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PHYSICAL ACTIVITY PROFILE AND COMMUNITY INTEGRATION OF INDIVIDUALS WHO HAVE SUSTAINED A TRAUMATIC BRAIN INJURY: A PILOT STUDY

par

Concetta Pantalena

École de réadaptation

Faculté de médecine

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Physical Activity Profile And Community Reintegration Of Individuals Who Have Sustained A Traumatic Brain Injury: A Pilot Study

Evaluated by a jury composed of the following persons:

Robert Forget Ph.D : President

S. John Sullivan Ph.D. : Director of Research

Elisabeth Dutil M.Sc.,O.T. : Co-Director of Research

Louis W.Jankowski Ph.D : External Member

Thesis was accepted:_____

SUMMARY

Traumatic brain injury (TBI) may cause temporary or permanent physical, cognitive and behavioural impairments and disabilities which can greatly impact on successful community reintegration. One of the primary goals of rehabilitation is to ensure the individual acquires the necessary skills and the level of independence to achieve optimal community reintegration. Physical activity can play an important role in a multidisciplinary rehabilitation program in an attempt to restore maximum level of function. In addition, physical activity may also aid in the prevention of disease and in the establishment of psychological factors such as self-esteem, body image and social adjustment. The primary objective of this pilot study was to identify some factors that could possibly effect physical activity, in an attempt to describe the physical activity profile of adults with TBI. The secondary objective was to document the level of community integration in the home, social and productivity domain, in order to examine whether relationships exist between physical activity and community reintegration in this group of individuals.

A convenience sample of 13 subjects, 8 males and 5 females between 21 - 55 years of age volunteered to participate. All participants had a diagnosis of a moderate or severe ($\bar{x}$=6.15 ± 2.54 on the Glasgow Coma Scale) TBI and were interviewed at 2.8 ± 1.5 years following discharge from a multidisciplinary rehabilitation program. This pilot study consisted of a single interview session where the participants completed three questionnaires (the Community Integration Questionnaire, the "Profil du Loisir" and the Campbell Survey).

The Community Integration Questionnaire was used to document the level of independence and the frequency of participation in activities related to home integration,

social integration and productive activity. The "Profil du Loisir" was used to assess the possible physical, cognitive, behavioural and environmental barriers towards physical activity participation. The Campbell survey was used to collect data on physical activity profile and to classify the subject's physical activity level as physically active, moderately active and sedentary.

Most subjects (10/13) reported a decrease in physical activity participation post-injury. However, the majority (8/13) still enjoyed an active (5/13) or a moderately active (3/13) lifestyle but all the subjects participated uniquely in solitary type physical activities. The most popular activities were biking, physical conditioning, swimming, and gardening. Age, time since injury and time since discharge from a rehabilitation centre were significantly related to physical activity levels. Persons who engaged in more physical activities were younger and their time since injury and time since discharge from rehabilitation were longer. The main barriers towards physical activity participation as reported by the subjects were difficulties with: manual dexterity, equilibrium, fatigue and personal discipline. Spearman rho correlation coefficients indicate that fatigue ($r = .70$; $p = .007$), easily getting out of breath ($r = .58$; $p = .039$), difficulty walking ($r = .56$; $p = .048$) and winter climate ($r = .71$; $p = .006$) were significantly related to physical activity level and limited further physical activity participation for sedentary and moderately active subjects only. The mean scores of community reintegration for the sample were 6.24 ± 2.53 (maximum score of 10) on the home dimensions, 8.23 ± 1.92 (maximum score of 12) on the social dimension, 2.15 ± 0.55 (maximum score of 5) on the productive dimension and 16.67 ± 3.34 (maximum score of 29) for total community integration as measured by the CIQ. Similar results were obtained

in other studies that have evaluated persons with TBI and reported lower community integration scores for this clientele when compared to non disabled populations. No relation was found between the level of physical activity participation and the four aspects of community integration (home integration, social integration, productive activity and total community integration). Similar findings were reported by Gordon et al. (1998) when assessing the effects of exercise on community integration with the CIQ in 240 individuals with TBI (64 exercisers and 174 non exercisers) with the exception of exercise being significantly related to productivity. The present study did not find a significant correlation between physical activity and productivity probably due to the small sample size and that all the subjects were unemployed and not looking for work.

Even several years post injury this clientele has not obtained optimal community reintegration. Rehabilitation specialists may need to follow this clientele post discharge to help them deal with problems as they arise in society to ensure optimal community reintegration. Furthermore, therapists should systematically integrate physical activity early in the rehabilitation program to help maximize function and increase the opportunity to experience the other possible benefits of physical activity.

RÉSUMÉ

La problématique du traumatisme cranio-encéphalique (TCE) est reconnue depuis plusieurs années pour être la cause majeure de décès et de morbidité parmi un nombre important de pays industrialisés. Suite au traumatisme, des incapacités d'ordre physique, cognitives et comportementales peuvent survenir. La présence de celles-ci peuvent causer des situations de handicap selon les obstacles environnementaux auxquelles la personne est confrontée et limiter alors la réintégration de la personne dans la communauté.

En réadaptation, un des buts premiers est la reprise des activités dans la communauté. L'activité physique est une composante importante à l'intérieur des programmes de réadaptation pour les personnes présentant un TCE. En effet, on reconnaît à l'activité physique plusieurs effets bénéfiques dont le maintien de la santé physique, l'apprentissage de comportements sociaux acceptables, la découverte de nouveaux intérêts et le développement de nouvelles amitiés qui en retour, peuvent aider à l'estime de soi. Bien que plusieurs points positifs soient observés, on connaît très peu le rôle de l'activité physique comme facilitateur pour la réintégration sociale. Le but de cette étude est de décrire dans un premier temps, le profil d'activité physique de la personne présentant un TCE. Le profil sera décrit en terme de fréquence, de choix, d'endroit où se fait ses activités et avec qui la personne les fait ainsi que les obstacles reliés à la réalisation de ces activités. Dans un deuxième temps, le niveau de réintégration sociale sera étudié tout comme la relation entre le niveau d'activité physique et le niveau de réintégration sociale.

Un échantillon de 13 sujets (8 hommes, 5 femmes), âgées entre 21-55 ans ont été sélectionnés à l'intérieur d'un même centre de réadaptation de phase 3 (réinsertion sociale-

programmes TCC-SAAQ). Les sujets à l'étude présentaient un TCE modéré ou sévère (Échelle de Coma Glasgow: $\bar{x}$=6,15 ± 5,54). Pour la présente étude, les sujets avait reçu leur congé du centre de réadaptation depuis un certain nombre d'années (1,03-5,41). Lors d'une seule rencontre, trois entrevues ont été réalisées à l'aide des outils suivants: l'Enquête Campbell (Stephen & Craig, 1988), le Profil du Loisir (Dutil & Forget,1991) et le "Community Integration Questionnaire" (Willer et al., 1990). Pour connaître les types d'activités physiques, la fréquence et le lieu de participation tout comme les personnes avec qui la personne exercent ces activités, l'Enquête Campbell a été utilisée. Le Profil du Loisir a servi à documenter les incapacités et les obstacles environnementaux reliés à la pratique d'activités physiques réalisées a l'intérieur de l'ensemble des activités de loisir. En dernier lieu, une version traduite en français du "Community Integration Questionnaire" a servi à documenter le niveau d'intégration de la personne à la maison, son intégration sociale et le niveau d'activités productives. Le niveau d'intégration communautaire illustre le résultat de ces trois niveaux, selon une cote globale.

Pour analyser les résultats, trois catégories de sujets ont été identifiés: ceux qui sont physiquement actifs, modérément actifs ou sédentaires. Étaient considérés comme actifs, les sujets qui participaient à un programme d'activités physiques plus de 3 fois par semaine pour plus de 9 mois par année alors que les modérément actifs participaient plus de 3 fois par semaine mais moins de 9 mois par année et les sédentaires, leurs activités se limitaient à une participation de moins de 3 fois par semaine.

Les résultats démontrent que la majorité des sujets (10/13) ont rapportés une diminution de leur activité physique suite au traumatisme. Toutefois, la majorité (8/13) des

sujets se considèrent comme étant actifs (5/13) ou modérément actifs (3/13). Les types d'activités les plus pratiquées étaient la natation, la bicyclette et le conditionnement physique. Celles-ci étaient réalisées généralement seules. La moitié des personnes actives et modérément actives retournaient au centre de réadaptation pour participer à leurs activités physiques. L'âge, le temps depuis l'accident et le moment de la réintégration dans la communauté sont reliés de façon significative au niveau d'activité physique. Les sujets plus actifs sont plus jeunes et ils sont retournés dans la communauté depuis un certain temps. Pour réaliser leurs activités, les sujets mentionnent certaines difficultés reliées à la dextérité, l'équilibre, la discipline personnelle et la fatigue. Parmi celles-ci, la fatigue ($r=0,7037$; $p=0,007$), la difficulté à respirer ($r=0,5774$; $p=0,039$), la difficulté à marcher ($r=0,5579$; $p=0,048$) et les conditions climatiques ($r=0,7115$; $p=0,006$) sont reliées de façon significative au niveau de l'activité physique. Ces difficultés se retrouvent particulièrement chez les sujets modérément actifs et les sujets sédentaires. Au niveau de la réintégration dans la communauté, tel que mesuré avec le "Community Integration Questionnaire", la moyenne des scores obtenus est la suivante: l'intégration à la maison ($6,24/10 \pm 2,53$), l'intégration sociale ($8,23/12 \pm 1,92$), la productivité ($2,15/5 \pm 0,55$) et le score total d'intégration communautaire ($16,67/29 \pm 3,34$). Des résultats similaires ont été rapportés dans d'autres études à savoir un score inférieur chez les personnes présentant un traumatisme crânien comparativement à une population ne présentant pas de déficiences. Quels que soient les catégories de sujets, le score obtenu pour le niveau correspondant à la productivité, a été très bas car aucun des sujets de l'étude occupait un emploi ou était aux études et seulement trois personnes faisaient du bénévole. Bien que des différences aient

été observées entre les catégories de sujets et entre les différents niveaux de l'intégration communautaire, aucune corrélation significative n'a été observée.

Ces résultats suggèrent qu'un suivi continu et à long terme doit se faire étant donné que les personnes présentant un TCE n'ont pas obtenu un score optimal au niveau de l'intégration dans la communauté après plusieurs années suite à leur congé de leur programme de réadaptation. Aussi, les intervenants doivent utiliser plus systématiquement l'activité physique pour "maximize function and the possible benefits that can be obtained by physical activity".

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INTRODUCTION

Traumatic brain injury (TBI) is defined as damage to cerebral tissue including the brainstem, caused by a direct impact or external force. Permanent or reversible damage occurs when the force of impact is sufficient enough to produce distortions of vascular and neurological tissue (Gennarelli, 1986). The rate of survival following a TBI has increased in part due to advances in emergency and acute medical care, and the reinforcement of the seat belt/shoulder harness and alcohol driving legislation. As a direct consequence of a decreased mortality, the morbidity associated with TBI has increased.

Traumatic brain injury may result in long-lasting and often permanent alternations in physical, cognitive, emotional and behavioural functioning which may ultimately affect community reintegration and quality of life. The majority of persons who sustain a moderate or severe TBI actively participate in a rehabilitation program where one of the main goals is to increase the individual's level of independence and level of community reintegration. Physical activity can play an important role during rehabilitation to restore the client's maximum level of function and if physical activity is practised on a regular basis it can also contribute to a healthier lifestyle.

1.1 EPIDEMIOLOGY OF TRAUMATIC BRAIN INJURY

1.1.1 Rate of Incidence and Causes of TBI

Traumatic brain injury has been recognized as one of the major causes of mortality and morbidity in industrialized countries (Jennett & Teasdale, 1981; Jennett, 1996). There is substantial difficulty in determining accurate epidemiological data due to the large number of TBI's which go unreported (Miller, 1986). The available epidemiological data do however give some indication of the importance of a TBI. Males are twice as susceptible to sustain a TBI than females (Kraus & Nourjah, 1988; Jennett, 1996) and there is a high incidence of TBI among persons aged 15 to 24 years and a second smaller peak among the elderly (Moore & Stambrook, 1995; Goldstein & Levin, 1995). Every year 50,000 Canadians sustain brain injuries (Anello, 1996). In the United States approximately, 550 per 100,000 persons between the age of 15 to 19 years sustain a TBI in any given year. The rate decreases to 160 per 100,000 for individuals up 50 years of age and then the incidence increases to 200 per 100,000 for persons 65 years of age and older (Goldstein & Levin, 1995). The leading cause of head injuries is motor vehicle accidents, falls are the second most frequent cause, followed by assaults and sport/recreation accidents (Kraus & Nourjah, 1988; Gennarelli, Champion, Copes & Sacco, 1994; Jennett, 1996). Motor vehicles accidents are the major cause of a TBI in males between 15 and 24 (Goldstein & Levin, 1995; Burk & Lewis, 1986). Whereas, falls predominate in older individuals (Goldstein & Levin, 1995; Kraus, 1987; Hernesniemi, 1979; Marshall, Becker & Bowers et al., 1983). In Quebec, a study conducted by Gagnon & Brassard (1998) reported that 1,900 persons annually sustained a TBI caused by road accidents.

1.1.2 Morbidity

Epidemiological data may be used to illustrate the rate of occurrence, cause of injury and the importance of the injury in terms of morbidity. Researchers and clinicians often use the following parameters to determine the severity of TBI which can range from mild to severe: Glasgow coma scale score (GCS), length of unconsciousness, diagnostic and clinical symptoms (skull fracture, haematoma, etc). The GCS developed by Teasdale & Jennette in 1974 and revised in 1976, was initially developed as an objective measure of consciousness. The coma scale is now an integral part of neurological examination completed soon after injury and the three major factors that are measured are motor response, eye opening and vocal response (Teasdale &Jennett, 1974; 1976). The scale is used to determine the severity of the injury and the score can range from three to fifteen. Severe injury corresponds to a score of 3-8; moderate injury corresponds to a score of 9-12; and mild injury corresponds to a score of 13-15.

Several studies have shown that the severity of TBI, influences the degree of recovery. Wong, Dornan, Keating, Schentag et al., (1994) suggested that as the severity of TBI increased, the likelihood of a full recovery decreased. Gennarelli et al., (1994) conducted an analysis of the completed Major Trauma Outcome Study data on persons who had sustained a TBI and reported similar results. The results were interpreted as an indication that as injury severity increased, morbidity at discharge increased and the areas where disability was most experienced were feeding, expression and locomotion. Gennarelli et al., (1994) have gone one step further than most epidemiological studies by attempting

to pin point the areas of disability, but other epidemiological studies are needed to further investigate the effects of TBI on other possible areas of disability such as employment, family and leisure participation. It is important to know how prominent TBI is, but it is equally important to understand its effects on lifestyle.

Moderate and severe TBI is a common cause of persistent disability (Annovi, Beer & Kesselring, 1992). Moscato, Trevison & Willer (1994) conducted a survey in Canada and estimated that 54 per 100,000 households were experiencing disability for at least six months after TBI. The interpretation of the results further showed that 65% of individuals were experiencing disability for more than five years and 45% for more than ten years post injury. TBI can be considered as the "silent epidemic" relative to the longevity and youthfulness (majority who sustain a TBI are between the ages of 15-24) of persons with a TBI (Lyle, Quine, Bauman & Pierce, 1990). Therefore, a significant proportion of survivors of head injury are left with disabilities which may be considerable and prolonged.

Advances in medical technology have resulted in a substantial increase in survival rates. This places new challenges on health care professionals in rehabilitating and reintegrating persons with TBI (Moore & Stambrook, 1995). The primary objective of rehabilitation is to assist the individual to become as autonomous as possible so as to assure optimal community reintegration thus, helping them to re-establish their place and role in society.

1.2 COMMUNITY REINTEGRATION

1.2.1 Definition of Community Reintegration

The term "community reintegration" (social reintegration) is frequently used in the literature to describe the ultimate goal of rehabilitation and it has been viewed as the converse of handicap (Willer, Rosenthal, Kreutzer, Garden & Rempel, 1993). In order to define social reintegration one must understand what causes a handicap. The conceptual framework, the International Classification of Impairments, Disabilities and Handicaps (ICIDH) developed by Wood (1975) for the World Health Organisation (WHO), introduces three concepts which describe the consequence of disease at the level of its impact on the body and the person as a social being (Badely, 1993). These three concepts are: (1)impairment; any loss or abnormality of psychological, physiological or anatomical structure or function; (2)disability; any restriction or lack (resulting from an impairment) of ability to perform an activity in the manor or within the range considered normal for a human being; and (3)handicap; a disadvantage for a given individual, resulting from an impairment or a disability, that limits or prevents the fulfilment of a role that is normal (depending on age, sex, social and cultural factors) for that individual.

1.2.1.1 The CSICIDH/QCICIDH Conceptual Framework

In 1987, an international conference of experts was held to identify applications and improvements to be made to the definitions and classifications proposed by the WHO in 1980. The experts agreed that the aspect of the ICIDH that created the most difficulties for its users was at the level of handicap. The Canadian Society and Quebec Committee of the

ICIDH (CSICIDH/QCICIDH) received a mandate to further develop the WHO's definition of the concept of handicap. Concern was expressed about a handicap being a result of an impairment or disability and in particular the implication that disability was the only contributory factor to handicap. The Canadian Society and the Quebec Committee defined handicap as the resulting situation of an *interactive* process between impairments, disability and possible environmental factors that may create social or ecological obstacles in a given situation (see fig. 1) (Fougeyrollas et al., 1991). By adding the environmental factors, this classification system provides a theoretically sound method of describing the experience of disablement associated with TBI and reflects an understanding of how culture, values and resources modify the impact of TBI. The endpoint of the CSICIDH/QCICIDH goes beyond the individual and considers how the individual is affected in his/her own community. Environmental factors can enhance or inhibit social reintegration. Thus "situations" of social reintegration are defined as situations which allow persons to participate in life's activities in nonsegregated context (Doré, Allie & Ruel, 1994). Minimizing one or more causes of a handicap situation will enhance the opportunity for optimal community reintegration. The CSICIDH/QCICIDH will be utilized in this thesis in order to illustrate the major impairments, disabilities and environmental factors and how they interact to create possible handicap situations for persons with TBI.

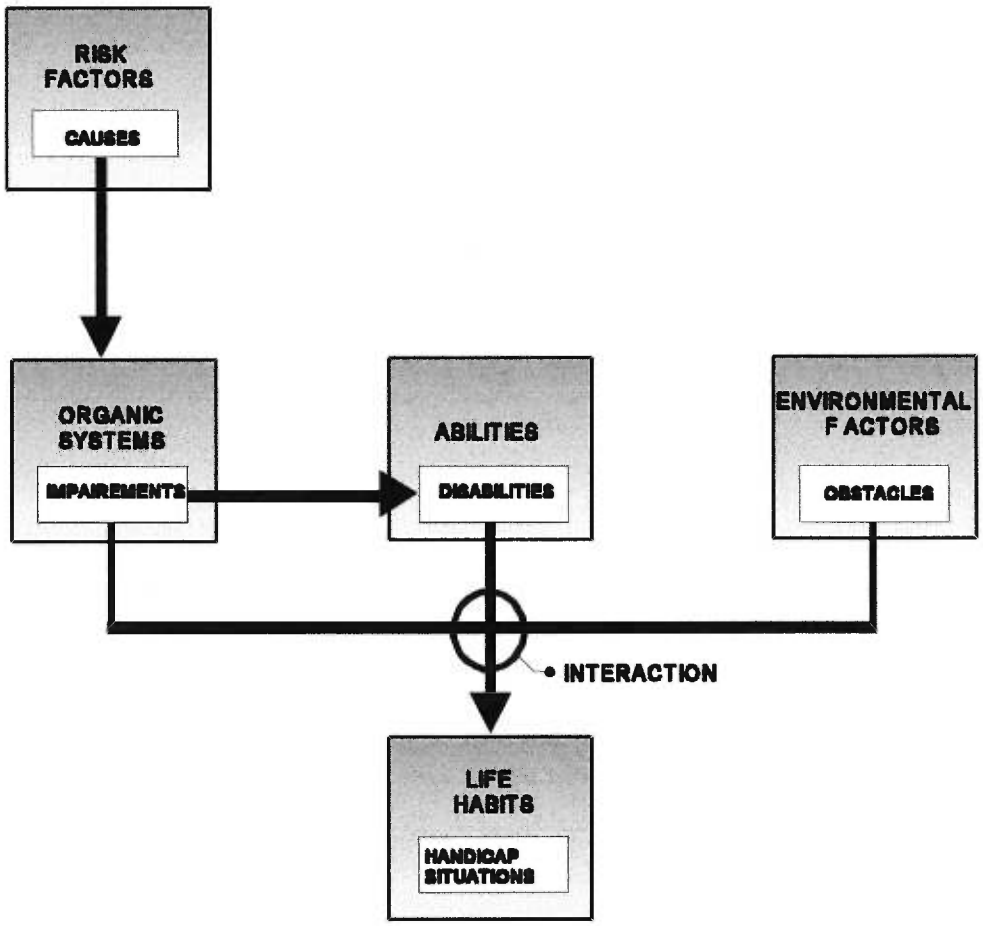

FIGURE 1. CSICIDH Conceptual Model-Handicap Creation Process

Reproduced with permission from Fougeyrollas, P. et colleagues. Le Processus de Production des Handicaps: analyse de la consultation nouvelles proposition complètes. Réseau international CIDIH vol 4(1-2), 1991.

