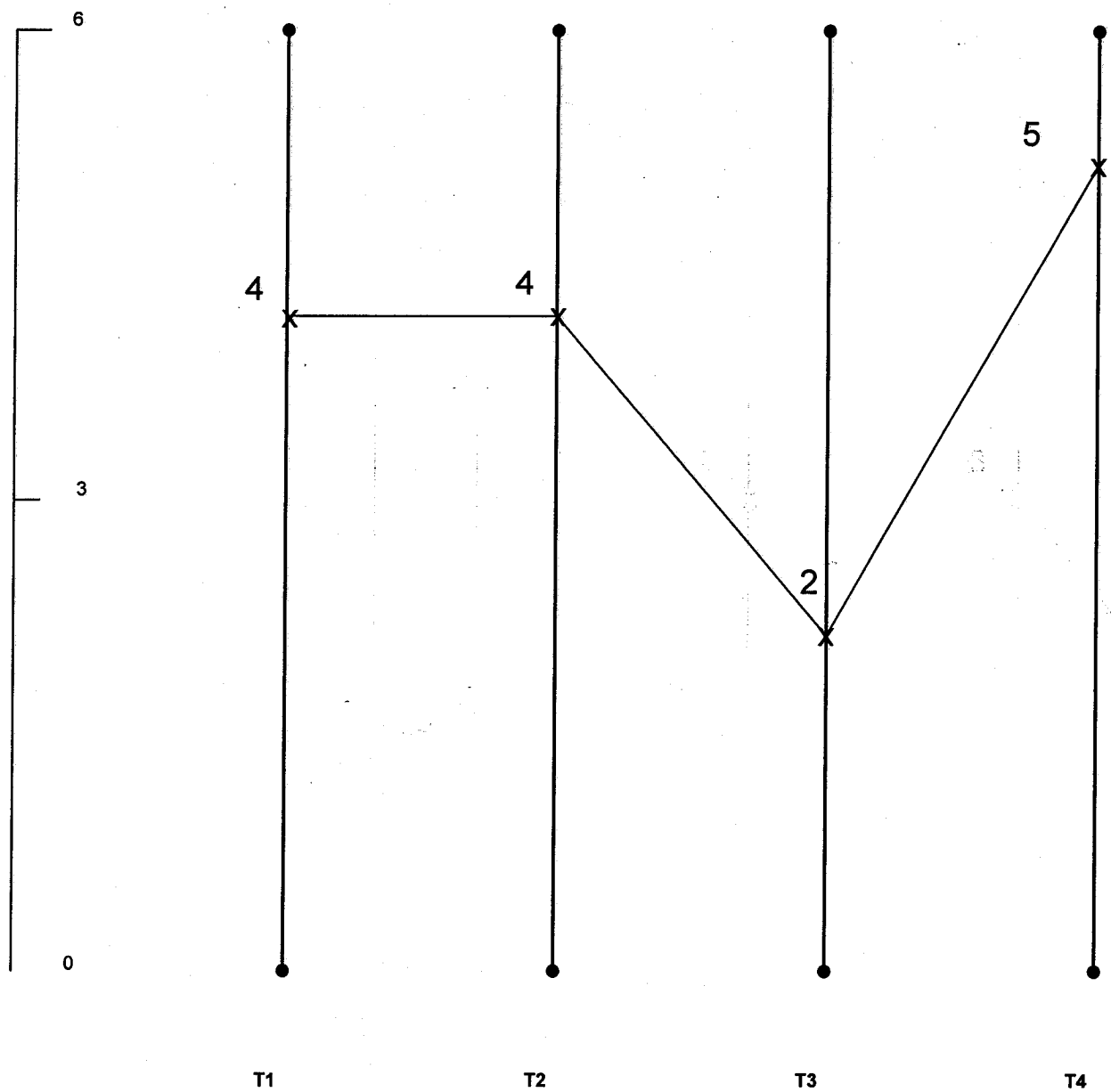


Scale: 0 - 6

Higher integers indicate improved status

APPENDIX V

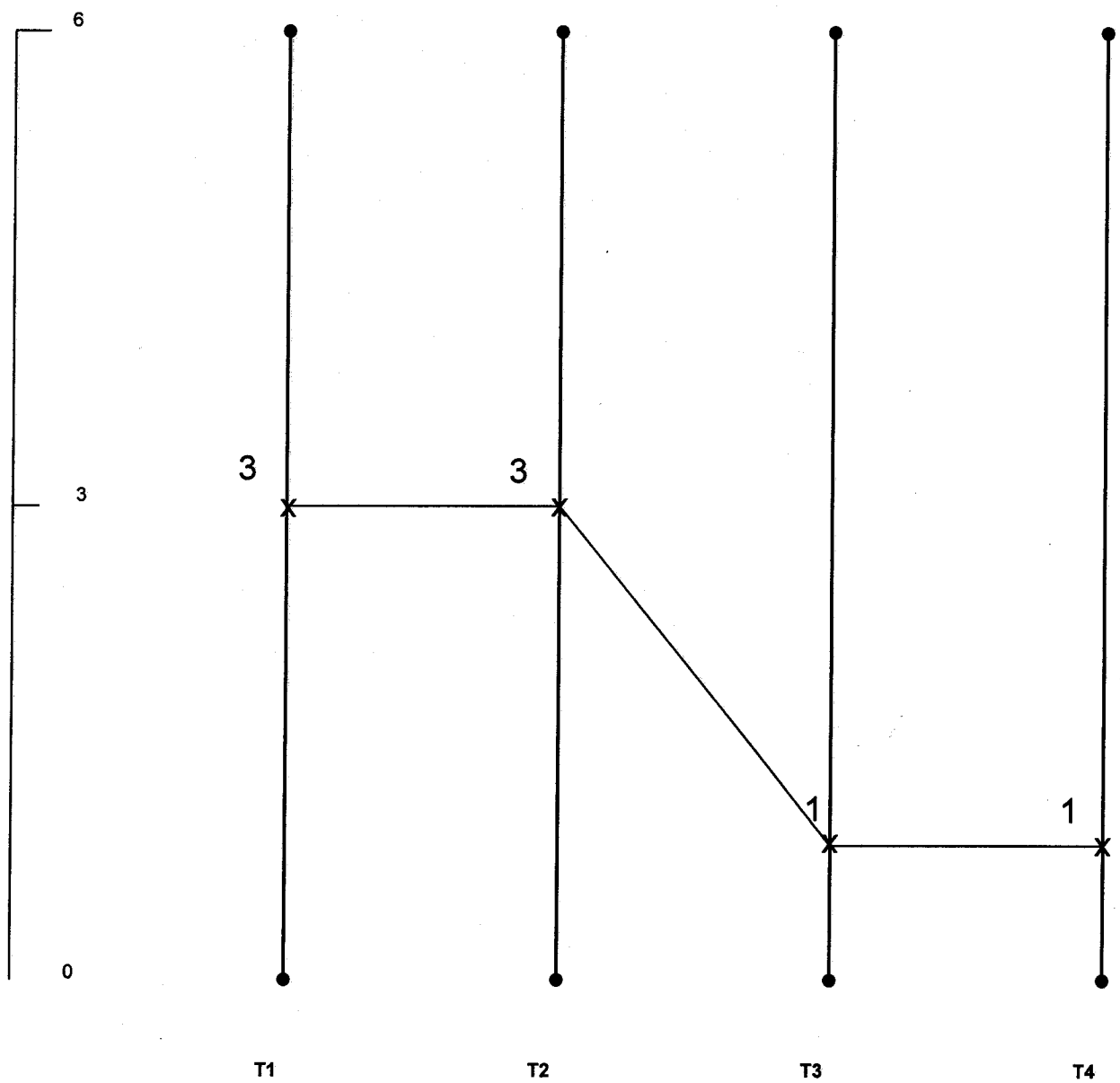
FIGURE 29: Subject # 22 - Index of Social Engagement



Scale: 0 - 6

Higher integers indicate improved status

FIGURE 30: Subject # 29 - Index of Social Engagement



Scale: 0 - 6

Higher integers indicate improved status