1.2.2 Factors That May Influence Community Reintegration in TBI

Traumatic brain injuries are most frequently sustained by adolescents and young adults who are in the process of attaining independence, forming important relationships and most probably completing school or establishing a vocation. As Cottles (1988) pointed out, the attainment of these milestones was interrupted by the occurrence of TBI. The consequence of a TBI may be diffused neuronal damage, physical, cognitive and psychosocial impairments and disabilities which includes behavioural, emotional and social disturbances (Thomsen, 1987). Each individual's recovery is unique due to the location and severity of the injury, pre-injury personality and their emotional reaction to the injury (Stumbo & Bloom, 1990). The interaction of impairments, disabilities and environmental factors including social network, may influence the level of community reintegration and quality of life.

1.2.2.1 Impairments and Disabilities

The Canadian Society and Quebec committee of ICIDH (1991) have defined impairments as: any physiological, anatomical or histological anomaly or alteration; and disability as: any disturbance resulting from an impairment, in the capacity to perform a physical or mental activity considered normal for a human being (depending on his biological characteristics) (Bergeron, St-Michel, Cloutier & Fougeyrollas, 1991).

1.2.2.1.1 Physical Impairments and Disabilities Following TBI

Blunt trauma to the head results in primary and secondary brain injury. Primary injury occurs at the moment of impact, being caused directly by the blow to the head. Cerebral contusions and diffused axonal injuries are examples of primary injuries. Cerebral contusions are haemorrhagic lesions resulting when a blow to the head causes rapid acceleration or deceleration resulting in differential movements between the brain and the skull. Cerebral contusions can result in secondary complications such as brain swelling, oedema and local ischaemia, but not necessarily an initial loss of consciousness (Teasdale & Mendelow, 1984).

Diffused axonal injury is thought to be the primary mechanism of TBI and the loss of consciousness (Ponsford, Sloan & Snow, 1995). Diffused axonal injury can occur during severe, moderate or mild TBI. Lesser degrees of diffused axonal injury also occur in mild head injuries, where there may be as little as five minutes loss of consciousness (Pilz, 1983).

Secondary injuries occur as a result of systemic injuries or complications. Examples of secondary injuries are: brain swelling, intracranial haematoma, ischaemic brain damage, infections and post-traumatic epilepsy. A broad range of sensory disturbances may be caused by cranial nerve lesions or injury to the subcortical or cortical sensory pathways such as: visual impairments, hearing loss, diminished sense of smell, diminished tactile sensation and proprioception. Furthermore, a broad range of sensorimotor impairments may result from TBI, depending on the location and the extent of injury to the brain such as weakness

or paralysis on one or both sides of the body, incoordination of muscle movements, a loss of fine and gross motor dexterity, poor balance and reduced physical endurance (Ponsford, Sloan & Snow, 1995). These impairments and disabilities can interfere with the accomplishment of life habits such as activities of daily living, work and leisure.

Fatigue is a common debilitating symptom experienced by individuals who have sustained a TBI (Wrightson & Gronwall, 1981; Oddy, Humphrey & Uttley, 1978; Brooks, Campsie, Symington, Beattie & McKinlay, 1987; McKinlay, Brooks & Bond, 1983) which may influence performance of certain activities of daily living. Fatigue continues to be a problem even several years post injury in individuals who have sustained a moderate or severe TBI (Tennant, MacDermott & Neary, 1995; Brooks et al., 1987). It may be caused by many factors, one of them being physiological changes leading to lack of fitness which may be due to prolonged inactivity during the initial hospitalization and deficit specific rehabilitation may lead to muscle weakness and cardiopulmonary deconditioning which will impede efforts to restore functioning (Bray, Cartson, Humphrey, Mastrilli & Valko, 1987). Furthermore, fatigue can make it difficult to participate fully in other areas of rehabilitation which may further prolong their convalescence. Fatigue may also be related to lower physical work capacity (Becker, Bar-or et al., 1978). When persons with TBI lack work stamina, the stress created by prolonged activity can cause cognitive breakdowns (e.g.: inattention to the task at hand, inability to follow multi-step directions), physical complaints (e.g.: reduced coordination, exhaustion) or irritability and interpersonal problems may arise (Gobble, Henry, Pfahl & Smith, 1987).

Fatigue may be caused by impaired cognitive functioning. Melamed, Stern, Rahmani, Groswasser & Najenson (1985) conducted a follow-up study two years after hospitalization of TBI patients. They explored attention capacity limitation and its correlation with psychiatric parameters as well as their impact on work involvement. Capacity limitation was identified as difficulties in performing dual-tasks. Poor performance on one or both tasks was correlated with the feeling of fatigue after physical and mental effort. The authors of this study concluded that mental fatigue may be a contributing factor to an overall feeling of fatigue.

Low level of resistance to fatigue may negatively influenced health and community reintegration. Low energy level may lead to a more passive or sedentary lifestyle and sedentary persons may be at risk for sustaining cardiovascular disease and obesity which may lead to Type II diabetes and other health problems (Shephard, 1991). The lowered physical work capacity may negatively affect: the performance of day-to-day activities, the possibility of returning to their previous level of employment, participating in social, leisure and recreational activities.

The individual's emotional reaction to their physical disabilities as well as the reaction of others, will also influence their level of community reintegration. If they are unable to accept or are embarrassed by their physical disabilities, it may cause them to be withdrawn and depressed possibly leading to social isolation. Furthermore, this clientele may encounter environmental barriers limiting their accessibility in and around their home,

shopping area and the area of previous employment. The interaction of environmental factors with physical impairments and disabilities may create handicap situations, thus decreasing the level of community reintegration.

1.2.2.1.2 Cognitive Disabilities Following TBI

Blunt head trauma tends to result in a characteristic range of cognitive difficulties, due to the high frequency of diffused axonal injury, combined with localized frontal and temporal lobe damage. These include: deficits of attention and speed of information processing; learning and memory; executive functions such as the ability to think in abstract terms; initiative and flexible thought process; goal setting, and planning (Sloan & Ponsford, 1995; Szekers, Ylvisaker & Cohen, 1987).

Attentional deficits commonly reported include reduced capacity and speed of information processing, with difficulties in focussing on more than one thing at once (Dikmen, Machamer & Temkin, 1993; Dikman, Mclean & Temkin, 1986; Ponsford, Olver & Curran, 1995; van Zomeren & van den Burg, 1985). Poor selective attention has also been reported and can manifest itself as distractibility, poor attention to detail and problems in sustaining attention overtime (Ponsford & Kinsella, 1991).

Long term studies conducted from six months up to seven years after injury have found memory problems to be the most frequent subjective complaint by the subject and/or their relatives (Brooks et al., 1987; Brown & Nell. 1992; Oddy et al., 1978; Ponsford et al.,

1995; van Zomeren et al., 1985). A follow-up study conducted by Thomsen (1974, 1984) two and a half years and ten to fifteen years after injury on 40 persons who had sustained severe TBI revealed that three-quarters or more of their patients had poor memory. In the most severe cases the subjects were not always oriented to the time of day, lost track of what was said and forgot what was mentioned just a moments ago.

Many persons who have sustained a TBI may have difficulties in analysing, planning and executing solutions to problems. Those with problem solving deficits are frequently unable to generate strategies for efficient task performance. There may also be an inability to think creatively and generate different solutions to a problem, with a tendency to repeatedly apply an old, unworkable solution, resulting in failure and frustration (Vogenthaler, 1987).

Cognitive disabilities may be the basis of many difficulties experienced daily. Cognitive deficits such as memory loss, reduced organizational skills, concrete thinking, slowed information processing and attentional problems often underlie a person's inability to shop, balance a checkbook, understand what is read, travel independently in the community, return to work or school (Gordon & Hibbord, 1995). Severe TBI frequently results in a lack of awareness of changes in cognitive function and behaviour which results in confusion, an inability to understand the reasons for failure at work or in social situations.

1.2.2.1.3 Behavioural/Emotional Disabilities

Dealing with behavioural and emotional disabilities are apparently very difficult for relatives of persons with TBI and therapists. Several authors have mentioned that emotional and behavioural problems are the most difficult for rehabilitation therapists to predict and treat (Howard, 1985; Rosenthal, 1983). Behavioural disorders are one of the most significant factors hindering retraining efforts to restore the client's cognitive, physical and vocational functioning (Muir et al., 1983). The greatest concern and single most frequent disability reported by relatives were; personality changes (Brooks, 1992; Jacobs, 1985; Lezak, 1978); childishness (Thomsen, 1974; Lezak, 1978; Prigatano et al., 1986); emotional liability (Thomsen, 1974; Alexander, 1982; Lishman, 1978; Prigatano et al., 1986); irritability (Lezak, 1978; Oddy, Humphrey & Uttley, 1978; Prigatano et al., 1986), and impatience (Leigh, 1979; Oddy et al., 1978; Prigatano et al., 1986).

Anxiety and depression are prominent and persistent disabilities. McKinlay et al., (1981) found that anxiety and depression were reported by all 55 patients with TBI which served as subjects at three, six and twelve months post injury. Tyerman and Humphrey (1984) found that 60% of a group of 25 severe TBI subjects interviewed from two to fifteen months after injury were clinically depressed. Brooks et al., (1986) found that 57% of a group of relatives of severe TBI patients indicated that depression was a significant problem for the patients five years after injury. In a subsequent study Brooks et al., (1987) found that 65% of relatives reported anxiety and 63% reported that depression was a problem with the injured family member seven years after injury. Several authors have suggested that

anxiety and depression increased as the person with TBI became more aware of their disabilities (Brooks et al., 1987; Fordyce, Roueche & Prigatano, 1983). These results are not surprising given the loss and changes in lifestyle which may follow a TBI. This clientele would need help from their therapist, family and friends to come to terms with their loss. Depression, decreased self-esteem and the sense of hopelessness which may accompany depression will seriously interfere with attempts to rebuild a new lifestyle.

Behavioural and emotional disorders not only affect the persons with the TBI but also their friends and family. Friends and family members may find it difficult to interact with the person who has sustained the injury due to the fact that they are no longer the same "person" they used to know. Often, it is the relatives who provide the only ongoing support for those who have sustained a moderate or severe TBI (Kozloff, 1987). Jacobs (1988) found that the majority of individuals with TBI returned and stayed with their family in the longer term. Changes in behaviour and personality were found to be the major source of family disruption and distress (McKinlay et al., 1981; Brooks et al., 1987). Friends and family need to be educated on the consequences of TBI and be taught how to deal with these emotional and behavioural changes. If these emotional and behavioural disorders are not dealt with during rehabilitation, they can have serious consequences on the patient's personal and social relationships, negatively affecting their quality of life.

1.2.2.2 Environmental Barriers

Environmental factors are all social, cultural and physical environmental dimensions that determine the organization and context of a society (Fougeyrollas et al., 1991). The Canadian society and Quebec committee of ICIDH (1991) divided environmental factors into two categories: (1)social factors which were further sub-divided to socio-economic organization and social rules; (2)physical environmental factors which were divided into nature (e.g.: geography, climate) and development (e.g.: architecture, technology). The interaction of physical, cognitive, behavioural and emotional impairments and disabilities with environmental factors can create handicap situations. It may be possible to reduce a problem by adapting the task itself or by eliminating the obstacles in the environment to alleviate the person's disabilities and handicaps. By modifying environmental factors the level of handicap may decrease while improving the quality of community reintegration.

Few studies have identified the environmental facilitators and/or obstacles towards community reintegration for persons with TBI. Crépeau & Scherzer (1993) conducted a literature review from 1967-1990 and identified environmental barriers and facilitators to return to work. They found that vocational rehabilitation services (Ainsley & Gliner,1989; Walker et al., 1987), community reintegration services (Vogenthaler et al., 1989), the presence of a case manager (Ainsley & Gliner, 1989), quality of life (Walker et al., 1987) and the number of leisure time activities (Weddell et al., 1980) were highly correlated with work status. Further research is needed to identify how environmental factors effect other areas of community integration (e.g.: leisure participation, physical activities participation

and activities of daily living) in order to prevent handicap situations, thus improving quality of life.

1.2.2.3 Handicap Situation

A handicap situation is "a disruption in the accomplishment of a person's life habits, taking into account age, sex and socio-cultural identity, resulting on the one hand from impairments or disabilities and on the other hand by environmental factors" (Fougeyrollas et al., 1991). Life habits ensure the survival and development of a person in society and they include daily and domestic activities such as: nutrition (e.g.: food selection and preparation), fitness, personal care, communication, residence, mobility, responsibility (e.g.: financial) and social roles such as; interpersonal relations, family relations, community (e.g.: consumption of goods and services), education, employment, recreational and other habits (Fougeyrollas et al., 1991). A large proportion of persons who have sustained a TBI are between the ages of 19-25, and are thus in the early stages of establishing their independence in areas including friendships, intimate relationships, residence, employment and leisure activities (Morton & Wehman, 1995). Due to physical, cognitive and behavioural impairments or disabilities and certain environmental factors, a large portion of individuals with TBI will continue experiencing handicap situations for many years post injury. Consequences of a TBI disrupt many areas of life but among the most severely disrupted are activities of daily living (ADL), interpersonal relationships, work and leisure (Bond, 1975; Bond & Brooks, 1976).

1.2.2.3.1 Activities of Daily Living

Performing ADL's is an area of disability and handicap for some persons who have sustained a TBI. ADL's include self-care activities such as bathing, dressing, eating and toileting. It also includes tasks that are more complex such as domestic tasks (e.g.: cooking, cleaning and laundry) as well as shopping and financial management (Law, 1993). The literature suggests that most persons with TBI do not have difficulties with self-care activities except for those who are more severely injured and who have significant physical disabilities (Jacobs, 1988; Warnock, Northin, Carberry, Ward, Hughes, Tennant, & Chamberlain, 1992). Panikoff (1983) described the course of recovery of functional skills in 80 adults with severe TBI during a two year period. The author reported that by 12 months post-injury, 90% of the subjects were independent in feeding, bed mobility, grooming and that 80% were independent in dressing. Difficulties that were present were classified as mild and occurred to subjects with a coma length greater than 14 days. Jacobs (1988), Ponsford et al. (1995) and Brown & Nell (1992) reported similar findings.

Several follow-up studies suggest that people with TBI experience more difficulties with more complex ADL (Brown & Nell, 1992; Jacobs, 1988; McNeny, 1990; Panikoff, 1983; Ponsford et al., 1995) and it tends to be cognitive and behavioural disabilities rather physical problems which underlie these difficulties. Jacobs (1988) study was designed to identify the long-term needs of 452 persons with severe TBI by assessing functional skills one to six years post trauma. The author found that only 63% of the subjects were independent in higher order tasks such as shopping, caring personal health and safety and

money management. Jacobs further reported on the level of ability within each skill area ranging from basic processes, such as understanding money, through more complex activities such as budgeting money. Shallice & Burgess (1991) described the difficulties experienced by three persons with TBI and among the difficulties identified were failure to organize social events or plan spare time activities.

1.2.2.3.2 Interpersonal Relations

The primary psychological concern of persons between 20 and 40 years of age is to develop a mature capacity for intimacy through friendships and romantic relationships (Erikson, 1959). Individuals in this age group develop their identity through their friendships and spend more time with their friends than any other age group (Pogrebin, 1987). People who sustain a severe TBI report that their primary concern was social isolation and loss of contact with a close friend (Thomsen, 1974; 1984). Oddy and colleagues assessed social integration of several persons with TBI at six and twelve month and at two and seven years. Oddy et al.'s (1978), investigation showed that at six months there was a significant decrease in the number of close friends as reported by relatives for 49 subjects. At twelve months follow-up, 44 subjects received fewer visits, had fewer social encounters than before the injury and at two years the findings revealed that they lead more restricted social lives (Oddy & Humphrey, 1980). Seven years later a follow-up with the remaining 34 subjects showed that 50% of the subjects had limited contact with friends and loneliness was reported to be the greatest difficulty (Oddy, Coughlan, Tyerman et al., 1985). Similar results were reported by Weddell, Oddy and Jenkins (1980) who found that after

two years post injury, subjects had fewer friends, made and received fewer visits and dated less frequently. The findings further indicated that as close friendships diminished, they were replaced with casual acquaintances. Similar results were also reported by Thomsen (1984) ten to fifteen years post injury. Elsass & Kinsella (1987) and Thomsen (1974) found that individuals with severe TBI had significantly fewer opportunities for social interaction.

The threat of social isolation can not only become a reality for persons with a TBI but also for the caregivers. Findings from a study conducted by Kozloff (1987) on 37 subjects who had sustained severe TBI's (GCS= eight or less) indicated that the family attempted to compensate for the subject's decreasing social network by spending more time with them. As a consequence, the family served multiple functions for the person with the TBI. Caregivers may have to giver up their own employment and leisure pursuits, providing care at the expense of their own health, needs and emotional well-being. By devoting most of their time and energy to the individual's recovery, the family have little opportunity or energy to maintain outside relationships. As a consequence, the family unit gradually withdraws from social contact (Kozloff, 1987; Oddy, 1984).

1.2.2.3.3 Employment

The Incidence of Return To Work

Returning to work is an important outcome variable because an employed individual contributes to society instead of being an economic burden on society. The incidence of returning to work is often used as a means to evaluate head injury outcome. The reported rates of return to work vary enormously from 25% (Dawson & Chipman, 1995) to 73% (Fraser, Dikman, McLean Jr., Miller & Temkin, 1988) among research investigations. The variability occurs partly as a function of the severity of injury. Dawson & Chipman (1995) surveyed 454 people with disabilities resulting from a TBI at an average of 13 years post injury. Persons with a TBI were identified by one question inquiring about memory and learning problems. Four hundred and fifty-four persons reported having memory or learning problems related to a brain injury not present at birth or caused by a stroke, disease or illness. Injury severity was not evaluated, nor was pre-injury work status. The authors reported that only 25% of the subjects were employed but of these, more than 30% were employed in sheltered workshops or in situations where they were not payed. Fraser et al., (1988) reported a 73% return rate at one year post injury but this high rate may be explained by the sample comprising of individuals having mostly sustained a mild TBI. The results further indicate that the individuals who were employed sustained mild range of impairments whereas the unemployed group had suffered severe impairments. Furthermore the unemployed group reported significantly greater physical problems compared to the employed group. Brook, McKinlay, Symington, Beattie & Campsie (1987) conducted a two to five year follow-up on 98 severely head injured individuals and the results showed

that only 29% returned to work post injury and found no convincing evidence of any increase in the proportion of those working from two years to five years. These investigations also reported that as injury severity increases the rate of employment decreases.

Some of the variability in reported rates of return to work may be due to not clearly defining what is included in the term "return to work". McMordie, Barker & Paolo (1990) surveyed 177 persons who had sustained a head injury. From the sample population, 134 persons had sustained a closed head injury, 11 had an open head injury , while the remaining 32 had sustained a head injury due to an illness or disease. The majority of the participants were either working (n=122) or going to school (n=49) before they were injured. The authors reported that 45% of head injured individuals at an average of 6.7 years post injury returned to some work related activity. Whereas only 19% (n=34) were engaged in competitive employment which included either full time or part time work. The inclusion of activities such as sheltered workshops and volunteer work to competitive employment may inflate estimates and distorts the realities of head injury outcome. The findings also indicated, in relation to pre-injury occupation, that the majority of subjects (21 of 25 people who responded to the question) were working at a lower level than before their injury. Some respondents commented that the person with the head injury was experiencing difficulty at work and trying to keep up. The results of these studies show that persons with head injuries have a lower rate of return to competitive employment and even those who do return to work may still experience difficulties even several years post injury.

The Impact of Physical and Other Disabilities on Employment

Many authors suggest that cognitive deficits and personality changes may have a greater impact than physical disabilities on return to work (Humphrey & Oddy, 1980; Brooks et al., 1987; Lezak & O'Brien, 1988). Specifically, some researchers have shown that memory problems, concentration problems, slowed information processing, changes in personalities, loss of emotional control and social isolation pose the greatest barriers to returning to work (Thomsen, 1984; van Zomerent & van den Berg, 1985). Nevertheless, others cite the importance of motor deficits on failure to return to work (Fraser et al., 1988) as indicated by McMordie et al. (1990) who reported that among other factors, persons who had sustained a TBI, had significantly more problems with the degree of motor impairment and ambulation were unemployed whereas persons less physically disabled could work as volunteers or be employed. Cognitive disabilities may have a greater impact on failure to return to work than physical disabilities but the studies reviewed above collectively support the conclusion that both cognitive and physical disabilities are an important influence on successful return to work.

Fatigue and reduced endurance have also been identified as major problems following head injury (Glenn & Rosenthal, 1985; Gronwall & Wrightson, 1974; Lynch & Mauss, 1981). In fact "tending to fatigue" was included as one of the greatest barriers towards regaining employment by both Thomsen (1984) and van Zomerent & van den Berg (1985). Fatigue may cause an individual to be careless and less productive which may cause an economic burden on their employer, thus it would be important to counteract fatigue in

order to enhance the opportunity to regain or maintain employment. Jankowski & Sullivan (1990) evaluated 14 adults with TBI's before and after they participated in a circuit training program 3 times per week for 16 weeks. Among the variables that were measured the index of physiological fatigability (IPF) was calculated in order to incorporate valid and reliable physiological measures of aerobic capacity and the energy cost of locomotion to accurately predict fatigability. The IPF was calculated by dividing the normalized oxygen cost of locomotion (observed VO_2 walking x normal VO_2 max) by normalised aerobic capacity (normal VO_2 walking x observed VO_2 peak). They reported an increase in oxidative capacity (VO_2 peak), a decrease in physiological fatiguability (IPF) and these variables were significantly related to worker productivity in sheltered workshop. Thus, physical conditioning may positively affect the rate of return to work by increasing worker productivity. Further research is needed to test the hypothesis that physical conditioning may influence return to work.

Effects of Unemployment

The American society highly values employment due to the multiplicity of benefits that it may provide such as financial independence, a sense of purpose, a greater support network and an increase in self-esteem. Unfortunately, most studies indicate that less than half of those who sustain severe TBI are successful in returning to permanent employment (Brooks et al., 1987; Crepeau & Scherzer, 1993; Dikman et al., 1993; Ezrachi et al., 1991; Jacobs, 1988). Dawson & Chipman (1995) reported that in Canada 34.4% of unemployed individuals with TBI had income below the poverty line. Chronic unemployment can lead

to financial dependency, possibly causing individuals to become more dependent on the family at a time in their life where they were developing an identity and acquiring independence apart from their family. Furthermore, unemployment contributes to depression, low self-esteem and decreases the opportunity to develop social contacts and leisure activities (Thomson, 1974; Wehman, 1981; Wehman & Kreitzer, 1990). While the capacity for work represents a very significant aspect of a person's lifestyle other aspects such as the capacity to form and sustain personal and social relationships and the ability to pursue recreational interests are equally important and may be just as vulnerable to the impact of TBI (Ponsford, Olver, Curran & NG, 1995).

1.2.2.3.4 Leisure

In the present study the definition of leisure is based on the work of Dumazedier (1962) and is defined as: "the free time available to an individual, that is the time apart from the obligations of work, family and society. Activities performed during this free time either to relax, to enjoy themselves, to increase their knowledge in a subject of interests or to develop their creative capacity".

Effects of TBI on Leisure

Several investigators have found that the primary areas of dysfunction post TBI were in the domain of employment, leisure and recreational activities (Jellineck, Torkelson & Harvey, 1982; Klonaff, Snow & Costa, 1986). As has been mentioned in the previous section, the majority of persons who sustained a moderate to severe TBI remain

unemployed, thus it would seem they would have more time to participate in leisure activities. Actually, Weddell, Oddy & Jenkins (1980) found that unemployed individuals who had sustained a TBI, had fewer leisure pursuits, were bored and had a higher dependency on their families when compared to controls. Levin, Grossman & Ross (1979) reported that almost 50% of 27 persons with severe TBI had become socially isolated and withdrawn, whereas before their injury they were socially active. Others have also noted a drop in high social activities (activities which contained an inherent social component) especially those activities that required physical exertion and many new high solitary leisure activities (activities performed alone) that did not contain an inherent physical requirement were initiated (Potter, Smith & Finegan, 1994). Similar results were reported by Harwood (1990) who investigated the level of independence during leisure pre and post trauma for adolescents who have sustained a TBI. The results indicate the more dependent adolescents participated in more passive and solitary pursuits during following rehabilitation than did their less dependent peers. Lack of social contacts may be one of the major barriers to leisure activity (Kennedy, Smith & Austin, 1991). Furthermore, fatigue and low endurance commonly experienced by this clientele, may also be a critical factor that influenced their choice of leisure activities.

Benefits of Leisure

Whether or not returning to work or school is possible, leisure interests assume a very important role in the life of a person with TBI. Leisure may provide a mechanism for continuing to make gains in cognitive, physical and psychosocial areas but also creates

opportunities to develop independence and further develop personal interest and talents (Miller & Bria, 1990). Appropriate management of leisure time has been said to "enhances the client's expression, self concept, social interaction skills, and community involvement (Paulsen, 1984)". An investigation conducted by Kinney & Cole (1992) on the perception of life satisfaction among 790 adults with physical disabilities, found that the level of satisfaction attained by the participants in leisure activities was a strong predictor of life satisfaction. Thus, the literature suggests that participation in leisure activities play an important role and may enhance quality of life.

A difficult task for persons who have sustained a TBI is using leisure. There are factors which may contribute to difficulties in pursuing leisure interests and these include impairment of cognitive, behaviour and social skills, physical disabilities, lack of initiative and poor social support (Jacobs, 1989). Furthermore, the inability to generate ideas for leisure involvement and a lack of leisure planning skills may lead to a sedentary lifestyle and impair physical endurance (Howard & Claiman, 1994). Individuals with TBI need to be assisted in developing skills that will enable activities to be planned and carried out as independently as possible. Based on the patients interest, abilities and disabilities the rehabilitation therapist can teach the client the necessary skills and create a leisure plan. The process of making their own choices and planning their activities may help the individual regain control over their life through the use of leisure activities which may represent important first steps in community reintegration (Howard & Claiman, 1994).

1.3 COMMUNITY INTEGRATION QUESTIONNAIRE (CIQ)

1.3.1 Introduction

The Community Integration Questionnaire (CIQ) was developed in 1990 by a group of researchers (Allen, K., Bontkle, C., Haffey, W., Hamilton, B., Jacobs, H., Kay, T., Willer, B., Wood, R., Rempel, M. R. and Wolcott, G.) (see annexe B). The CIQ was originally designed for use with persons who have sustained a TBI and who were included in the model system data base. The model system data base has several participating hospital programs from various regions of the United States which compile the same data on each patient from the point of entry into the program to regular follow-up after discharge from rehabilitation (Thomas, 1988). One purpose for the development of the CIQ was to serve as a principle measure of rehabilitation outcome for the model system. The CIQ was developed as a measure of "reduced handicap" as conceptualized by the WHO. The WHO defined handicap as "... a disadvantage for a given individual, resulting from an impairment or disability, that limits or prevents the fulfilment of a role that is normal (depending on age, sex, social and cultural factors) for that individual".

1.3.2 Description

The CIQ assess three components of community integration: (1) Home integration assess the participation level of the individual in the operation of the home. Participation includes shopping for groceries, preparing meals, doing housework and caring for children (if there are any), (2) Social integration assesses the frequency of participation in activities practised outside the home, including shopping (other than groceries), leisure activities, and

visiting friends. Interpersonal relations such as having a best friend and participating in social activities with friends who are not disabled and (3) Productive activities including employment, educational and volunteer activities and the extent to which the individual gets out of the house during the day.

1.3.3 Scoring Guidelines

Of the 15 items in the CIQ, 12 items are scored on a three point ordinal scale and the remaining three items relating to productive activity are scored on a six point scale. Four scores are produced by this instrument, three subscores corresponding to home integration, social integration and productive activity. The fourth score is obtained by adding the three subscores in order to obtain a total community integration score which ranges from 0-29. A higher score reflects a higher level of community integration (Willer, Ottenbacher & Coad, 1994). Each item in the questionnaire and each item in a subscale contributes equally to the total score (Willer, Rosenthal, Kreutzer, Gordon & Rempel, 1993).

1.3.4 Reliability

1.3.4.1 Internal Consistency

The pilot version of the CIQ was administered to 49 individuals with moderate to severe injury who lived in the community . Sites for pilot tests included the model system at Santa Clara Valley Medical Centre, the model system at the Rehabilitation Institute of Michigan and the University of Buffalo (Willer et al., 1993). The internal consistency was assessed and found to be acceptable. Cronback's alpha coefficient of the overall CIQ was

0.76 (Willer et al., 1993). Cronback's alpha coefficient was also calculated for home integration, social integration and productivity, yielding results of 0.84, 0.73 and 0.35 respectively (Willer et al., 1993).

1.3.4.2 Test-Retest Reliability

A second pilot test of the CIQ was conducted on a sample (n=16; 12♂ and 4♀) of individuals with moderate to severe brain injury and a family member identified by the individual as the "the person who knows the most about their health and social situation". This sample was drawn from the membership list of a head injury association. The individuals with brain injury qualified as having severe brain injury with having been in a coma for a minimum of one week and manifesting at least two weeks of post traumatic amnesia following injury. Both the individual and the family member were assessed twice with an average of ten days between the assessments. The test retest reliability coefficient for the overall CIQ is presented in Table 1.

Table 1: Community Integration Questionnaire Test-Retest Reliability Coefficients

	Individual	**Family Member**
Home Integration	0.93	0.96
Social Integration	0.86	0.90
Productive Activities	0.83	0.97
Total Score	0.91	0.97

1.3.5 Validity

Corrigan and Deming (1995) replicated and extended the Willer et al., (1994) study. Data were collected via the CIQ, from persons who experienced a TBI and from persons with disabilities resulting from conditions other than TBI. These subjects were evaluated three to six months following discharge from inpatient rehabilitation. Their data were evaluated and then compared to the psychometric characteristics originally reported by Willer et al., (1994). The finding from Corrigan and Deming's study were similar to Willer et al.'s findings. Thus, the substantial replication of these findings is an important contribution to the construct validity of the CIQ.

This tool was used in the present study because of its ability to reliably assess community integration and by using the same tool that has been used by several authors , a comparison can be made between the studies. The CIQ was only available in English, thus a french version was created by a professional medical translator. The french version of the questionnaire was later translated back into English by a bilingual person without prior knowledge of the CIQ. The translation was verified and corrections were made on one question.

1.4 THE IMPORTANCE OF PHYSICAL ACTIVITY

1.4.1 Physiological Benefits of Physical Activity

Physical activity is an important aspect of a multidisciplinary rehabilitation program for individuals with TBI. Physical activity participation can help restore the maximum level of function. Sullivan, Richer and Laurent (1990) described the role of exercise in a rehabilitation program for 51 persons with severe TBI and its effects on the individual's autonomy. The unique aspect of the rehabilitation program is that physical therapy and physical activity accounted for 50% of rehabilitation time. The remainder of the program consisted of: occupational and speech therapy; psychological assessment and counselling; vocational and leisure preparation; specialized nursing care and family counselling. The patient's physical deficits and functional performance capacities were evaluated and then the patients were placed in one of six categories depending on their locomotory status (decubitus, wheelchair, walker with assitive device, walker indoors, walker outdoors and jogging/running). The results indicate an increase in functional performance on completion of the rehabilitation program. Eighty-eight percent obtained the status of walker (outdoors) which may be interpreted as an indication that a large percentage of patients, regardless of injury severity, can reach a relatively high level of functional performance.

A well balanced physical activity program includes aerobic muscle-strengthening, muscle-endurance and flexibility activities. One benefit of such a program is improvement in cardiovascular fitness which results from physiological alterations that causes an increase in oxygen delivery to muscle tissue and improved oxygen utilization which in turn causes

lower myocardial work at submaximal physical work loads and an improved maximal physical tolerance. Regular physical activity participation comprised of aerobic and neuromuscular training was shown to increase the maximum rate of oxygen consumption and decrease the index of physiological fatigability (Jankowski & Sullivan,1990). Decreasing fatigue and increasing physical strength allows the client to participate actively in other areas of the rehabilitation program and following rehabilitation, facilitates the accomplishments of activities of daily living. In addition, participation in regular physical activity helps to reduce the incidence of ischemic heart disease (Paffenbarger, Hyde, Wing, & Hsieh, 1986), hypertension (Tipton, 1984), obesity (Brownell & Smoller, 1985), diabetes (Holm & Krotkiewski, 1985), osteoporosis (Chow, Harrison, Sturtridge, Josse et al., 1987) and immune disorders (Keast, Cameron & Morton, 1988).

The clientele should be encouraged to engage in regular physical activity, following the completion of their rehabilitation program, not only to maintain physical health and prevent an early onset of disease but to also benefit from the psychological and social aspects of physical activity. The well structured and supervised physical activity program received during rehabilitation should provide the client with the knowledge and skills necessary to effectively engage in physical activity (Bray, Cartson, Humphrey, Mastrilli & Valko, 1987).

1.4.2 Psychological and Social Benefits of Physical Activity

Leisure and recreation programs are a significant component of community reintegration for individuals with TBI (Fazio & Fralish, 1988; Stumbo & Bloom, 1990; Dryovage & Seidman, 1992), especially if the client remains unemployed for a prolonged period following the injury. Furthermore, several studies suggest that satisfaction derived from leisure activities rather than satisfaction from family, work or financial resources is the main determinant of psychological well-being (Ragheb & Griffith, 1982; Mancini & Orthner, 1980; Beard & Regheb, 1980). Unfortunately, individuals who have sustained a moderate or severe TBI continue experiencing cognitive, behavioural/emotional and physical disabilities for a period of time following rehabilitation. These individuals may experience depression and anxiety due to a loss of function or ability, loss of pre-injury friends leading to a sense of abandonment, loneliness and possibly loss of employment. Several studies have supported the possibility that regular physical activity participation results in a reduction of anxiety and depression (Folkies & Sime, 1981; Mihevic, 1982; Morgan, 1981). A well controlled clinical study regarding the role of exercise in relieving depression was conducted by Griest, Klein, Eishens, Faris, Gurmas & Morgan (1978). Clinically depressed patients were randomly assigned to treatment groups. The results showed that exercise was equally as effective in reducing depression as psychotherapy. The investigators report the effectiveness of exercise in reducing depression is due to its ability to generate a sense of mastery and a new positive self-image. From a physiological perspective, Kostrubala (1977), has suggested that increased blood flow, catecholamines and oxygenation might have a significant influence on the central nervous system, thus causing mood changes which

may help to decrease depression. Another mechanism by which physical activity can decrease depression may result from a psychological process such as distraction or time out of daily stress, increased social interactions, feeling of accomplishment and enhanced self-confidence and self-esteem (Long, 1983;1985).

Physical activity not only helps alleviate depression but can have a positive effect on the self concept of individuals by developing a sense of mastery, a view of the self as productive and enhance body image perception (Berryman, James & Trader, 1991). Furthermore, active participation in physical activity may increase self-esteem, personality, confidence and facilitate social adjustment (Silva & Klatsky, 1984). Fines and Nichols (1994) evaluated the effects of a 12 week kayak program on self-concept, leisure satisfaction and leisure attitude of eight TBI subjects. After a 12 week program which studied the effects of one 60 to 90 minute period of kayaking each week the authors observed an increase in psychological well-being. Specifically, they reported an increase in perception of self in reference to physical appearance, skill, feeling of adequacy and a sense of worth in social interactions. The authors also observed improvements in leisure satisfaction and leisure attitude levels. Regular physical activity provides new opportunities by facilitating social contact (Noreau, 1995), encouraging new friendships, developing a social support network (Shephard, 1991) and can be used as a vehicle for the transmission of knowledge, social values and norms (Wankel & Berger, 1990). Leisure based physical activity may be seen as a significant enabling and supportive medium for enhancing and improving quality of life (Ross, 1983).

The literature demonstrates the possible benefits of actively participating in physical activity but it also demonstrates a change in physical activity patterns, particularly a decrease in the quantity of physical activity performed by children and adolescents with disabilities. Longmuir and Bar-Or (1994) evaluated the activity level of physical activity participation of 987 children and adolescents (6-20 years) with physical disabilities, sensory impairment or chronic illness. Activity level was classified according to the Canada Fitness Survey which defined activity level according to the number of activity bouts (minimum of 15 minute duration) completed per week and the number of months that the activity pattern was maintained each year. Sedentary individuals were deemed to be those who participated less than three bouts/wk for less than nine mth/yr, moderately active people participated more than three bouts/wk for less than nine mth/yr or less than three bouts/wk for more than nine mth/yr and active individuals participated in physical activity more than three bouts/wk for more than nine mth/yr. The interpretation of the results showed that; 39% were active, 32% were moderately active and 29% were sedentary. The proportion of sedentary persons was larger than expected when compered to able-bodied youth (10%). Activity level was influenced by age and a sedentary lifestyle was particularly evident in latter years of the second decade. Rossi & Sullivan (1996) evaluated 19 children with severe TBI, between the ages of eight and seventeen at 4.16 ± 2.61 years following injury. The authors measured the physical fitness and in an informal manner documented the frequency of participation in physical activity both pre and post trauma. They concluded that children with TBI had either diminished or ceased participating in physical activity post trauma.

1.4.3 Relationship Between Physical Activity and Community Reintegration

Research which has assessed the relationship between physical activity and community reintegration is rare. A few studies have evaluated the effects of physical fitness in relation to activities of daily living and social integration. Authors have reported that an increase in physical fitness had a positive impact on the performance of activities of daily living (ADL) in people with spinal cord injuries (Hjeltness & Jansen, 1990; Noreau, Shephard, Simard et al., 1993; Jansen, Van oers & Van der Woude, 1994). A study conducted by Kleiber, Ashton-Shaeffer, Malik, Lee & Hood (1990) describes the impact of a recreation and leisure program on community integration, personal development and adjustment of 145 young adults with disabilities (n=113 persons with mental disabilities; n=16 persons with multiple handicaps; n=16 persons with either physical, emotional or sensory disabilities). The program included sports, health and fitness, the arts, social events and other leisure pursuits. According to the authors, community integration can be accomplished through physical integration which refers to "placement in settings which promote social interaction by being physically accessible and usable, and within close proximity to the general public and other community resources" and social integration which refers to "activity in generic programs and services which facilitate social interaction between individuals regardless of disability or lack of disability". The interpretation of the results showed that physical activity was not significantly correlated to community integration but did suggest that involvement in competitive physical activity seemed to have an impact on improving social interactions at home, establishing friendships, improving

physical conditioning and self-confidence.

Gordon, Sliwinsky, Echo, McLoughlin, Sheerer & Meili (1998) conducted a study to document the physical, cognitive and emotional benefits associated with exercise in persons with TBI who do exercise and those who do not. Persons were classified as "exercisers" if they exercised for at least 30 minutes for three times per week, for the preceding six months. Anyone who exercised less were excluded from the study. The sample comprised of 240 persons with a TBI in which 64 were classified as exercisers and 176 were classified as non exercisers. All the subjects were living in non institutional community setting and were between the ages of 18-65. Severity of injury was based the duration of loss of consciousness (LOC) in which 55.9% of the non exercise group and 76.6% of the exercise group had LOC greater than 24 hours. One of the instruments used to collect the data was the CIQ in order to assess the level of community integration (home integration, social integration, productive activity and total community integration) for exercisers and non exercisers. Data were analysed using chi square procedures and the findings indicated that exercise did not have an effect on home, social and total community integration but found that the exercisers were more productive than the non exercising group. Furthermore, exercise was found to be associated with less impairment, elevated mood, increased perception of health and increased mobility in persons with TBI. The interpretation of the findings suggest that exercise is one of the important elements that may contribute to better community integration and more productive use of time.

1.5 METHODS OF ASSESSING PHYSICAL ACTIVITY

Physical activity can be measured either directly or indirectly and these methods have been summarised by Ainsworth, Montoye & Leon (1994). Physical activity can be assessed directly by measuring different components of fitness such as: (1)morphological fitness (e.g.: body composition and bone strength), (2)musculoskeletal fitness (e.g.: muscle strength endurance and flexibility), (3)motor fitness (e.g.: postural control), (4)cardiovascular fitness (e.g.: maximal aerobic capacity) and (5)metabolic fitness (e.g.: carbohydrate and lipid metabolism).

There are several indirect methods to assess physical activity habits during leisure and work. One method of assessing physical activity is by observing the subject at the moment of physical activity participation or by video-recording the sessions and reviewing the video tapes at a later time. This procedure is costly, time consuming, and obtrusive which may lead to alterations of typical behaviour. Reviewing physical activity records is another method of indirect assessment. These records contain information about the quantity and quality of physical activity patterns during a specific time period (e.g. type, frequency and intensity). This procedure is useful for energy balance studies and can be used as a measure for validating physical activity questionnaires. Questionnaires and interview techniques are popular indirect methods of evaluation. This procedure assesses physical activity behaviour by self report or interviewer-completed evaluations. They provide a large volume of information, are easy to administer and generally do not require much effort or motivation from the participant. Furthermore, it allows for reassessment of

physical activity patterns for varying time frames (e.g.:after one week, one month, one year etc.).

There are several types of questionnaires available but only four will be discussed. The first type is **occupational activity** which focuses on employment that is physical in nature (eg.: construction), thus it does not apply to the majority of the population who work in sedentary occupations. The second type of questionnaire is **global self-assessment** which only documents whether or not individuals regularly perform high intensity physical activity. It does not provide detailed information about physical activity habits or energy expenditure. **Recall** questionnaires evaluate physical activity participation during the previous one to four weeks which collects information about type and quantity of physical activity performed. The main limitation is that the type and amount of physical activity performed during the specific period, may not accurately represent an individual's true year round activity patterns. The fourth type of assessment procedure are **quantitative histories** which documents detailed quantitative and qualitative information about the type, frequency and duration of activities, of a physical nature which take place at work or during leisure. The Campbell survey (Stephens & Craig, 1990) is an example of a quantitative history, it documents physical activity habits and evaluates the association between physical activity and health outcome.

This study employed both the survey questionnaire and the interview technique, together with the quantitative histories in order to measure physical activity, which was

assessed by using the Campbell survey. The Campbell survey employs the quantitative history technique, but was administered during a semi-structured interview. This questionnaire was specifically designed to assess a wide range of physical activity attributes and has been administered to large samples of adults and children with or without disabilities. This tool was adopted in order to help identify factors that effect physical activity, enabling the present study to describe a physical activity profile of individuals with TBI. Also, another survey "Profil du Loisir" was chosen because it was specifically designed for this cliental and it evaluates a wide spectrum of variables (physical, cognitive, behavioural and environmental) that may act as barriers towards leisure participation which may help explain the variability and tendencies found among the subjects.

1.6 THE WELL BEING OF CANADIANS:THE 1988 CAMPBELL SURVEY

1.6.1 Introduction

The Campbell survey was developed in 1988, as a follow-up study to the Canada Fitness survey (CFS) which was developed in 1981. The CFS was administered to 15,519 Canadians and their primary objective was to collect reliable data on the physical condition and lifestyle of Canadians. The data collected by the CFS was used to increase the population's knowledge on the benefits of physical activity and lead to the creation of appropriate physical activity programs. The Campbell survey was developed in order to: (a)verify the data collected by the CFS, (b)evaluate the influence of exercise on health, (c)to study the evolution of the degree of physical activity participation between 1981 and 1988, and (d)to document the reasons for initiating physical activity and possible barriers towards

physical activity participation.

1.6.2 Description

The Campbell Survey form consists of two sections, the Standardized Test of Fitness (STF) and a questionnaire. The STF measures several aspects of performance such as: muscular strength and endurance, cardiovascular fitness and collects anthropometric data. The questionnaire collected information concerning health, life style and physical activity habits, attitudes, knowledge and motivation. The information obtained enabled investigators to assess the participant's degree of physical activity which was defined by one the following criteria: (a)total energy expenditure which is the total number of kilocalorie expended while participating in recreational activities during a 12 month period, calculated per kilogram of body weight, and (b)frequency, intensity, and duration of exercise. Evaluation of the any of the above criteria allowed persons to be classified as physically active, moderately active or sedentary. For convenience, the classification system used in the present study was based on frequency and duration of participation and physically "active" persons were those who engage in physical activity more than three times per week for more than nine months of the year, "moderately active" persons engage in physical activity either for more than three times per week for less than nine months of the year or for less than three times per week for more than nine months of the year, and "sedentary" persons engage in physical activity for less than three times per week for less than nine months of the year. Only the questionnaire portion was used for the current study.

1.6.3 Reliability

The Campbell Survey used the same instruments as was used in the Canada Fitness Survey except that the questionnaire was modified. Certain questions were revised and others were added to obtain greater detail on certain aspects. The entire questionnaire underwent a pilot test in order to confirm the comprehension and its reliability. The questionnaire was distributed twice, to 200 individuals within a three week interval. The individuals were asked to comment on how easy it was to fill out and to understand. The results obtained from the pilot test were concordant during the three week interval (the level of correspondence varied from 73% to 83% and the Kramer correlation coefficient varied between 0.53 and 0.83) (Stephens & Craig, 1990). Correlation coefficient varied from 0.78 to 0.85 for the number of times an activity was practised during a given month. The questionnaire was revised according to the results obtained from the pilot test.

1.7 "PROFIL DU LOISIR"

1.7.1 Introduction

The "Profil du Loisir" was developed by Dutil & Forget in 1991, in order to assesses the leisure profile of individuals who have acquired a brain injury. This is one of the instruments developed from a larger project called Project Trauma, where a group of researchers received a mandate to develop evaluation instruments capable of objectively measuring the limitations and residual capacities of persons subsequent to a TBI. Furthermore, these instruments must be able to measure progress during recuperation, readaptation and reintegration into society (Dutil, 1991). The conceptual framework of

"Profil du Losir" is based on the CQICIDH and the concept of leisure was operationalized based on the concepts developed by Dumazedier (1962) whom defined leisure as: a group of activities that an individual willingly engages in after taking care of their professional, family or social responsibilities, either to relax, to enjoy themselves, to increase their knowledge on a subject of interest, or to develop their creative capacity.

1.7.2 Description

The "Profil du Loisir" was divided in two sections. The first section consists of a list of leisure activities which are classified according to Dumazedier leisure classification system. The five categories are: artistic, intellectual, manual, physical, and social. This section assesses activities of interest and actually practice, degree of interest and frequency of participation in leisure activities pre and post brain injury. The second section consists of a list of statements which allows for the documentation of attitudes, behaviours and difficulties related to leisure activities pre and post brain injury. Specifically, the variables assessed are physical, motor, sensory and psychological disabilities, social and ecological barriers, and their effect on leisure activities. Furthermore, these variables are scored on a nominal or ordinal scale. For the purpose of this study only the second section of the instrument was used.

1.7.3 Reliability

The test-retest reliability was determined by administering the questionnaire to ten persons with a brain injury, on two different occasions with one week interval in between (Gagne 1994). Each section of the questionnaire was administered in the same order and at the same time of day on both occasions. Analysis of the results was limited to data collected from several randomly chosen question concerning the person's leisure profile post injury. The results indicate a good test-retest reliability (48% of the kappa coefficients ranged from perfect to good, 44% ranged from moderate to acceptable, and only 8% were weak). The section that assess difficulties towards physical activity performed during leisure was used in the present study, obtained a score between moderate and perfect (0.43 - 1.00).

1.7.4 Content Validity

Content validity was verified by administering the questionnaire to health professionals (leisure technicians, occupational therapists, and special educators). Their suggestions and comments were included to create version 2.0 which was re-evaluated by Gagne (1994). The content validity was found to be satisfactory according to the theoretical (conceptual model, items, scoring scale and interpretation of data) and practical aspect (scoring sheet, materials used and instruction manual) of the instrument.

1.8 IDENTIFICATION OF THE PROBLEM

Physical activity can provide many benefits and play an important role in the life of a person who has sustained a TBI. In spite of this, the literature indicates a change in the type and frequency of physical activities performed post injury. Authors have reported a decrease in physical activity participation and an increase passive and solitary pursuits (Harwood, 1990; Longmuir and Bar-Or, 1994; Rossi & Sullivan, 1996). The literature also suggests that there is a tendency for physical activity participation to decrease in the latter years of the second decade in the general population. Does this mean that adults with TBI are even less physically active? This is a cause for serious concern because it increases the possibility of social isolation and the potential long-term health consequences.

There is a need for further investigation concerning physical activity patterns of adults with TBI and to determine which barriers are inhibiting further participation. With this knowledge, rehabilitation therapists can work with the client to create and implement an active recreation plan so they can enjoy the benefits that physical activity has to offer.

The literature has suggested that regular physical activity participation may provide many possible benefits such as: help increase self-concept and self-esteem, alleviate depression, decrease fatigue, prevent the early onset of disease, increase physical work capacity possibly facilitating return to work, and increase the opportunity for social interaction. However, little research has been conducted to help determine the tendency of physical activity of persons with TBI and it's influence on community reintegration. Also,

another important concept that has been recently receiving more attention is community integration. Considering the importance of both community integration and physical activity, there are few studies that have assessed the relationship between two variables. Due to the benefits of physical activity, it may be of interest to investigate if persons with TBI, who regularly participate in physical activity are better integrated in the community.

1.9 PURPOSE OF THE PILOT STUDY

The following short term objectives were established in order to conduct this pilot study:

1. The primary objective of the pilot study was to identify some factors that could possibly effect physical activity in an attempt to describe the physical activity profile of adults with TBI.
2. The secondary objective was to document the level of community integration in the home, social and productive domain, in order to examine whether relationships exist between physical activity and community integration in this group of individuals.

This preliminary analysis can serve to generate future research studies.

MANUSCRIPT

TOWARDS THE COMMUNITY REINTEGRATION OF INDIVIDUALS WHO HAVE SUSTAINED A TRAUMATIC BRAIN INJURY: A PHYSICAL ACTIVITY PROFILE - A Pilot Study

Concetta Pantalena B.Sc.[1-2]

S. John Sullivan Ph.D. [3]

Elisabeth Dutil M.Sc., O.T. (C)[1-2]

AUTHORS AFFILIATIONS

1. École de Réadaptation, Faculté de Médecine, Université de Montréal.

2. Centre de Recherche, Institut de Réadaptation de Montréal.

3. School of Physiotherapy, Division of Health Science, University of Otago, Dunedin, New Zealand.

Address reprint requests and correspondence:

S. John Sullivan Ph.D.

School of Physiotherapy, Division of Health Science

University of Otago, P.O. Box 56, Dundin, New Zealand

Tel: 64 3 479 7902

Fax: 64 3 479 7184

E-mail: jsullivan@gandalf.otago.ac.nz

Data obtained in the present research have previously been presented in part at the 12th International Congress of the World Federation of Occupational Therapists and at the 1st congress of the Quebec Provincial Rehabilitation Research Network.

ABSTRACT

Objective: The primary objective of the pilot study was to identify some factors that could possibly effect physical activity and explain their variability in an attempt to describe the physical activity profile of adults with TBI. The secondary objective was to determine if there was a relationship between the degree of community reintegration and the level of physical activity participation.

Design: This study consisted of a single interview session where the participants completed three questionnaires: Community Integration Questionnaire, the Campbell Survey and the "Profil du Loisir" to assess, community integration, physical activity patterns, and barriers towards physical activity.

Setting: All subjects were recruited from among the former clients of a rehabilitation centre who's primary goal for each client is to develop optimal community reintegration.

Subjects: A convenience sample of 13 subjects, 8 males and 5 females between 21-55 years of age volunteered to participate. All participants had a diagnosis of a moderate or severe ($\bar{x}$=6.15 ± 2.54 on the Glasgow Coma Scale) traumatic brain injury and were interviewed at 5.50 ± 1.94 years after the injury.

Results: The majority enjoyed an active or a moderately active lifestyle but participated uniquely in solitary type physical activities. Age, time since injury and length of community integration were significantly related to physical activity. The main barriers towards physical activity participation as reported by the subjects were difficulties with; manual dexterity, equilibrium, fatigue and personal discipline. No relation was found between the level of physical activity participation and the four aspects of community integration (home

integration, social integration, productive activity and total community integration).

Conclusion: Even several years post injury this clientele has not obtained optimal community reintegration. Rehabilitation specialists may need to follow this clientele post integration to help them deal with problems as they arise in society to ensure optimal community reintegration. Furthermore, therapists should systematically integrate physical activity early in the rehabilitation program to help maximize function. Further research is needed to assess the possible relationship between physical activity, health and overall quality of life.

Key Words: Brain Injury, Physical Activity, Community Reintegration

INTRODUCTION

Traumatic brain injury (TBI) may cause temporary or permanent physical, cognitive and behavioural impairments and disabilities. The combination of impairments and/or disabilities together with environmental factors can create handicap situations [1] which can greatly impact on successful community reintegration and overall quality of life. Optimal community integration is an effective role performance in the community settings and has been viewed as the converse of handicap [2]. One of the primary goals of rehabilitation is to ensure that the individual acquires the necessary skills and the level of independence to assure optimal community reintegration. In spite of a good prognosis for the recovery of most physical and some cognitive functions, re-establishment of community integration skills usually remain poor in TBI [3].

Physical activity can play an important role in a multidisciplinary rehabilitation program for individuals who have sustained a TBI. The basic purpose of physical activity is to enhance the quality of life by reducing the period of convalescence, improving physical work capacity by decreasing fatigability [4] and providing a means of social and recreational activities [5]. Reduced physical work capacity and fatigue are important and common problems for this clientele [6] even several years post-injury [7,8]. Reduced physical work capacity may be a limiting factor in performing activities of daily living, work, leisure and active recreational activities, influencing quality of life. Regular physical activity participation may help reduce the incidence and consequences of ischemic heart disease [9], hypertension [10], obesity [11], diabetes [12], osteoporosis [13] and immune disorders [14].

Furthermore, regular physical activity participation may also aid in the establishment of psychological factors such as self-concept, self-esteem, body image, social adjustment [15] reduction of anxiety and depression [16-18]. For persons with TBI who fatigue easily, the stress created by prolonged activity can cause cognitive breakdowns (such as inattention to the task at hand), physical complaints, irritability and interpersonal problems [19].

Several studies have investigated physical activity in persons with a TBI. Specifically studies have evaluated it's rehabilitative effect [4, 20-24], others have investigated its physical [4, 25, 26] and cognitive [27] benefits. Physical activity can be measured either directly or indirectly. Some authors have evaluated it directly by measuring different components of fitness such as musculoskeletal and cardiovascular fitness [4]. Others have assessed physical activity indirectly via interviews, questionnaires and by obtaining information about the quality and quantity of physical activity patterns [28, 29, 30]. Collectively, these studies suggest that physical activity has a positive influence on health but indicate an increase in sedentary lifestyle for children and adolescents with a TBI. The lack of participation in physical activity and the increase in solitary leisure based activities is a serious public health concern due to the social isolation that can occur and the potential long-term health consequences.

Several authors have assessed community integration in persons with TBI that ranges from three months [2] to an average of 5 [31] and 13 years post injury [32]. Others have compared the level of community integration in persons with TBI to non disabled

population and found that individuals without a disability experienced higher levels of community integration than did individuals with TBI as assessed by the CIQ [2, 3, 33, 34]. Little has been documented on the effects of physical activity on enabling community reintegration in TBI. A recent study by Gordon et al., [34] compared the level of community integration between individual with TBI and persons without a disability who do or do not exercise. The results revealed that exercise was related to community integration for persons with TBI. Further assessment needs to be done to obtain a more complete physical activity profile in order to gain an appreciation of the knowledge, attitudes, and barriers towards physical activity and to determine the possible influence of physical activity on community reintegration .

The purpose of this pilot study was two fold. The primary objective of the pilot study was to identify some factors that could possibly effect physical activity and explain their variability in an attempt to describe the physical activity profile of adults with TBI. The secondary objective was to determine if there was a relationship between the degree of community reintegration and the level of physical activity participation.

METHODS

Subjects

Thirteen persons (8 men, 5 women) with TBI were recruited from a single metropolitan rehabilitation centre. Persons were admitted to this centre at the later stages of rehabilitation, about 10 months after they had sustained a severe brain injury. The

primary objective of this centre is to offer rehabilitation services, to establish environmental support in order to enhance work and social reintegration, and ultimately assist the individual to reestablish their place in society. Inclusion criteria were: (1) severe (Glasgow Coma Score (GCS) 3 - 7) or moderate TBI (GCS 8 -12); (2) have completed a formalized rehabilitation program in which a physical conditioning program was an integral aspect of rehabilitation; (3) minimum one year post rehabilitation; (4) at least 18 years of age; (5) ability to express themselves verbally or in written form. Subjects were excluded if they had been living in the community for less than one year post discharge from the centre and if they were unable to return to the centre in order to participate in the study. The characteristics of the subjects are reported in Table 1.

Instruments

Three questionnaires: (1)the Campbell Survey [35], (2)the "Profil du Loisir" [36] and (3)the Community Integration Questionnaire [3] were used to obtain data on physical activity patterns, limitations towards physical activity participation and level of community reintegration, respectively.

1. Campbell Survey

The Campbell Survey was developed in 1988, as a follow-up study to the Canada Fitness survey [35]. The survey consists a the Standardized Test of Fitness and a Questionnaire. Only the questionnaire portion was used in this study to help collect information concerning: the frequency of physical activity participation, the type of physical

activity practised, the location and with whom the subjects participated in physical activities, barriers towards physical activities, knowledge concerning the benefits of physical activity and to compare the level of physical activity pre and post injury. This information enables investigators to assess the participant's degree of physical activity and classify the participants as being physically "active", "moderately active" or "sedentary" by evaluating the frequency of physical activity participation. Physically active persons were defined as those who engage in physical activity more than three times per week for greater than nine months per year. Moderately active persons engage in physical activity for more than three time per week for less than nine months per year or for less than three times per week for greater than nine months per year and. Sedentary person engage in physical activity for less than three times per week for less than nine months per year.

Test-retest reliability obtained over a three week interval demonstrated a level of correspondence that varied from 73% to 83% and the Kramer correlation coefficient varied between 0.53 to 0.83 [35].

2. "Profil du Loisir"

The "Profil du Loisir" was developed to assesses the leisure profile of individuals who have acquired a brain injury [36, 37]. The conceptual framework is based on the International Classification of Impairments, Disabilities, and Handicap (ICIDH) developed by Wood and subsequently modified by the Canadien Society and Quebec Committee [1]. The concept of leisure employed in the "Profil du Loisir" was operationalized based on the

concepts developed by Dumazedier [38], who defined leisure as: "a group of activities that an individual willingly engages in after taking care of their professional, family or social responsibilities, either to relax, to enjoy themselves, to increase their knowledge on a subject of interest, or to develop their creative capacity."

This instrument is divided in two sections: the first section documents activities of interest, activities actually practiced, degree of interest and frequency of participation in artistic, intellectual, manual, physical, and social leisure activities pre and post brain injury. The second section consists of a list of statements which allows the documentation of attitudes, behaviours and difficulties related to leisure activities. Specifically, the presence of physical, motor, sensory and psychological disabilities; social, and ecological barriers and their effect on leisure were assessed. Variables are scored on a nominal or ordinal scale. For the purpose of this study only the second section of the instrument was used to assess barriers towards physical activity performed during leisure. Test-retest reliability, inter rater reliability and content validity appears to be adequate [36, 39, 40] and the construct validity is currently being evaluated.

3. Community Integration Questionnaire

The Community Integration Questionnaire (CIQ) was developed to assess the level of community integration of persons who have sustained a TBI [3]. It has also been described as a measure of reduced handicap which was defined as a disadvantage for a given individual, resulting from an impairment or a disability, that limits or prevents fulfilment of

a role that is normal (depending on age, sex, and social and cultural factors) for that individual [41]. The CIQ yields a total score as well as scores for the three components related to; home integration, social integration and productive activity. Home integration assess the level of independence the individual demonstrates in the operation of the home including; shopping for groceries, preparing meals, doing house work and caring for children. Social integration assesses the frequency of participation in activities practiced outside the home, including shopping, leisure activities, and visiting friends. Interpersonal relations such as having a best friend and participating in social activities with friends who are not disabled were also evaluated. Productive activities include employment, educational and volunteer activities and the extent to which the individual gets out of the home during the day. The CIQ is a 15 item scale with the total community integration score representing the summation of the three subscores: home integration, social integration and productive activity is scored on 10, 12 and 7 respectively. Of the 15 items in the CIQ, 12 items are scored on a three point ordinal scale and the remaining three items related to productive activity are scored on a six point scale. The total community integration score ranges from 0-29 and a higher score reflects a greater level of community integration and a lower score reflects less integration [33]. Evidence for the reliability and validity appears to be adequate [3, 33, 42].

Procedure

The study received ethical approval from the institution where the study was conducted and informed consent was obtained from all subjects. Data were collected on

one occasion only at the rehabilitation centre in a calm, distraction free environment and were obtained by administering the three questionnaires in the same order, during a semi-structured interview, with a five minute break between each questionnaire. Due to a severe memory problem, the mother of one subject was contacted in order to verify the data. Each evaluation was performed and scored by the same evaluator (C.P.).

Descriptive statistics were calculated for the following variables: (a) demographic data such as: age, Glasgow coma scale (GCS), time since injury, coma duration, length of rehabilitation, time since discharge from rehabilitation, (b) variables from the Campbell questionnaire such as: type and frequency of physical activity, location of participation and the person who usually engages in physical activity with the client, knowledge concerning the benefits of physical activity, and some barriers towards physical activity, c) variables from the "Profile du Loisir": such as barriers limiting physical activity participation and (d) variables from the CIQ: home integration, social integration, productive activities and total community integration. Spearman rho correlations were performed to determine the relationship between community integration and the level of physical activity. The Kruskal-Wallis test was used to compare the difference between all three groups (sedentary, moderately active and active subjects). The Mann-Whitney was used to compare the difference between two groups, moderately active and active subjects vs sedentary and moderately active and sedentary vs active subjects.

RESULTS

Physical Activity Profile

The results describing physical activity profile post-injury are shown in Table 2. The degree of physical activity was classified according to the Campbell Survey and were the following: five persons were classified as sedentary (less than three bouts/wk for less than nine mths/year), three persons were classified as moderately active (less than three bouts/wk for more than nine mths/years or more than three bouts /wk for less than nine mths/years), and the remaining five persons were classified as active (more than three bouts/wk for more than nine mths/year).

The age of the sample ranged from 23 to 55 years and sedentary subjects appear to be older than active and moderately active subjects. Women appeared to be under represented in the active group and had a tendency to be older than men.

Most of the subjects have family members and/or friends who regularly engage in physical activity. Most of the active (4/5) and all of the moderately active subjects receive encouragement to participate in regular physical activity mostly, from parents, other family members and some friends. Some sedentary subjects (3/5) received encouragement from their children. Even though, the subjects had support from their family and friends, all the subjects participated only in solitary type physical activity. The most popular activities were: biking, physical conditioning, swimming, gardening and skiing. Half of the active and moderately active subjects participated regularly in physical activity at their former

rehabilitation centre, whereas others participated either outside or at a public physical conditioning centre, without specialized equipment. The majority of the subjects, independent of their physical activity classification level, engaged in physical activities by themselves.

The correlations between demographic data and physical activity are shown in Table 3. Age was significantly related to physical activity when the three groups (sedentary, moderately active and active) were compared and when moderately active and active subjects were combined together and compared to sedentary subjects. Sedentary subjects were older than the more physically active subjects. Time since injury and time since discharge from rehabilitation were also significantly related to physical activity level and were greater for active subjects compared to sedentary and moderately active subjects.

The knowledge concerning the benefits of regular physical activity participation were similar between sedentary, moderately active and active subjects (Table 4). All subjects believed it was important to engage in regular physical activity and believed that it could improve/maintain their physical fitness, muscle strength and endurance. Independent of physical activity level, the subjects were not as aware of the possible positive influence of regular physical activity on cognitive abilities, social relations and behavioural abilities such as: regular physical activity can help them to feel better mentally, get together with other people and to have fun. Even though, the subjects were knowledgable concerning some of the benefits of regular physical activity participation, the majority (n=10) reported a

decrease in physical activity participation level post-injury when compared to pre-injury levels. The remaining three subjects reported either no change (n=1) or an increase in physical activity level post-injury (n=2).

Difficulties towards physical activity participation are shown in Table 5. Among the difficulties identified by the subjects, the primary obstacles that limited physical activity participation, independent of their physical activity classification level, were fatigue, manual dexterity, equilibrium, personal discipline, shyness/uneasiness, fear of getting hurt and vision. The majority of the subjects did not require any technical aid such as a cane or a brace to accomplish physical activity. Memory, concentration, organisation, communication, a partner and financial situation were not reported frequently by the subjects as barriers towards physical activity.

In order to identify the limiting factors for physical activity, correlation coefficients (Spearman Rho) between activity levels and levels of limitations were performed. The following limitations affected only sedentary and moderately active subjects: fatigue ($r = .70$; $p < .007$), easily getting out of breath ($r = .58$; $p < .039$), difficulty walking ($r = .56$; $p < .048$) and winter climate ($r = .71$; $p < .006$). Fatigue was assessed by both the "Profil du Loisir" and the Campbell Survey and the results in the two evaluation procedures were significantly related ($r = .73$; $p < .004$).

Level of Community Integration

The level of community integration of physically active, moderately active and sedentary persons is presented in Figure 1. The mean scores of community reintegration for the sample were 6.24 ± 2.53 on the home dimension, 8.23 ± 1.92 on the social dimension, 2.15 ± 0.55 on the productive dimension and 16.67 ± 3.34 for total community integration as measured by the CIQ. According to the physical activity level, there was no difference between sedentary, moderately active and active individuals for home ($\bar{x}$=5.05 ± 3.60; $\bar{x}$=6.83 ±1.14; $\bar{x}$=6.90 ± 1.85, respectfully) and social integration ($\bar{x}$=8.00 ± 2.55; $\bar{x}$=9.33 ± 1.53; $\bar{x}$=7.80 ± 1.48, respectfully). Productive activity was relatively poor among the subjects, no subjects were engaged in competitive employment and none were attending school or looking for work. Only a few subjects regularly participated in volunteer work, 15.38% (7.69% sedentary and 7.69% physically active) participating 5 or more times per month and 7.69% of physically active subjects participated 1-4 times per month. Total community integration was assessed by combining the three subdivisions listed above. The interpretation of the results indicate that there is no difference among sedentary ($\bar{x}$=15.24 ± 4.30), moderately active ($\bar{x}$=17.83 ± 1.61) and active subjects ($\bar{x}$=17.40 ± 3.26).

The correlation coefficients among community reintegration and physical activity are illustrated in Table 7. The analysis of the results showed no significance between physical activity and the four aspects of community integration (home integration, social integration, productive activity and total community integration). The Mann-Whitney and the Kruskal-Wallis tests demonstrated no significance between the three physical activity groups

(sedentary, moderately active and active), when sedentary and moderately active subjects were combined and compared to active subjects and when moderately active and active subjects were combined and compared to sedentary subjects.

The individual items used to assess home integration, social integration and productive activity are illustrated in Table 6. The following items were used to assess home integration. Over half of the subjects (69.23%) ran errands independently. Most subjects prepared meals independently (46.15%) or with some assistance (46.15%). The question on child care only applied to three subjects since they were the only people who had children under the age of 18. Two people needed assistance and one person had someone else take care of their child. Most subjects did housework and planned social arrangements either independently (46.15%) or with assistance (30.76%). Three male subjects (23.07%) had other people perform housework and social planning activities for them.

The individual items used to assess social integration were: personal finances, frequency of shopping, frequency of leisure participation, frequency of visiting friends and/or family and having a best friend. The majority (76.92%) of the subjects took care of their personal finances either alone or with someone else's help. Over half went shopping 1- 4 times per month and 30.76% went shopping five or more times per month whereas, one sedentary person never went shopping. Forty-six percent of the subjects engaged in leisure activities and visited friends and/or family 1-4 times per month and 46.15% participated five or more times per month. One sedentary person (7.69%) never participated in leisure

activities or visited friends and/or family. The majority (84.61%) had a best friend with whom they could confide in.

Several factors that limited further physical activity participation, as reported by the subjects, were also related to the community integration items as assessed by the CIQ. The following factors were found to affect home integration. Severity of injury, demographic and physical variables such as: duration of coma (r= .69; p= .010), time since discharge from rehabilitation (r= .69; p= .008), time since injury (r= .75; p= .003) and vision (r= -.55; p= .049) were significantly related to the home integration item "planning social arrangements". Difficulties with equilibrium (r= .60; p= .029), manual dexterity (r= .83; p= .000) and lack of initiative (r= -.66; p= .014) were significantly related to the ability to do housework.

Physical, behavioural and cognitive factors were significantly related to several social integration items. Difficulties with vision was significantly related to "handling personal finances" (r= .55; p= .048) whereas, fatigue (r= -.65; p= .017), difficulty walking (r= -.62; p= .025), feeling scared or anxious (r= -.76; p= .033) and the tendency to avoid meeting other people (r= -.59; p= .033) were significantly related to "frequency of shopping". Lack of personal discipline (r= -.73; p= .005) and difficulties with organisation (r= .58; p= .040) were significantly related to "frequency of leisure activity participation".

Problems with speaking and self expression was the only factor that was significantly related to total community integration (r= .58; p= .036). Age was not significantly related

to any of the four aspects of community integration (home integration, social integration, productive activity and total community integration).

DISCUSSION

Emphasis, often has been placed on documenting the benefits of exercise. Less is known about the physical activity profile and factors that limit physical activity in individuals with TBI. Men appeared to be more physically active than woman when comparing the active and sedentary subjects. Age was significantly related to physical activity level, but generally the women were older than the men. Older subjects had a tendency to be less physically active than younger subjects and also reported a greater number of barriers which limited further physical activity participation. Only sedentary and moderately active subjects reported that fatigue, easily getting out of breath, difficulty walking, and winter climate impaired further participation. None of the active subjects reported fatigue or getting out of breath as a barrier to physical activity which supports the results of Jankowski and Sullivan (1990) who reported an increase resistance to fatigue after persons with TBI participated in an exercise training program [4]. Whether, these subjects originally experienced less fatigue therefore were capable of participating in more physical activity or due to physical activity resistance to fatigue was increased was, not evaluated and merits further investigation.

From the subjects point of view behavioural and cognitive disabilities were not considered to be major difficulties towards further participation. Memory and concentration

problems were not frequently reported as limiting factors. This may be due to the type of physical activity regularly practised by the subjects which may require less cognitive and behavioural skills compared to other physical activity. On the other hand, it has been reported that a common problem for this clientele is that they may not be fully aware of their deficits [43] and this may be another explanation why these problems were not frequently reported.

The majority of persons with TBI reported a decrease in physical activity participation post-injury compared to pre-injury levels even though the majority received encouragement from their parents and/or other family members. This decrease in participation may be due to fatigue which was significantly related to physical activity. Other factors such as: manual dexterity, equilibrium, personal discipline, shyness and uneasiness were not significantly related to physical activity but were frequently reported by the subjects as limitations to further participation which may also help explain this decrease in participation. The latter difficulties may possibly make it difficult to interact with others and establish friendships. Harwood [30] stated that diminished social skills and limited physical abilities were listed most often as barriers to recreational involvement. This may be a reason why the majority of the sample (10/13) engage in physical activity alone. Furthermore, when asked if lack of a partner was a limitation six subjects said "yes", whereas one subject stated that lack of a partner was not a limitation because they would simply engage in physical activity that they could do on their own, thus compensating for their reduced social network.

In the analysis of the Community Integration Questionnaire (CIQ), the four CIQ scores (home integration, social integration, productive activity and total community integration score) were low. Several authors have documented the level of community integration of individuals with TBI as assessed by the CIQ and others have also compared those results to non disabled populations. Heinemann and Whiteneck [31] evaluated 758 individuals with TBI and reported similar findings except that home integration scores were lower (4.8 ± 3.2) when compared to the present study (6.24 ± 2.51). The study conducted by Burleigh et al. [32] with 30 individuals with severe TBI between 21-60 years old, obtained similar scores except productivity scores were higher in Burleigh et al.'s study [32]. Other studies that have used the CIQ have reported lower levels of community integration for persons with TBI when compared to individuals without disabilities [3, 33, 34].

In the analysis of the Community Integration Questionnaire (CIQ), physical activity was not related to any of the four CIQ scores (home integration, social integration, productive activity and total community integration score). One recent study by Gordon et al. [34] has also assessed the possible relationship between physical activity and community integration. This study reported similar findings when assessing the effects of exercise on community integration with the CIQ in 240 individuals with TBI (64 exercisers and 174 non exercisers) with the exception of exercise being significantly related to productivity. The present study did not find a significant correlation between physical activity and productivity most probably because of the small sample size and that all the

subjects were unemployed and not looking for work. Even though, the correlation between physical activity and the community integration was not significant, other studies [4, 34] indicate a positive relationship between the effects of physical activity and productivity, this possible relationship merits further investigation.

More specifically, the CIQ scores obtained by the sedentary subjects (home integration: 5.05 ± 3.60, social integration: 8.00 ± 2.55, productive activity: 2.20 ± 0.45 and total community integration: 15.24 ± 4.30) were similar to the scores obtained by individuals with TBI who did not exercise in Gordon et al's study [34] (home integration: 5.22 ± 3.69, social integration: 6.50 ± 2.0, productive activity: 3.66 ± 1.75 and total community integration: 15.38 ± 5.01). The CIQ scores obtained by the active and the moderately active subjects combined, for home (6.93 ± 1.54) and social integration (8.38 ± 1.60) were higher than the scores obtained by individuals with TBI who exercised for at least 30 minutes, three times per week for at least six months (home integration: 5.30 ± 3.26 and social integration: 6.79 ± 1.84). The active and moderately active subjects may have received higher scores probably because more time could be dedicated towards home and social activities since all the subjects were unemployed.

The findings of this pilot study help to illustrate the physical activity and community integration profile of individuals with TBI. The interpretation and generalization of the results should be done with caution due to the small sample size in each physical activity category and the non random selection of the sample. Furthermore, all the subjects of the

study had received rehabilitation services and may not be representative of all persons with TBI who did or did not receive the benefits of rehabilitation. In addition, the time since injury was not the same for each subject and all the subjects were unemployed.

Future research should include both employed and unemployed persons who have or have not been exposed to physical activity during rehabilitation and use control groups (TBI vs non disabled) in order to better assess the role of physical activity. The inclusion of a standard fitness test will compliment the information obtained in the Campbell survey better illustrating their physical activity profile.

The CIQ gives a global assessment of community integration and therefore should not be the only instrument used. It evaluates if the client performs specific activities independently, with assistance or not at all and the frequency of participation but it does not evaluate the quality of interaction nor the level of life satisfaction. Furthermore, since the items are scored on an ordinal scale, it is difficult to interpret if there is a significant difference between the scores obtained among the sample.

Even several years post-injury, a large proportion of individuals who have sustained a TBI, continue to experience situations of "handicap" in the domains assessed by the CIQ, which indicates that this clientele needs assistance and support to ensure that progress continues and that they are becoming better integrated into the community as time progresses. Since a majority of persons who sustain a severe TBI remain unemployed [8,

44, 45], rehabilitation specialists should focus on the development of skills for the pursuit of social, leisure and physical recreational activities.

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Table 1: Characteristics of Sample (n=13)

Variables	Mean	Standard deviation	Range	Number of subjects	Percentage (%)
Age	34.85	10.79	21-55		
- 20-30				5	38.46
- 31-40				3	23.07
- 41-50				4	30.76
- 51-55				1	7.69
Gender					
- male				8	61.53
- female				5	38.46
Education					
- elementary				1	7.69
- high school				2	15.38
- high school (not completed)				3	23.08
- college				3	23.08
- university				2	15.38
- missing data				2	15.38
Living Situation					
- live alone				7	53.85
- live with parents				3	23.08
- live with significant other				2	15.38
- live with their children				1	7.69
Severity					
- coma (days)	24.83	24.81	1 - 90		
- post traumatic amnesia- PTA (days)	75.75	56.52	14 - 183		
- Glasgow Coma Scale/15	6.15	2.54	4 - 11		
- length of rehabilitation at the Centre (years)	1.70	0.63	0.88 - 3.41		
- time since injury (years)	5.50	1.49	3.16 - 9.70		

✶ Coma: information was not available for 1 subject

✦ PTA: information was not available for 4 subjects

✧ Length of rehabilitation: duration of rehabilitation in the particular centre

Table 2: Physical Activity Profiles (n=13)

Level of PA	Age (yrs)	Gender	Type of PA	Area of Participation✦	Participation (with whom)
sedentary	55	female	swimming	home	alone
sedentary	48	female	nil	commercial areas	friends
sedentary	46	male	biking, gardening, dancing	outside*	alone
sedentary	42	male	swimming, bowling	outside*	son/friends
sedentary	31	male	nil	outside*	alone
moderate	42	female	physical conditioning	former rehabilitation centre	alone
moderate	21	female	walking, biking, skiing, baseball, bowling	outside*	sister/friends
moderate	27	male	physical conditioning, snow shoeing	former rehabilitation centre	alone
active	35	female	biking, swimming, physical conditioning, hiking	former rehabilitation centre, outside*	alone
active	32	male	physical conditioning, biking, skiing	commercial physical conditioning centre	alone
active	26	male	physical conditioning, exercise at home, biking, swimming	commercial physical conditioning centre	alone
active	25	male	walking, biking, skating swimming, gardening, golf, dancing	outside*	alone
active	23	male	physical conditioning, exercise at home, biking, swimming, gardening	former rehabilitation centre	alone

* outside without specialized equipment

✦ area of participation: the area where they engaged in physical activity most often

Table 3: Relationship Between Demographic Data and Physical Activity Level

Variables	Sedentary		Moderate		Active		Sedentary/Moderates/ Actives✣	Sedentary and Moderates vs Active ✧	Moderates and Actives vs Sedentary★
	$\bar{x}$	range	$\bar{x}$	range	$\bar{x}$	range			
Age	44.40	31-55	30.00	21-42	28.20	23-35	.0532*	.1069	.0156*
Glasgow Coma Scale	6.80	4-10	7.67	5-11	4.80	4-6	.2532	.1549	.8223
Length of Coma (days)	12.25	2-21	16.67	1-42	39.80	12-90	.3998	.1871	.5576
Community Re-entry (years)	1.88	1.03-3.26	2.40	1.11-4.17	4.18	2.58-5.40	.0486*	.0192*	.0404*
Length of Rehabilitation (years)	1.38	0.88-1.80	1.77	1.50-2.20	2.02	1.30-3.40	.3401	.3785	.1421
Time After Injury (years)	4.27	3.16-5.55	4.88	3.75-6.84	7.09	4.70-9.70	.0600	.0192*	.0790

* $p \leq 0.05$

✣ Comparison between three groups: (Kruskal-Wallis)
group 1: sedentary
group 2: moderately active
group 3: active subjects

✧ Comparison between two groups: (Mann-Whitney)
group 1: sedentary and moderately active subjects
group 2: active subjects

★Comparison between two groups: (Mann-Whitney)
group 1: moderately active and active subjects
group 2: sedentary subjects

Table 4: Knowledge About the Benefits of Regular Physical Activity Participation

Physical Activity Benefits	Sedentary (n=5)	Moderate (n=3)	Active (n=5)	Total (%)
- believe it is important to engage regularly in physical activity	5	3	5	100
- greatly * or moderately ✝ improve/ maintain physical fitness	5	3	5	100
- greatly or moderately improve/ maintain muscle strength and endurance	5	3	5	100
- greatly or moderately help maintain or lose weight	4	3	5	92.30
- greatly or moderately helps them to feel better physically	4	3	5	92.30
- greatly or moderately improve/ maintain cardiovascular fitness	4	2	5	84.61
- greatly or moderately improve/ maintain flexibility	5	2	4	84.61
- greatly or moderately helps get them together with other people	5	2	3	76.92
- greatly or moderately helps them to have fun	4	2	4	76.92
- greatly or moderately helps them to feel better mentally	4	1	4	69.23

The effects of physical activity on the variables listed above were scored on a scale of one to five
*Greatly: a score of 4 or 5
✝Moderately: a score of 3

Table 5 : Main Difficulties That Limit Physical Activity as Perceived by the Client ("Profil du Loisir" and the Campbell Questionnaire) and it's Correlation to Physical Activity Level

Difficulties	Sedentary (n=5)	Moderately Active (n=3)	Active (n=5)	Total (n=13)	Total (%)	Physical Activity Level Spearman Rho Correlation (p values)
Physical and Psychological						
manual dexterity	3	2	2	7	53.84	-.1054 (.732)
equilibrium	4	2	1	7	53.84	.1684 (.582)
fatigue	4	3	0	7	53.84	.7037 (.007)*
personal discipline	3	1	3	7	53.84	-.0745 (.804)
shyness/uneasiness	3	2	1	6	46.15	-.3597 (.227)
fear of getting hurt	3	1	1	5	38.46	-.4038 (.171)
vision	2	1	2	5	38.46	.2417 (.426)
walking	2	2	0	4	30.76	.5579 (.048)*
easily gets out of breath	2	1	0	3	23.07	.5774 (.039)*
concentration	1	1	1	3	23.07	-.2122 (.486)
technical aid(e.g. cane)	2	0	0	2	15.38	.1006 (.744)
organization	1	0	1	2	15.38	.3085 (.305)
memory	1	1	0	2	15.38	-.1168 (.704)
angers quickly	0	1	1	2	15.38	.3110 (.301)
Communication						
speaking/expressing oneself	0	2	0	2	15.38	.3892 (.189)
Environmental Factors						
- Physical						
winter climate	3	2	0	5	38.46	.7115 (.006)*
money	2	0	0	2	15.38	.5318 (.061)
- Social						
partner	1	0	2	3	23.07	-.1483 (.629)

*$p \leq 0.05$

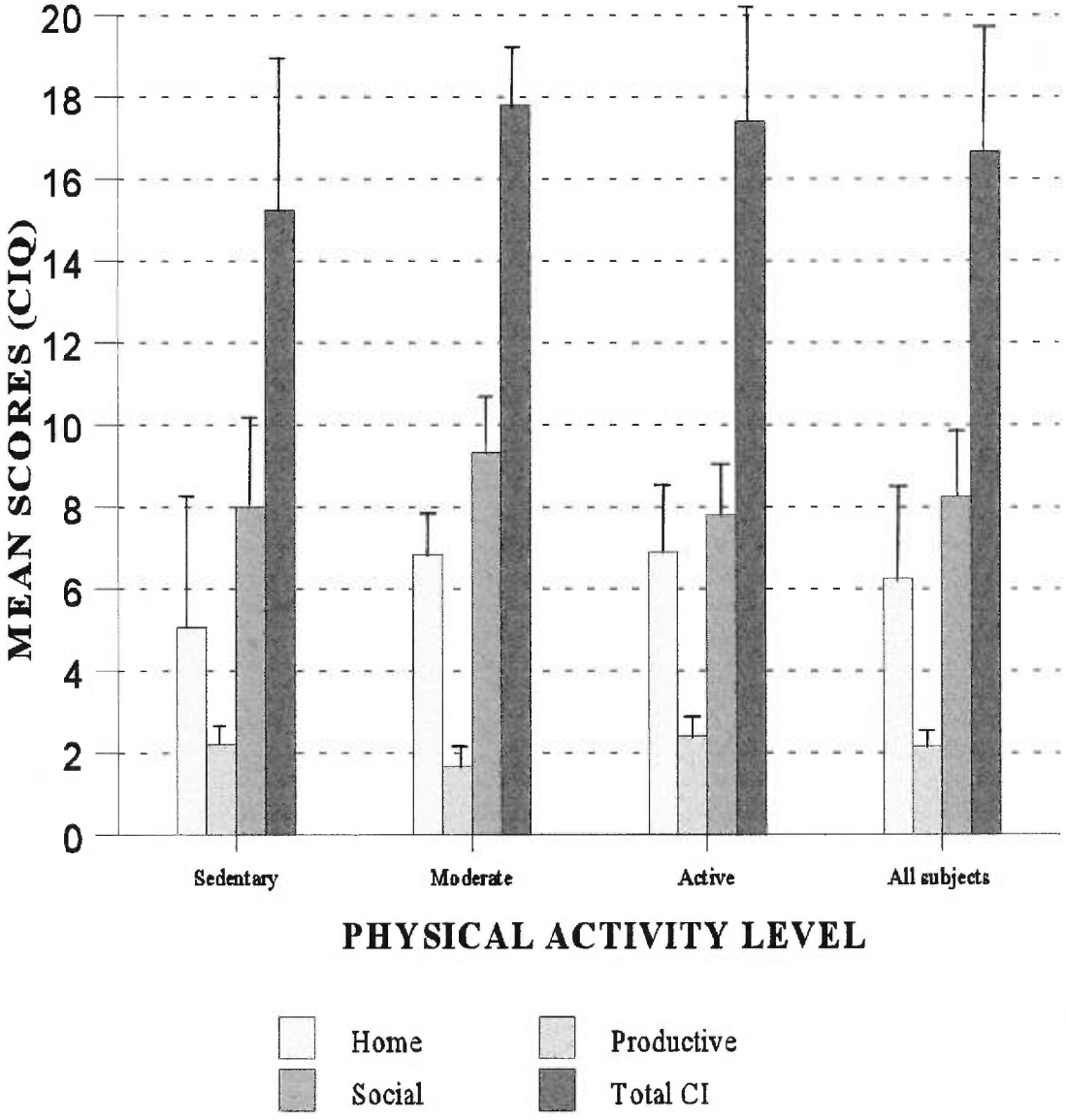

Figure 1: Community Integration and Physical Activity Level

Table 6: Community Integration Level as Assessed by the CIQ

	Sedentary (n=5)	Moderate (n=3)	Active (n=5)	Total % (n=13)
HOME INTEGRATION				
- Running errands				
performed alone	2	3	4	69.23
performed with others	2	0	1	23.07
performed by others	1	0	0	7.69
- Meal preparation				
performed alone	2	2	2	46.15
performed with others	2	1	3	46.15
performed by others	1	0	0	7.69
- Housework				
performed alone	2	1	3	46.15
performed with others	1	2	1	30.76
performed by others	2	0	1	23.07
- Chid care *				
performed alone	-	-	-	0.00
performed with others	1	1	-	15.38
performed by others	1	-	-	7.69
- Planning social arrangements				
performed alone	2	1	3	46.15
performed with others	1	1	2	30.76
performed by others	2	1	0	23.07
SOCIAL INTEGRATION				
- Personal finances				
performed alone or with others	5	2	3	76.92
performed by others	0	1	2	23.07
- Frequency of shopping (times/mth)				
never	1	0	0	7.69
1 - 4	2	1	5	61.53
5 +	2	2	0	30.76
- Frequency of leisure activities (times/mth)				
never	1	0	0	7.69
1 - 4	3	1	2	46.15
5 +	1	2	3	46.15
- Frequency of visiting friends (times/mth)				
never	1	0	0	7.69
1 - 4	1	2	3	46.15
5 +	3	1	2	46.15
- Persons with whom they usually participate in leisure activities				
mostly alone	2	1	3	46.15
friends with a TBI or combination of friends and family	1	0	0	7.69
friends with out TBI or combination of friends and family	2	2	2	46.15
- A best friend with whom to confide in				
yes	4	3	4	84.61
no	1	0	1	15.38
PRODUCTIVE ACTIVITIES				
- Frequency of going out				
almost every day	5	2	5	92.30
almost every week	0	1	0	7.69
- Unemployed and not looking for work	5	3	5	100.00
- Not attending school	5	3	5	100.00
- Volunteer Work	1	0	2	23.07

* Only three subjects had children under the age of seventeen

Table 7: Spearman Rho Correlation Coefficients Among Physical Activity and Community Reintegration

Variable	Spearman Rho (p values)
Home Integration	.2622 (0.387)
- Running errands	.4041 (0.171)
- Meal preparation	.0913 (0.767)
- Housework eg cleaning	.2142 (0.482)
- Child care	.0121 (0.969)
- Planning social arrangements	.3024 (0.315)
Social Integration	.0716 (0.816)
- Personal finances	.2697 (0.373)
- Frequency of shopping	.2041 (0.504)
- Frequency of leisure activity participation	.4043 (0.171)
- Frequency of visiting friends	.0652 (0.832)
- Persons with whom they usually participate in leisure activities	.0000 (1.000)
- Best friend to confide in	.0000 (1.000)
Productive Activity	.1732 (0.571)
- Frequency of going out	.0000 (1.000)
- Unemployed and not looking for work	———
- Not attending school	———
- Volunteer work	.1748 (0.568)
Total Community Integration	.1406 (0.647)

3.1 DISCUSSION

The objective of this pilot study was to describe the physical activity profile, the level of community reintegration and to assess the possible relationship between the two variables. The majority of the subjects reported a decrease in physical activity participation post-injury and regularly engaged in solitary type physical activity. The main barriers towards physical activity were difficulties with manual dexterity, equilibrium, fatigue and personal discipline. The low community integration scores obtained by this sample were similar to scores obtained in other studies which used the CIQ to assess the level of community integration of individuals with TBI, except that productivity scores were lower in the present study. The findings demonstrated that physical activity was not significantly related to the four aspects of community integration (home integration, social integration, productive activity and total community integration) as assessed by the CIQ. Many of the results in this pilot study are interesting and many aspects could help in the planning of future research in this area.

3.1.1 Physical Activity and Demographic Variables

Gender was not significantly related to physical activity although we observed that more men (4/5) were physically active than women (1/5). The women in this study were older than the than men and age was significantly related to physical activity. Older subjects were less physically active than younger subjects and reported more barriers which limited further physical activity participation. Furthermore, time after injury and the time since discharge from a rehabilitation centre was significantly related to physical activity. The

length of time after injury and time since discharge from rehabilitation was less for sedentary and moderately active subjects when compared to active subjects. Possibly sedentary and moderately active subjects have not yet adjusted to their disability.

3.1.2 Frequency and Type of Physical Activity

The majority of the subjects reported a decrease in participation level post-injury, even though, most subjects received encouragement to engage in physical activity, mostly from their parents and other family members. The reduction in physical activity may be due to physical, cognitive and behavioural disabilities. Several subjects have reported that the feeling of shyness/uneasiness and lack of a partner limited the degree of physical activity participation. Some subjects stated that lack of a partner was not a limiting factor because they would simply engage in physical activity that they could do on their own, thus most probably compensating for their reduced social network. This may help explain why the subjects participate uniquely in solitary type physical activity. It has been established in the literature that as time progress individuals with TBI may experience social isolation partially due to a loss of pre-injury friends (Oddy & Humphrey, 1980; Thomsen, 1974; 1984; Oddy et al., 1985; Weddell et al., 1980). The feeling of shyness and uneasiness may also explain why some subjects return to their rehabilitation centre to participate in physical activity. They returned to the centre because they claim that it feels like home.

3.1.3 Barriers Towards Physical Activity

Fatigue, easily getting out of breath, difficulty walking and winter climate were significantly related to reduced physical activity and they were reported by sedentary and moderately active subjects. For people who have difficulty walking, winter climate may be a deterrent due to the ice and snow which make walking more difficult and increase the possibility of falling and injuring themselves. Some subjects also listed fear of getting hurt as a barrier towards participation. None of the active subjects reported fatigue or getting out of breath as a barrier to physical activity which supports the results of Jankowski and Sullivan (1990) who noted an increase resistance to fatigue after persons with TBI participated in an exercise training program. The question arises as to whether, the subjects originally experienced less fatigue and therefore were capable of participating in more physical activity or due to their increased participation in physical activity simply increased their resistance to fatigue. The latter was not evaluated and merits further investigation.

From the subject's point of view, cognitive and behavioural disabilities were not considered to be major difficulties towards physical activity participation. This may be due to the type of physical activity regularly practised by the subject which requires less cognitive and behavioural skills compared to other types of physical activity. However, it has been reported that a common problem for this clientele is that they may not be fully aware of their cognitive deficits (Prigatano et al., 1986).

3.1.4 Effects of Demographic Data on Community Integration

Gender, age and years after injury were not significantly related to the four aspects of community integration (home integration, social integration, productive activity and total community integration) as assessed by the CIQ. Other studies have assessed community integration of individuals who have sustained a TBI by using the CIQ and have reported that: younger respondents experienced less handicap in social and productive realms (Heinemann & Whiteneck, 1995); women obtained significantly higher scores than men on the home (Heinemann et al., 1995; Willer et al., 1993) and social domain (Heinemann et al., 1995); and as years after injury increased, total community and social integration decreased (Burleigh, Faber and Gillard, 1998). The results obtained in the present study were not significant however, women had a tendency to be more independent in the home compared to men. Perhaps, the results obtained were not similar to those reported in other studies because there was not an equal number of men and women and the sample size was too small.

3.1.5 Home, Social and Productive Integration

A few studies that have used the CIQ have reported lower levels of community integration for persons with TBI when compared to individuals without disabilities (Gordon et al.,1998; Willer et al.,1993, 1994). The scores obtained in the present study were similar to those reported by other authors who have also used the CIQ to evaluate community integration (Burleigh et al., 1997; Corrigan et al., 1995; Heinemann et al., 1995) . Specifically, the score obtained for home integration ($\bar{x}$=6.24 ± 2.53) was similar to the

findings reported by Burleigh et al. (1997), who assessed community integration in 30 persons with TBI at an average of 13 years post-injury and they obtained a score of $\bar{x}$=6.43 ± 2.94. Corrigan et al. (1995) also measured community integration in 46 persons with TBI at three months post-injury and they obtained a score of $\bar{x}$=5.16 ± 3.34. Heinemann et al. (1995), who assessed 758 persons with TBI at an average of 5.4 years post-injury reported a slightly lower score ($\bar{x}$=4.80 ± 3.20) than obtained in the present study.

The score obtained for social integration ($\bar{x}$=8.23 ± 1.92) appeared slightly higher than reported in Burleigh et al. (1997) ($\bar{x}$=7.57 ± 2.11), Corrigan et al. (1995) ($\bar{x}$=6.80 ± 2.01) and Heinemann et al. (1995) ($\bar{x}$=7.60 ± 2.70) but is within one standard deviation of those distributions.

The productive activity score ($\bar{x}$=2.15 ± 0.55) was lower than reported by Burleigh et al. (1997) (=4.03 ± 1.40) and Heinemann et al. (1995) ($\bar{x}$=3.90 ± 1.80) but similar to Corrigan et al. (1995) ($\bar{x}$=2.00 ± 1.93) . Probably due to the small sample size, 100% of the subjects were unemployed which explains the low score obtained by this sample. In addition, several authors found a low return to work rate among persons with TBI (Brooks et al., 1987; Dawson et al., 1995; McMordie et al., 1990). The subjects in the present study might have obtained higher home and social integration scores probably because more time could be dedicated towards home and social activities since all the subjects were unemployed.

3.1.6 Relationship Between Physical Activity and Community Integration

Physical activity was not significantly related to any of the four CIQ scores (home integration, social integration, productive activity and total community integration score). Similar findings were reported by Gordon et al. (1998) when assessing the effects of exercise on community integration with the CIQ in 240 individuals with TBI (64 exercisers and 174 non exercisers). The exception to this general observation was that exercise was significantly related to productivity. The present study found no correlation between physical activity and productivity simply because all the subjects were unemployed and not currently seeking work. Possibly, no correlation was found between physical activity and community integration because the tools used were not sensitive enough. On the other hand, the Campbell Survey was sensitive enough to observe a correlation between physical activity with age, time since injury and time since discharge from rehabilitation. So, if there is a correlation between physical activity and community integration, this relationship is probably not as strong as the relationship to age, time since injury and time since discharge from rehabilitation.

3.2 LIMITATIONS OF THE STUDY

The interpretation and generalization of the results should be done with caution due to the small sample size in each physical activity category and the non random selection of the sample. Furthermore, the sample had received rehabilitation services and may not be representative of all persons with TBI who did or did not receive the benefits of rehabilitation. Also, physical activity was an integral part of their rehabilitation but the quantity of exposure was not measured. In addition, the time since injury was not the same for the subjects originally selected in the study and all the subjects were unemployed. Data were obtained by self-report only, with one exception, the subject had severe memory problems therefore the mother was contacted. Due to problems of self awareness commonly reported in the literature, the participants may have over or underestimated their abilities/disabilities. Nevertheless, the clients perception is equally important and should be valued and excepted.

Another limitation was that physical activity patterns prior to the injury were not assessed. The subjects were only asked if there was any change in participation level. Physical fitness was not measured directly, only the frequency and duration of physical activity was documented. Furthermore, whether fatigue was experienced due to physical and/or mental effort was not distinguished. Further research needs to be conducted in order to assess the possible influence of physical activity on mental fatigue for this clientele.

Community integration is a complex interactive process and using only the CIQ as a measure of community reintegration may not be sufficient. CIQ provides an indication of community integration outcome by offering a total score but it does not define if the client is poorly, adequately or well integrated. This is left to the user and only by comparison to other studies may provide some guidelines to help interpret the results. Furthermore, it only evaluates whether a limited amount of activities are performed independently, or with assistance, the frequency of engaging in particular activities, but not, the quality of the work being performed . The CIQ does not assess the level of life satisfaction of the client and the satisfaction of their immediate surrounding such as family and friends. To gain an appreciation of the level of community reintegration, it is essential to determine what is important to the client and their significant others, what they perceive to be essential for community integration and to assess the quality of interaction between the client and the environment.

3.3 IMPACT OF THE STUDY

While studies documented the important benefits of physical activity for individuals with TBI only a limited number have documented a detailed profile of the physical activity habits of adults who have sustained a TBI. This study presents their physical activity profile by describing the frequency of participation, type of activity, with who and where they participate in physical activity, their support system, their perception of exercise benefits and physical, cognitive behavioural and environmental difficulties that may limit participation. This information can be used to identify areas of difficulties so that proper services and interventions can be developed in order to facilitate physical activity participation and thus experience the range of benefits that physical activity has to offer.

Community integration was generally assessed by using the CIQ five and half years after injury and the findings suggest some individuals are still experiencing some difficulties limiting community integration. There may be a need for ongoing community based support to facilitate their community integration.

3.4 DIRECTION OF RESEARCH

In order to obtain a more complete profile and to understand the effects of TBI on physical activity, a future study should include two groups (TBI vs non disabled) and document physical activity patterns prior to injury. In addition to documenting the type and frequency of physical activity the intensity of the exercise should also be assessed because it is an important variable in improving physical condition. Physical conditioning is improved by placing the body under a greater than normal workload, or overload, until it adapts to this new level. Overload can be increased by manipulating combinations of frequency, intensity, time and type of activity. Physical fitness should also be measured to compliment the data obtained by the Campbell survey or similar instruments and to verify that the individuals who reported being more physically active are "fitter" than less active individuals.

An assessment of whether regular physical activity participation has an impact on mental fatigue either directly or if increasing the index of physiological fatigue has an impact on mental fatigue is an important question that should be addressed due to the common cognitive problems often experienced by this clientele which may limit participation in several activities of daily living. Furthermore, a long term follow-up should be conducted to compare if persons with TBI who regularly participate in physical activity are healthier, visit physicians less frequently, thus reducing the cost of medical care and have a higher level of life satisfaction than those who do not participate in regular physical activity.

Future research should re-examine whether a positive relationship exists between physical activity and community integration by using a tool which assesses community integration in greater detail than the CIQ. Furthermore, the positive relationship found between the effects of physical activity and productivity as reported in other studies (Jankowski et al., 1990; Gordon et al., 1998) merits further investigation since productivity is an important part of community integration and is a common area of difficulty for this clientele. Future research should also, examine the influence of: demographic data (age, gender, level of education, time since injury and severity of injury), psychosocial variables (adjustment before injury, acceptance of disability and perceived control) and environmental factors (degree of support provided family, friends, employers and the community; physical, social policy and attitudinal barriers; comprehensive rehabilitation and support services for persons with TBI) on physical activity and community integration.

3.5 CONCLUSION

The majority of the subjects reported a decrease in physical activity participation post-injury and engaged uniquely in solitary type physical activity which was partly due to a diminishing social network. Our study helped to identify the limiting factors towards further physical activity participation such as: fatigue, easily out of breath, difficulty walking ans winter climate. The findings also indicated that clients may be experiencing some difficulties with certain aspects of community reintegration even several years after injury. Thus there is a need for ongoing community based support and assistance in dealing with problems as they are experienced after returning to the community. Since the majority of persons who have sustained a severe TBI do not return to employment, one of the essential goals of treatment would be to focus on the development of skills for the pursuit of social, leisure and recreational activities during and after rehabilitation. Even though physical activity was not significantly related to community integration, individuals with TBI should still be encouraged to participate in physical activity so they can experience the physical and psychological benefits which may ultimately help to increase their quality of life.

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ANNEXES

ANNEXE A

Consent form

Centre de Réadaptation Lucie Bruneau

Formulaire de Consentement en Connaissance de Cause

Titre: "LE PROFIL D'ACTIVITÉ PHYSIQUE CHEZ LES PERSONNES AYANT SUBI UN TRAUMATISME CRANIO-ENCÉPHALIQUE"

Les responsables sont Concetta Pantalena, B.Sc. et S. John Sullivan, Ph.D.

Nature du Projet de recherche:

Cette étude vise à documenter le profil d'activité physique et le niveau d'intégration dans la communauté chez les personnes ayant subi un traumatisme cranioencéphalique (TCE). Cette information sera recueillie pendant un entrevue avec la personne TCE par l'administration des sections sélectionnées des trois outils: 1) l'enquête Campbell, 2) le Profil du Loisir, 3) l'enquête d'Intégration Communautaire. Les sujets passeront l'entrevue qui durera environ une heure et demie, à une seule occasion. L'information obtenue pendant l'entrevue sera utilisée pour développer un modèle théorique qui décrira le rôle que l'activité physique joue dans la réintégration communautaire.

Consentement du sujet:

Par la présente, je soussigné(e) _____ (nom du sujet) accepte de participer au projet de recherche ci-haut mentionné. Je reconnais avoir été informé(e) de façon satisfaisante sur la nature de ma participation au projet qui est brièvement décrit ci-dessus.

J'accepte que l'information recueillie puisse être utilisée pour fins de communications scientifiques et professionnelles et il est entendu que l'anonymat sera respecté à mon égard.

Pour la durée de l'étude, je permets aux chercheurs associés au projet de consulter mon **Dossier Médical**.

Il est aussi entendu que je peux me retirer en tout temps du projet en avisant le responsable, sans aucune conséquence.

Je permets que l'enquêteuse communique avec un ami(e)(s) et/ou un membre de ma famille qui connaît mieux mon profil d'activité physique et d'intégration communautaire.

Je suis conscient(e) que ces évaluations ne constituent pas un traitement.

Les responsables du projet s'engagent à faire approuver par le comité d'éthique toute modification significative du projet.

Date

Nom du responsable
du projet

Nom du bénéficiaire

Signature du responsable
du projet

Signature du bénéficiaire
ou du respondant

Nom du témoin

Signature du témoin

Pour plus d'information, contacter:
Connie Pantalena
a/s, Eric Le Bouthillier
Centre de Réadaptation Lucie Bruneau
Tél.: (514) 527-4527

ANNEXE B

Instruments

COMMUNITY INTEGRATION QUESTIONNAIRE

1. **Who usually does shopping for groceries or other necessities in your household?**

   ☐ yourself alone

   ☐ yourself and someone else

   ☐ someone else

2. **Who usually prepares meals in your household?**

   ☐ yourself alone

   ☐ yourself and someone else

   ☐ someone else

3. **In your home, who usually does normal everyday housework?**

   ☐ yourself alone

   ☐ yourself and someone else

   ☐ someone else

4. **Who usually cares for the children in your home?**

   ☐ yourself alone

   ☐ yourself and someone else

   ☐ someone else

   ☐ not applicable/no children under 17 in the home

Willer, B., Rosenthal, M., Kreutzer, J.S., Gordon, W.A. and Rempel, R.: Assessment of community integration following rehabilitation for traumatic brain injury. Journal of head Trauma rehabilitation, 8(2): 75-87, 1993.

5. **Who usually plans social arrangements such as get-togethers with family and friends?**

- ☐ yourself alone
- ☐ yourself and someone else
- ☐ someone else

6. **Who usually looks after your personal finances, such as banking or paying bills?**

- ☐ yourself alone
- ☐ yourself and someone else
- ☐ someone else

Can you tell me approximately how many times a month you now usually participate in the following activities outside your home?

7. **Shopping**

☐ Never ☐ 1 - 4 times ☐ 5 or more

8. **Leisure activities such as movies, sports, restaurants, etc.**

☐ Never ☐ 1 - 4 times ☐ 5 or more

9. **Visiting friends or relatives**

☐ Never ☐ 1 - 4 times ☐ 5 or more

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10. **When you participate in leisure activities, do you usually do this alone or with others?**

- ☐ mostly alone
- ☐ mostly with friends who have head injuries
- ☐ mostly with family members
- ☐ mostly with friends who do not have head injuries
- ☐ with a combination of family and friends

11. Do you have a best friend with whom you confide?

- ☐ yes
- ☐ no

12. How often do you travel outside the home?

- ☐ almost every day
- ☐ almost every week
- ☐ seldom/never (less than once per week)

13. Please choose the answer below that best corresponds to your current (during the past month) work situation:

- ☐ full-time (more than 20 hours per week)
- ☐ part-time (less than or equal to 20 hours per week)
- ☐ not working, but actively looking for work
- ☐ not working, not looking for work
- ☐ not applicable, retired due to age

14. Please choose the answer below that best corresponds to your current (during the past month) school or training program situation:

- ☐ full-time
- ☐ part-time
- ☐ not attending school or training program

15. In the past month, how often did you engage in volunteer activities?

- ☐ never
- ☐ 1 - 4 times
- ☐ 5 or more

QUESTIONNAIRE CONCERNANT L'INTÉGRATION À LA COMMUNAUTÉ

1. **Qui fait habituellement les courses (épicerie et autres) chez vous?**

   ☐ vous-même, seul

   ☐ vous et quelqu'un d'autre

   ☐ quelqu'un d'autre

2. **Qui prépare les repas chez vous?**

   ☐ vous-même, seul

   ☐ vous et quelqu'un d'autre

   ☐ quelqu'un d'autre

3. **Qui fait habituellement le ménage quotidien chez vous?**

   ☐ vous-même, seul

   ☐ vous et quelqu'un d'autre

   ☐ quelqu'un d'autre

4. **Qui s'occupe des enfants chez vous?**

   ☐ vous-même, seul

   ☐ vous et quelqu'un d'autre

   ☐ quelqu'un d'autre

French version translated by Lyliane Poitevin B.Sc., M.A. traduction, Traductrice médicale

5. **Qui planifie habituellement les activités sociales comme les petites réunions en famille ou avec des amis?**

☐ vous-même, seul

☐ vous et quelqu'un d'autre

☐ quelqu'un d'autre

6. **Qui s'occupe habituellement de vos finances; par exemple, qui va à la banque ou qui paie vos factures?**

☐ vous-même, seul

☐ vous et quelqu'un d'autre

☐ quelqu'un d'autre

Pourriez-vous me dire combien de fois par mois vous participez maintenant de manière régulière aux activités suivantes en dehors de chez vous?

7. **Faire les courses**

☐ Jamais ☐ 1 à 4 fois ☐ 5 et plus

8. **Loisirs (cinéma, sport, restaurant, etc.)**

☐ Jamais ☐ 1 à 4 fois ☐ 5 et plus

9. **Rendre visite à des amis où à la famille**

☐ Jamais ☐ 1 à 4 fois ☐ 5 et plus

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10. **Quand vous prenez part à des activités de loisirs, participez-vous seul ou avec d'autres personnes?**

☐ seul, la plupart du temps

☐ la plupart du temps avec des amis qui souffrent de blessures à la tête

☐ la plupart du temps avec des membres de la famille

☐ la plupart du temps avec des amis qui ne souffrent pas de blessures à la tête

☐ en compagnie d'amis et des membres de la famille

11. Avez-vous un ami à qui vous pouvez vous confier?

- ☐ oui
- ☐ non

12. Combien de fois sortez-vous de chez vous?

- ☐ presque tous les jours
- ☐ presque toutes les semaines
- ☐ rarement ou jamais (moins d'une fois par semaine)

13. Veuillez choisir une des réponses suivantes qui s'applique le mieux à votre situation actuelle (au cours du dernier mois) par rapport à l'emploi:

- ☐ plein temps (plus de 20 heures par semaine)
- ☐ temps partiel (égal ou inférieur à 20 heures par semaine)
- ☐ sans emploi, mais recherche activement du travail
- ☐ sans emploi, ne recherche pas du travail
- ☐ retraité

14. Veuillez choisir une des réponses suivantes qui s'applique le mieux à votre situation actuelle (au cours du dernier mois) par rapport à l'école ou à un programme d'apprentissage:

- ☐ plein temps
- ☐ temps partiel
- ☐ n'est pas à l'école ou en apprentissage

15. Au cours du dernier mois, combien de fois avez-vous fait du travail bénévole?

- ☐ jamais
- ☐ 1 à 4 fois
- ☐ 5 et plus

PROFIL DU LOISIR (partie II)

Difficultés reliées au loisir

-Pour chacun des énoncés suivants, indiquer si vous éprouvez la difficulté qu'il représente. Si oui, dire si cette difficulté vous limite dans vos activités physiques.

	DIFFICULTÉS	PRÉSENCE	EFFET SUR LE LOISIR
1.	Je m'essouffle facilement.	0 1 6	0 1 6 9
2.	Je me fatigue facilement.	0 1 6	0 1 6 9
3.	Mon médecin ne veux pas que je pratique certaines activités.	0 1 6	0 1 6 9
4.	J'ai des problèmes de vision.	0 1 6	0 1 6 9
5.	J'ai des problèmes d'audition.	0 1 6	0 1 6 9
6.	J'ai de la difficulté à parler et à m'exprimer.	0 1 6	0 1 6 9
7.	J'ai des problèmes d'équilibre.	0 1 6	0 1 6 9
8.	J'ai de la difficulté à marcher ou à me déplacer en fauteuil roulant.	0 1 6	0 1 6 9
9.	J'ai des problèmes de dextérité manuelle.	0 1 6	0 1 6 9
10.	Je dois utiliser des appareils spécialisés (ex. orthèse d'écriture, lève-personne, prothèses, etc.).	0 1 6	0 1 6 9
11.	J'ai un problème de concentration.	0 1 6	0 1 6 9
12.	J'ai des problèmes de mémoire.	0 1 6	0 1 6 9
13.	J'ai de la difficulté à m'organiser (ex. je n'ai pas d'idée, je n'avise pas les gens au bon moment, je ne m'assure pas d'avoir l'aide, les services ou le temps requis, je ne fais pas ou je fais mal les démarches nécessaires, etc.).	0 1 6	0 1 6 9
14.	J'ai tendance à éviter de rencontrer des gens (ex. j'ai peur d'être jugé, ridiculisé, incompris, rejeté, etc.).	0 1 6	0 1 6 9
15.	J'ai de la difficulté à prendre l'initiative de mes activités (ex. quelqu'un décide pour moi ou m'encourage à les pratiquer, etc.).	0 1 6	0 1 6 9
16.	J'ai tendance à me fâcher facilement.	0 1 6	0 1 6 9
		0 = non, je n'éprouve pas cette difficulté 1 = oui, j'éprouve cette difficulté 6 = je ne sais pas	0 = non, cette difficulté ne me limite pas 1 = oui, cette difficulté me limite 6 = je ne sais pas 9 = non évalué, la difficulté n'est pas présente

Extrait de: Dutil, E. et Forget, A.: Profil du Loisir, Version I. Montréal: Centre de recherche de L'Institut de réadaptation de Montréal, 1991.

	DIFFICULTÉS (suite)	PRÉSENCE	EFFET SUR LE LOISIR
17.	J'ai tendance à avoir peur ou à être anxieux (ex. peur de sortir seul, de tomber et de conduire, etc.).	0 1 6	0 1 6 9
18.	Je n'ai pas assez d'argent pour les activités que j'aime.	0 1 6	0 1 6 9
19.	Je n'ai personne avec qui pratiquer des activités que j'aime.	0 1 6	0 1 6 9
20.	L'inquiétude ou le manque de confiance de mes proches face à mes capacités m'empêchent de faire ce que je veux.	0 1 6	0 1 6 9
21.	Des barrières architecturales à l'intérieur de mon domicile m'empêchent de pratiquer certaines activités chez moi.	0 1 6	0 1 6 9
22.	Des barrières architecturales chez-moi m'empêchent de sortir pour certains activités (ex. escaliers extérieurs, largeur du hall d'entrée, etc.).	0 1 6	0 1 6 9
23.	Des barrière architecturales, terrains, surfaces irrégulières ou escarpées, trottoirs, etc. me limitent dans mes activités.	0 1 6	0 1 6 9
24.	Je n'ai pas de moyen de transport ou je dépend des personnes de mon entourage pour mes déplacements.	0 1 6	0 1 6 9
25.	Les programmes de loisir qui m'intéressent ne sont pas offerts dans mon entourage.	0 1 6	0 1 6 9
26.	Les programmes de loisir adaptés ne me sont pas accessibles (ex. absence d'équipement spécialisé, barrières architecturales, transport adapté, etc.).	0 1 6	0 1 6 9
27.	Le climat hivernal limite la pratique de certaines de mes activités.	0 1 6	0 1 6 9
28.	Autres (précisez)	0 1 6	0 1 6 9
		0 = non, je n'éprouve pas cette difficulté 1 = oui, j'éprouve cette difficulté 6 = je ne sais pas	0 = non, cette difficulté ne me limite pas 1 = oui, cette difficulté me limite 6 = je ne sais pas 9 = non évalué, la difficulté n'est pas présente

L'ENQUÊTE CAMPBELL

VOTRE MODE DE VIE

1. Au cours d'une semaine ordinaire, combien d'heures consacrez-vous aux activités suivantes?

	heures par semaine					
	0	1 - 2	3 - 4	5 - 9	10 - 14	15 ou plus
regarder la télévision	☐	☐	☐	☐	☐	☐
lire	☐	☐	☐	☐	☐	☐
se livrer, généralement seul, à des travaux d'artisanat ou à un passe-temps	☐	☐	☐	☐	☐	☐
rendre visite à des parents	☐	☐	☐	☐	☐	☐
rendre visite à des amis	☐	☐	☐	☐	☐	☐
assister à des événements culturels (représentations musicales ou pièces de théâtre, par exemple)	☐	☐	☐	☐	☐	☐
organiser ou diriger des programmes d'activités physiques ou sportives en tant que bénévole	☐	☐	☐	☐	☐	☐
s'occuper de groupes religieux ou d'activités paroissiales	☐	☐	☐	☐	☐	☐
s'occuper d'organismes philanthropiques ou de bénévolat, tel que ceux des auxiliaires hospitaliers, les clubs comme les Chevaliers de Colomb, les Richelieu, etc.	☐	☐	☐	☐	☐	☐
participer aux activités de groupes sociaux ou de divertissements (jeux de carte, cuisine)	☐	☐	☐	☐	☐	☐
participer à d'autres activités de groupe (veuillez présicer):						
activité: _____	☐	☐	☐	☐	☐	☐
activité: _____	☐	☐	☐	☐	☐	☐

2. Voici une liste de ce que recherchent certaines personnes pendant leurs loisirs. Indiquez l'importance qu'a pour vous chacun des objectifs suivants.

	une grande importance					aucune importance
se détendre, oublier ses soucis	☐	☐	☐	☐	☐	☐
se réunir avec d'autres personnes	☐	☐	☐	☐	☐	☐
se sentir indépendant	☐	☐	☐	☐	☐	☐
gagner de l'argent	☐	☐	☐	☐	☐	☐
sortir au grand air	☐	☐	☐	☐	☐	☐
s'amuser	☐	☐	☐	☐	☐	☐
participer à des compétitions, gagner	☐	☐	☐	☐	☐	☐
se sentir mieux mentalement	☐	☐	☐	☐	☐	☐
se sentir mieux physiquement	☐	☐	☐	☐	☐	☐
améliorer sa condition physique, se maintenir en forme	☐	☐	☐	☐	☐	☐
se poser des défis, apprendre quelque chose de nouveau	☐	☐	☐	☐	☐	☐
améliorer son apparence, maîtriser son poids	☐	☐	☐	☐	☐	☐
prendre des risques, rechercher l'aventure	☐	☐	☐	☐	☐	☐

3. Parmi les déclarations données ci-dessous, quelle est celle qui décrit le mieux l'usage que vous faites du tabac? *Cochez les cases qui s'appliquent à votre cas.*

je n'ai jamais fumé	☐
j'ai cessé de fumer la cigarette:	☐ récemment ☐ il y a plus d'un an → ⌊⌊⌋ années
j'ai cessé de fumer la pipe, le cigare ou le cigarillo:	☐ récemment ☐ il y a plus d'un an
je fume actuellement:	☐ une cigarette de temps à autre ☐ moins d'un demi-paquet par jour ☐ environ 1 paquet par jour ☐ 2 paquets ou plus par jour ☐ la pipe, la cigare ou le cigarillo

4. Est-ce que votre conjoint(e) ou votre compagne (compagnon) fume la cigarette, la pipe, le cigare ou le cigarillo?

Ne fume pas:	☐
Fume:	☐ cigarettes
	☐ a pipe, cigars, cigarillos
Je n'ai pas de conjoint(e) ni de compagne (compagnon)	☐

5. Combien avez-vous de proches parents auxquels vous pouvez parler de problèmes personnels et vous adresser pour trouver de l'aide?

⌊⌊⌋ proches parents

6. Combien avez-vous d'ami(e)s intimes auxquel(le)s vous pouvez parler de problèmes personnels et vous adresser pour trouver de l'aide?

⌊⌊⌋ ami(e)s intimes

7. Parmi ces parents et ami(e)s, combien s'adonnent à des activités physiques régulières?

⌊⌊⌋ parents

⌊⌊⌋ ami(e)s

☐ aucun(e)

8. Votre conjoint(e) s'adonne-t-il (elle) à des activités physique régulières?

☐ oui
☐ non
☐ je n'ai pas de conjoint(e)

9. Les activités suivantes sont des activités physique sans rapport avec le travail. Vous êtes-vous adonné(e) à l'une des activités physique suivantes au cours des 12 derniers mois?

Veuillez indiquer si vous vous êtes adonné(e) à chacune des activités énumérées ci-dessous. Pour chaque réponse affirmative, précisez le nombre de fois et le temps que vous y avez consacré en moyenne (ne pas compter le temps passé en déplacement, à se changer, etc.).

			Nombre de fois par mois												temps consacré à l'activité chaque fois	
	Non	Oui	Jav	Fév	Mars	Avril	Mai	Juin	Jui	Aoû	Sept	Oct	Nov	Dec	h	min
marche pour se tenir en forme	☐	☐→														
bicyclette	☐	☐→														
jogging ou course à pied	☐	☐→														
exercice physique à la maison	☐	☐→														
cours de conditionnement physique; activités physiques à caractère aérobie	☐	☐→														

	Non	Oui	Jav	Fév	Mars	Avril	Mai	Juin	Jui	Aoû	Sept	Oct	Nov	Dec	h	min
patinage sur glace	☐	☐→														
ski de randonnée	☐	☐→														
ski alpin	☐	☐→														
hockey sur glace	☐	☐→														
natation en piscine	☐	☐→														

	Non	Oui	Jav	Fév	Mars	Avril	Mai	Juin	Jui	Aoû	Sept	Oct	Nov	Dec	h	min
jardinage, travaux extérieurs	☐	☐→														
golf	☐	☐→														
tennis	☐	☐→														
poids et haltères	☐	☐→														
base-bail, softball (balle-molle)	☐	☐→														

	Non	Oui	Jav	Fév	Mars	Avril	Mai	Juin	Jui	Aoû	Sept	Oct	Nov	Dec	h	min
danse populaire	☐	☐→														
ballet, danse de jazz, danse moderne	☐	☐→														
danse folklorique ou quadrille	☐	☐→														
quilles	☐	☐→														

9. (con't)

Veuillez vous reporter à la carte de référence sur les activités physiques et énumérer ici toute autre activité que vous avez pratiquée au cours des 12 derniers mois.

	Jav	Fév	Mars	Avril	Mai	Juin	Jui	Aoû	Sept	Oct	Nov	Dec	h	min

10. Au cours de l'année passée, avez-vous cessé de vous adonner à une activité physique pendant vos loisirs (à l'exception des activités interrompues à cause d'un changement de saison)?

☐ Non ☐ Oui: Laquelle? ____________________

↓

Pour quelle raison principale avez-vous cessé?

____

Avez-vous cessé de faire d'autres activités? ____________________

Pour quelle raison principale avez-vous cessé?

____

11. Au cours des derniers 3 mois, vous êtes-vous adonné(e) à une activité physique au moins une fois par semaine?

☐ Non ☐ Oui: À quel exercices ou à quelle activité sportive vous êtes-vous le plus souvent adonné(e) pendant vos loisirs, au cours des 3 derniers mois?

____

↓

b. Est-ce que cette activité était *(cochez plusieurs cases, le cas échéant)*

- ☐ prévue à des heures précises
- ☐ dirigée par un moniteur ou un superviseur
- ☐ à caractère compétitif, avec des tournois, des ligues ou des courses organisées
- ☐ sans formalités ni heures fixes, et sans conseils (ou à peu près) de la part d'un moniteur

c. Lorsque vous vous êtes adonné(e) à cette activité, quel effet l'exercices a-t-il eu sur votre rythme cardiaque et votre respiration? Étaient-ils ... *(ne cochez qu'une seule case)*

- ☐ un peu plus rapides que normalement
- ☐ beaucoup plus rapides, mais vous pouviez parler
- ☐ si rapides que vous ne pouviez pas parler
- ☐ aucun changement

d. Depuis combien de temps vous adonnez-vous à une activité physique au moins une fois par semaine pendant vos loisirs? Depuis...

- ☐ moins de 3 mois
- ☐ 4-6 mois
- ☐ 6 mois à 1 an
- ☐ 1-2 ans
- ☐ 3-4 ans
- ☐ 5-7 ans
- ☐ plus de 7ans (avant 1981)

12. Si vous comparez les activités de loisirs auxquelles vous vous êtes adonné(e) pré et post l'accident diriez-vous que vous faites... *(ne cochez qu'une seule case)*

- ☐ beaucoup plus d'exercices physique
- ☐ un peu plus d'exercices physique
- ☐ beaucoup moins d'exercices physique
- ☐ un peu moins d'exercices physique
- ☐ à peu près autant...j'ai toujours été actif(ve)
- ☐ à peu près autant...je n'ai jamais été actif(ve)

13. Si vous vous comparez à d'autres personnes de votre âge pour ce qui est de votre degré d'activité <u>quand vous aviez 15 ans</u>, diriez-vous que vous étiez...

beaucoup plus actif(ve) quelles? ☐ ☐ ☐ ☐ ☐ beaucoup moins actif(ve) quelles?

14. Si vous vous comparez à d'autres personnes de votre âge pour ce qui concerne la façon d'occuper vos loisirs, diriez-vous que vous êtes...

beaucoup plus actif(ve) quelles? ☐ ☐ ☐ ☐ ☐ beaucoup moins actif(ve) quelles?

15. Avec qui participez-vous normalement aux activités physiques pendant vos heures de loisirs? *(Ne cochez qu'une seule case.)*

☐ personne
☐ avec des ami(e)s
☐ avec des parent(e)s
☐ avec des collègues de travail
☐ avec des camarades de classe
☐ avec d'autres

16. Où participez-vous normalement aux activités physiques ? *(Ne cochez qu'une seule case.)*

☐ à la maison
☐ dans les parc
☐ dans des endroits commerciaux ou des clubs privés
☐ au travail
☐ dans un endroit réservé aux loisirs
☐ en plein air sans équipement spécial
☐ à l'école, au collège ou à l'université
☐ ailleurs

17. Y a-t-il des exercices ou des actives sportives que vous aimeriez entreprendre l'année prochaine?

☐ non ☐ oui: premier choix: _____

↓

deuxième choix: _____

18. Dans quelle mesure ce qui suit peut-il vous empêcher d'avoir plus d'activités physiques?

	beaucoup				aucunement
manque de temps en raison du travail ou des études	☐	☐	☐	☐	☐
manque de temps en raison des obligations familiales	☐	☐	☐	☐	☐
manque de temps en raison d'autres intérêts	☐	☐	☐	☐	☐
manque d'énergie, trop de fatigue	☐	☐	☐	☐	☐
manque d'aptitudes sportives	☐	☐	☐	☐	☐
manque de programmes, de moniteurs ou d'installations facilement accessible	☐	☐	☐	☐	☐
absence de partenaire	☐	☐	☐	☐	☐
manque de soutien de la part du conjoint ou des amis	☐	☐	☐	☐	☐
manque de services de garderie	☐	☐	☐	☐	☐
coût	☐	☐	☐	☐	☐
manque de discipline personnelle ou de volonté	☐	☐	☐	☐	☐
sentiment d'être intimidé(e), mal à l'aise	☐	☐	☐	☐	☐
blessure ou invalidité permanente, maladie prolongée	☐	☐	☐	☐	☐
craint de se blesser	☐	☐	☐	☐	☐

QUE PENSEZ-VOUS DES ACTIVITÉS PHYSIQUES À UNE GRANDE DÉPENSE ÉNERGÉTIQUE ?

Pour les questions ci-dessous, on entend par participation à des activités physique à une grande dépense énergétique le fait de s'exercer pendant ses loisirs:

- 3 fois par semaine ou davantage,
- pendant 20 minutes ou plus à chaque fois, et
- au point de respirer beaucoup plus rapidement tout en pouvant encore parler.

19. Que pensez-vous du fait de participer régulièrement à des activités physiques à une grande dépense énergétique? Estimez-vous que c'est:

ennuyeux	☐	☐	☐	☐	☐	amusant
bénéfique	☐	☐	☐	☐	☐	nuisible
désagréable	☐	☐	☐	☐	☐	agréable
pratique	☐	☐	☐	☐	☐	peu pratique
douloureux	☐	☐	☐	☐	☐	non douloureux
facile	☐	☐	☐	☐	☐	difficile

20. Cela étant dit, dans quelle mesure pouvez-vous décider de vous adonner régulièrement à des activités physiques à une grande dépense énergétique?

je suis tout à fait libre de décider	☐	☐	☐	☐	☐	trop de facteurs me limitent

21. Dans quelle mesure les personnes énumérées ci-dessous vous encouragent-elles à participer régulièrement à des activités physiques à une grande dépense énergétique?

	sans objet je n'en ai pas	beaucoup me soutient énormément			m'en décourage attitude très négative	
conjoint, ami, amie	☐	☐	☐	☐	☐	☐
parents	☐	☐	☐	☐	☐	☐
fils, fille	☐	☐	☐	☐	☐	☐
autres membres de la famille	☐	☐	☐	☐	☐	☐
la plupart de mes amis intimes	☐	☐	☐	☐	☐	☐
mon employeur	☐	☐	☐	☐	☐	☐
mon médecin	☐	☐	☐	☐	☐	☐

22. Si vous participez (ou participiez) à des activités physiques à une grande dépense énergétique, dans quelle mesure cela vous aide-t-il (aiderait-il)...
(Veuillez donner une réponse, que vous soyez actif(ve) ou non pendant vos loisirs.)

	beaucoup				pas du tout
à vous détendre, à oublier vos soucis	☐	☐	☐	☐	☐
à vous réunir avec d'autres personnes	☐	☐	☐	☐	☐
à vous amuser	☐	☐	☐	☐	☐
à gagner de l'argent	☐	☐	☐	☐	☐
à vivre au grand air	☐	☐	☐	☐	☐
à soutenir la concurrence, à gagner	☐	☐	☐	☐	☐
à vous sentir indépendant(e)	☐	☐	☐	☐	☐
à vous sentir mieux mentalement	☐	☐	☐	☐	☐
à vous sentir mieux physiquement	☐	☐	☐	☐	☐
à vous poser des défis, à apprendre quelque chose de nouveau	☐	☐	☐	☐	☐
à améliorer votre apparence	☐	☐	☐	☐	☐
à maîtriser votre poids ou à perdre du poids	☐	☐	☐	☐	☐
à affronter les situations difficiles, à rechercher l'aventure	☐	☐	☐	☐	☐
à améliorer votre condition physique ou à rester en forme	☐	☐	☐	☐	☐
à améliorer ou à maintenir votre santé sur le plan cardio-vasculaire	☐	☐	☐	☐	☐
à développer vos muscles et à augmenter votre endurance, ou à les maintenir au même niveau	☐	☐	☐	☐	☐
à devenir plus souple ou à rester souple	☐	☐	☐	☐	☐

23. Seriez-vous d'accord pour déclarer que, si vous le vouliez, vous pourriez facilement participer à des activités physique à une grande dépense énergétique trois fois par semaine ou plus, pendant 20 minutes au moins chaque fois?

tout à fait d'accord	☐	☐	☐	☐	☐	absolument pas d'accord

24. Au cours de l'année à venir, combien de fois comptez-vous vous adonner à des activités physique à une grande dépense énergétique?

- ☐ jamais
- ☐ moins
- ☐ 1 à 2 fois par semaine
- ☐ 3 fois par semaine
- ☐ 4 à 5 fois par semaine
- ☐ 6 ou plus par semaine

ANNEXE C

Raw Data

Demographic Data

Subjects	Gender	Age At The Time Of Interview	Living Situation	Physical Activity Level	Date of Accident
1	Female	21	Boy Friend	Moderate	93-01-31
2	Female	55	Alone	Sedentary	92-04-23
3	Male	46	Wife	Sedentary	92-12-08
4	Female	48	Alone	Sedentary	91-04-15
5	Male	25	Mother	Active	87-02-22
6	Male	31	Alone	Sedentary	93-09-06
7	Male	23	Alone	Active	92-02-19
8	Female	42	Alone	Moderate	90-01-02
9	Male	26	Mother	Active	90-01-17
10	Female	35	Mother	Active	88-08-06
11	Male	42	Older Son	Sedentary	92-10-?*
12	Male	27	Alone	Moderate	92-10-15
13	Male	32	Alone	Active	90-10-19

* Missing data in medical file

Physical Activity Level vs CIQ

Subject #	Sex	Age	PA Level	Home Integration	Social Integration	Productivity	Total Score	%
1	♀	21	mod.	7/10	8/12	1/7	16/29	55.2
2	♀	55	sed.	9	6	2	17	58.6
3	♂	46	sed.	5	5	2	12	41.4
4	♀	48	sed.	7,8	11	2	20.8	71.7
5	♂	25	active	9	8	3	20	68.9
6	♂	31	sed.	0	8	2	10	34.5
7	♂	23	active	7,8	6	2	15.87	54.7
8	♀	42	mod.	7,8	9	2	18.87	65.1
9	♂	26	active	7,8	10	3	21.87	75.4
10	♀	35	active	4,5	8	2	15	51.7
11	♂	42	sed.	3,375	10	3	16.37	56.5
12	♂	27	mod.	5,625	11	2	18.67	64.4
13	♂	32	active	5,625	7	2	14.67	50.6

Community Integration Items	Subject #1	Subject #2	Subject #3	Subject #4	Subject #5	Subject #6	Subject #7	Subject #8	Subject #9	Subject #10	Subject #11	Subject #12	Subject #13
Home Integration													
- Running Errands													
alone	✓	✓		✓	✓		✓	✓	✓			✓	✓
with someone else			✓							✓	✓		
by someone else						✓							
- Meal Preparation													
alone	✓	✓		✓	✓		✓	✓					
with someone else			✓						✓	✓	✓	✓	✓
by someone else						✓							
- Housework													
alone	✓	✓	✓		✓		✓		✓				
with someone else				✓				✓		✓	✓	✓	
by someone else						✓							✓
- Child Care													
alone													
with someone else	✓		✓										
by someone else						✓							
does not apply		✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
- Planning Social Arrangements													
alone		✓		✓	✓			✓	✓				✓
with someone else							✓			✓	✓	✓	
by someone else	✓		✓			✓							

Community Integration Items	Subject #1	Subject #2	Subject #3	Subject #4	Subject #5	Subject #6	Subject #7	Subject #8	Subject #9	Subject #10	Subject #11	Subject #12	Subject #13
Social Integration													
- Personal Finances													
performed alone or with others		✓	✓	✓	✓	✓		✓	✓		✓	✓	✓
performed by others	✓						✓			✓			
- Frequency of shopping (times/mth)													
never						✓							
1 - 4	✓		✓		✓		✓		✓	✓	✓		✓
5+		✓		✓				✓				✓	
- Frequency of leisure activities (times/mth)													
never			✓										
1 - 4		✓		✓	✓		✓	✓			✓		
5+	✓					✓			✓	✓		✓	✓
- Frequency of visiting friends or family (times/mth)													
never		✓											
1 - 4	✓		✓					✓	✓	✓			✓
5+				✓	✓	✓	✓				✓	✓	
- A best friend with whom to confide in													
yes	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
no		✓											✓

Community Integration Items	Subject #1	Subject #2	Subject #3	Subject #4	Subject #5	Subject #6	Subject #7	Subject #8	Subject #9	Subject #10	Subject #11	Subject #12	Subject #13
Social Integration (continue)													
- Persons with whom they usually participate in leisure activities													
mostly alone			✓		✓	✓	✓					✓	✓
mostly with family		✓											
friends with a TBI													
friends with out a TBI or combination of friends and family	✓			✓				✓	✓	✓	✓		
Productive Activity													
- Frequency of going out													
almost every day		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
almost every week	✓												
- Unemployed and not looking for work	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
- Not attending school	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
- Volunteer work													
no	✓	✓	✓	✓		✓	✓	✓		✓		✓	✓
yes					1/mth				5+/mth		5+/mth		

Barriers Towards Physical Activity As Assessed By The "Profil du Loisir"

Possible Barriers Towards Physical Activity	**Subject #1**	**Subject #2**	**Subject #3**	**Subject #4**	**Subject #5**	**Subject #6**	**Subject #7**	**Subject #8**	**Subject #9**	**Subject #10**	**Subject #11**	**Subject #12**	**Subject #13**
Je m'essouffle facilement													
présence ----------	1	1	0	1	0	0	0	0	0	0	1	0	0
effet sur l'activité physique ---	1	1	9	1	9	9	9	9	9	9	0	9	9
Je me fatigue facilement													
présence ----------	1	1	1	1	0	0	1	1	0	0	1	1	0
effet sur l'activité physique ---	1	1	1	1	9	9	9	1	9	9	1	1	9
Mon médecin ne veux pas que je pratique certaines activités.													
présence ----------	0	6	0	0	0	0	0	0	0	0	0	1	0
effet sur l'activité physique ---	9	6	9	9	9	9	9	9	9	9	9	1	9
J'ai des problèmes de vision													
présence ----------	0	1	0	1	1	1	0	1	0	1	0	1	1
effet sur l'activité physique ---	9	1	9	0	1	1	9	1	9	6	9	6	1
J'ai des problèmes d'audition													
présence ----------	0	1	0	0	0	0	0	0	1	0	0	0	0
effet sur l'activité physique ---	9	0	9	9	9	9	9	9	6	9	9	9	9
J'ai de la difficulté à parler et à m'exprimer													
présence ----------	1	1	1	0	0	1	0	1	0	1	0	0	0
effet sur l'activité physique ---	1	0	0	9	9	0	9	1	9	0	9	9	9
J'ai des problèmes d'équilibre													
présence ----------	0	1	0	1	0	1	1	1	1	0	1	1	1
effet sur l'activité physique ---	9	1	9	1	9	1	1	1	6	9	1	1	0
J'ai de la difficulté à marcher ou à me déplacer en fauteuil roulant													
présence ----------	0	0	0	1	0	1	0	1	0	0	0	1	0
effet sur l'activité physique ---	9	9	9	1	9	1	9	1	9	9	9	1	9

Possible Barriers Towards Physical Activity	**Subject #1**	**Subject #2**	**Subject #3**	**Subject #4**	**Subject #5**	**Subject #6**	**Subject #7**	**Subject #8**	**Subject #9**	**Subject #10**	**Subject #11**	**Subject #12**	**Subject #13**
J'ai des problèmes de dextérité manuelle													
présence ----------	0	0	0	1	0	1	1	1	0	1	1	1	1
effet sur l'activité physique ---	9	9	9	1	9	1	1	1	9	1	1	1	0
Je dois utiliser des appareils spécialisés (ex. orthèse d'écriture, lève-personne, prothèses, etc.)													
présence ----------	0	0	0	1	0	1	0	0	0	0	0	1	1
effet sur l'activité physique ---	9	9	9	1	9	1	9	9	9	9	9	0	0
J'ai un problème de concentration													
présence ----------	1	1	1	1	0	0	1	6	1	1	0	1	1
effet sur l'activité physique ---	1	1	0	0	9	9	0	6	1	0	9	0	0
J'ai des problèmes de mémoire													
présence ----------	1	1	1	1	1	0	1	0	0	1	1	0	1
effet sur l'activité physique ---	1	1	0	0	0	9	0	9	9	0	0	9	0
J'ai de la difficulté à m'organisé													
présence ----------	0	1	1	0	1	0	0	0	0	1	1	0	0
effet sur l'activité physique ---	9	1	0	9	1	9	9	9	9	6	0	9	9
J'ai tendance à éviter de rencontrer des gens (ex. j'ai peur d'être jugé, ridiculisé, incompris, rejeté, etc.)													
présence ----------	0	0	0	0	0	0	0	1	0	0	0	0	0
effet sur l'activité physique ---	9	9	9	9	9	9	9	1	9	9	9	9	9
J'ai de la difficulté à prendre l'initiative de mes activités (ex. quelqu'un décide pour moi ou m'encourage à les pratiquer, etc.)													
présence ----------	1	1	6	0	1	0	0	0	0	0	0	0	0
effet sur l'activité physique ---	1	6	6	9	1	9	9	9	9	9	9	9	9

Possible Barriers Towards Physical Activity	Subject #1	Subject #2	Subject #3	Subject #4	Subject #5	Subject #6	Subject #7	Subject #8	Subject #9	Subject #10	Subject #11	Subject #12	Subject #13
J'ai tendance à me fâcher.													
présence ----------	1	6	1	0	0	1	0	1	1	1	1	1	1
effet sur l'activité physique ---	1	6	0	9	9	0	9	0	1	6	0	0	0
J'ai tendance à avoir peur ou à être anxieux (ex. peur de sortir seul, de tomber et de conduire, etc.).													
présence ----------	0	1	0	0	0	0	0	1	0	0	0	1	0
effet sur l'activité physique ---	9	1	9	9	9	9	9	0	9	9	9	0	9
Je n'ai pas assez d'argent pour les activités que j'aime.													
présence ----------	1	1	1	1	0	0	0	0	0	0	0	0	0
effet sur l'activité physique ---	0	1	1	0	9	9	9	9	9	9	9	9	9
Je n'ai personne avec qui pratiquer des activités que j'aime.													
présence ----------	0	1	0	0	1	1	1	0	0	1	0	0	0
effet sur l'activité physique ---	9	0	9	9	1	1	0	9	9	1	9	9	9
L'inquiétude ou le manque de confiance de mes proches face à mes capacités m'empêchent de faire ce que je veux.													
présence ----------	0	0	0	0	0	1	0	6	0	0	0	0	0
effet sur l'activité physique ---	9	9	9	9	9	1	9	6	9	9	9	9	9
Des barrières architecturales à l'intérieur de mon domicile m'empêchent de pratiquer certaines activités chez moi.													
présence ----------	0	0	0	0	0	0	0	0	0	0	0	0	0
effet sur l'activité physique ---	9	9	9	9	9	9	9	9	9	9	9	9	9
Des barrières architecturales chez-moi m'empêchent de sortir pour certains activités (ex. escaliers extérieurs, largeur du hall d'entrée, etc.).													
présence ----------	0	0	0	0	0	0	0	0	0	0	0	0	0
effet sur l'activité physique ---	9	9	9	9	9	9	9	9	9	9	9	9	9

Possible Barriers Towards Physical Activity	**Subject #1**	**Subject #2**	**Subject #3**	**Subject #4**	**Subject #5**	**Subject #6**	**Subject #7**	**Subject #8**	**Subject #9**	**Subject #10**	**Subject #11**	**Subject #12**	**Subject #13**
Des barrière architecturales, terrains, surfaces irrégulières ou escarpées, trottoirs, etc. me limitent dans mes activités.													
présence ----------	0	0	0	0	0	0	0	0	0	0	1	0	0
effet sur l'activité physique ---	9	9	9	9	9	9	9	9	9	9	1	9	9
Je n'ai pas de moyen de transport ou je dépend des personnes de mon entourage pour mes déplacements.													
présence ----------	0	0	0	1	1	0	0	0	0	1	0	0	0
effet sur l'activité physique ---	9	9	9	9	1	9	9	9	9	1	9	9	9
Les programmes de loisir qui m'intéressent ne sont pas offerts dans mon entourage.													
présence ----------	0	0	0	0	1	0	0	6	0	6	0	0	0
effet sur l'activité physique ---	9	9	9	9	1	9	9	6	9	0	9	9	9
Les programmes de loisir adaptés ne me sont pas accessibles (ex. absence d'équipement spécialisé, barrières architecturales, transport adapté, etc.).													
présence ----------	0	0	0	0	1	0	0	6	0	0	0	0	0
effet sur l'activité physique ---	9	9	9	9	1	9	9	6	9	9	9	9	9
Le climat hivernal limite la pratique de certaines de mes activités.													
présence ----------	1	1	0	1	0	1	0	1	0	0	1	0	0
effet sur l'activité physique ---	1	1	9	1	9	1	9	1	9	9	0	9	9
Autres (précisez)													
présence ----------	6	6	0	6	0	1	0	6	0	0	6	0	0
effet sur l'activité physique ---	6	6	0	6	0	1	9	6	9	9	6	9	9

Campbell Survey

c1001

- 46.2% watch 10-14 hr of TV per week
  subject # 2, 3, 6, 7, 9, 11

- 30.8% watch 5-9 hr of TV per week
  subject # 1, 8, 10, 12

- 15.4% watch 15 or more hr of TV per week
  subject # 4, 5

- 7.7% watch 3-4 hr of TV per week
  subject #13

c1002

- 46.2% do not read regularly during an ordinary week
  subject # 3, 6, 7, 10, 11, 13

- 30.8% read for 1-2 hr/wk
  subject # 1, 5, 9, 12

- 7.7% read for 3-4 hr/wk
  subject # 8

- 15.3% read for 5-9 hr/wk
  subject # 4, 12

- 7.7% read for 15 or more hr/wk
  subject # 2

c1003

- 15.4% participate in artistic/pass time activities for 3-4 hr/wk
  subject # 11, 12

- 7.7% participate in artistic/pass time activities for 1-2 hr/wk
  subject # 1

- 7.7% participate in artistic/pass time activities for 10-14 hr/wk
  subject # 13

- 7.7% participate in artistic/pass time activities for 15 or more hr/wk
  subject # 4

- 61.9% do not participate in this activity regularly during an ordinary week

c1004

- 38.5% do not visit their parents during an ordinary wk
  subject # 2, 8, 9, 10, 13

- 30.8% regularly visit their parents between 1-2 hr/wk
  subject# 1, 3, 4, 5

- 15.4% regularly visit their parents between 3-4 hr/wk
  subject # 11, 12

- 7.7% regularly visit their parents between 5-9 hr/wk
  subject # 7

- 7.7% regularly visit their parents between 15 or more hr/wk
  subject # 6

c1005

- 46.2% **do not** visit their friends regularly during an ordinary wk
  subject # 1, 2, 6, 8, 12, 13

- 30.8% regularly visit their friends between 3-4 hr/wk
  subject # 4, 5, 9, 10

- 7.7% regularly visit their friends between 1-2 hr/wk
  subject # 3

- 7.7% regularly visit their friends between 10-14 hr/wk
  subject # 7

- 7.7% regularly visit their friends between 15 or more hr/wk
  subject # 11

c1006

- 100% do not regularly assist cultural event such as going to a concert

c1007

- 100% do not regularly organise or coach physical activity (PA) programs

c1008

- 100% do not regularly participate in religious activities

c1009

- 92.3% do not regularly do volunteer work philanthropic organisations

- 7.7% do volunteer work for a philanthropic organisation for 15 or more hr/wk
  subject # 9

c1010

- 76.9% do not participate in social group activities such as card playing or cooking

- 15.4% regularly participate in social group activities between 1-2 hr/wk
  subject # 3, 9

- 7.7% regularly participate in social group activities for 15 or more hr/wk
  subject # 6

c1011: Other group activities

- 7.7% go to the beach or park in the summer for 1-2 hr/wk
  subject # 3

- 7.7% participate in art class
  subject # 8

c3001-c3004: Smoking

- 61.5% smoke about 1 pack per day
  subject# 1, 4, 5, 6, 7, 8, 11, 13

- 23.1% do not smoke
  subject # 3 (quit 4 yr ago)
  subject # 9 (never smoked)
  subject #10 (never smoked)

- 7.7% smoke a cigarette occasionally
  subject #12

- 7.7% smoke 2 or more packs of cigarettes per day
  subject # 2

c4000

- 23.1% have a girl/boyfriend who smokes
  subject # 1, 4, 11

- 15.4% have a girl/boyfriend who do not smoke
  subject # 3, 13

- 61.5% do not have a girl/boyfriend therefor this question does not apply

c5000

- 46.2% have 1 close family member with whom they can talk to about their problems and ask for help
  subject # 1, 6, 7, 9, 10, 13

- 23.1% have 2 close family member with whom they can talk to about their problems and ask for help
  subject # 3, 8, 11

- 15.4% have 3 close family member with whom they can talk to about their problems and ask for help
  subject # 4, 5

- 7.7% have 5 close family members with whom they can talk to about their problems and ask for help
  subject # 12

- 7.7% have no close family members with whom they can talk to about their problems and ask for help
  subject # 2

c6000

- 53.8% have 1 close friend with whom they can talk to about their problems and ask for help
  subject # 1, 4, 5, 6, 8, 10, 13

- 23.1% have 4 close friend with whom they can talk to about their problems and ask for help
  subject # 3, 9, 12

- 15.4% have 2 close friend with whom they can talk to about their problems and ask for help
  subject # 7, 11

- 7.7% have no close friend with whom they can talk to about their problems and ask for help
  subject # 2

c7001

- 53.8% have close family members whom they can confide in but they **do not** participate in regular physical activity
  subject # 2, 3, 6, 9, 11, 12, 13

- 46.2% have close family members whom they can confide in and they do participate in regular physical activity
  subject# 1, 4, 5, 7, 8, 10

c7002

- 53.8% have a friend with whom they can confide in but they **do not** participate in regular physical activity
  subject # 1, 2, 3, 5, 6, 10, 12

- 46.2% have a friend with whom they can confide in and they do participate in regular physical activity
  subject # 4, 7, 8, 9, 11, 13

c8000

- 15.4% have a girl/boyfriend who participates regularly in physical activity
  subject # 4, 13

- 23.1% have a boy/girlfriend who **do not** participate regularly in physical activity
  subject# 1, 3, 11

- 61.5% do not have a boy/girlfriend

c9001

-15.4% walk in order to improve or maintain their physical condition
  subject # 1, 5

- 84.6% **do not** walk in order to improve or maintain their physical condition

c9002

53.8% bike ride:

subject # 1 (3-4 times per wk for 30min. each time. she takes the bike to go to the store)

subject # 3 (April-Oct. 10min. each time. He gets tired easily)

subject # 5 (May-Aug, 2/wk for about 1hr)

subject # 7 (during the winter he rides a stationary bike for 15 min 3/wk. In the summer (May-Oct) he rides for about 30-40 min each time 3-4/wk)

subject # 9 (May-Oct for 2-3 hr each time and at the gym he rides for 18min each time, 3/wk)

subject #10 (if it is nice she can take her bike out every day and she rides for 2-3hr at a time". "She can do 60 Km in one day)

subject # 13 (May- Oct, an average of 2/wk for about 1-2hr)

c9003

- 100% do not jog

c9004

- 7.7% exercise at home
  subject # 7 (he does weights & push-up for 15 min, 2/wk)

c9005

- 46.2% go to the gym (cardio & strength training)

subject # 7 (from Sept-April, 3/wk)

subject # 8 (Sept- May, 3/wk for 1hr each time)

subject # 9 (3/wk for 1½ hr, he just started in Oct. Ever since he started working out he feels less tired)

subject # 10 (Sept-April, 2/wk for 2½ hr each time)

subject # 12 (all year round for 1hr each time)

subject # 13 (all year round, 3/wk for 2½ hr each time/ 45 min of cardio)

c9006

- 7.7% go skating
  subject # 5 (Dec- Feb 1 or 2 times per wk / if it is not to cold)

c9007

- 15.4% participate in cross country skiing

  subject # 10 (2-3/wk for 1½ hr: on the river that freezes over close to her home)

  subject # 13 (2 times last year)

c9008

- 23.1% participate in alpine skiing
  subject # 1 (2 times per year for an 1½ hr including chair lift)
  subject # 9 (7 times per winter)
  subject #10 (Just started last winter again)

c9009

- 100% do not play hockey (some used to before the accident)

c9010

- 46.2% go swimming
  subject # 2 (rarely, even though there is a pool in her building/she does not like crowds)
  subject # 5 (6/wk, 45 min each time/ indoor pool at home)
  subject # 7 (Sept- April, 1/wk for 15 min after the gym)
  subject#10 (2/wk she can swim several laps continuously; she used to be a life guard)
  subject # 11 (1 time every 2 month for about 1 hr)
  subject # 12 (2 times per wk)

c9011

- 23.1% do gardening work
  subject # 3 (May -Sept, 15min each time)
  subject # 5 (May- Oct, 1hr each time to cut the grass)
  subject # 7 (occasionally to help his father)

c9012

- 7.7% play golf
  subject # 5 (twice this year/ 18 holes)

c9013

- 100% do not play tennis

c9014

- 23.1% participate in weight training
  subject # 7 (Sept-April, 3/wk for 1hr each time)
  subject # 9 (look at c9005/ after working out he goes to sleep because he is too tired to do anything else)
  subject # 13 (3/wk for 1½ hr, all year round)

Note: This value may be underestimated because strength training may be included in their physical conditioning program mentioned in question c9005. It is possible that they did not specify between cardio and strength training.

c9015

- 7.7% play baseball
  subject # 1 (1 per year for a ½ hr)

c9016

- 15.4% go dancing
  subject # 3 (6-7 per year / "dinner & dancing")
  subject # 5 (4/year goes to a club with the guys)

c9017

- 100% do not participate in ballet, jazz, or modern dance

c9018

- 100% do not participate in folklore dance

- 15.4% go bowling
  subject # 1 (in the winter, 1 per month for about 2hr each time)
  subject # 11 (1 or 2 per year)

c9020

- 15.4% participate in other physical activity
  subject # 1 (May-Aug she renovates her home ex. adding a new room, 5-6/wk)
  subject # 12 (snow shoeing, "raquette")

c1000

- 30.8%, during the previous year, stopped participating in a physical activity that was done during their leisure time
  subject # 1 (dancing, it is too tiring)
  subject # 2 (going to the gym because it was too dirty, she lasted 3 weeks)
  subject # 5 (karate, due to personal differences with coach)
  subject #13 (alpine skiing because his girlfriend thinks it is too dangerous)

c1100

- 38.5% started participating in a physical activity at least 1 time per wk, during the last 3 months

  subject # 2 (walking)
  subject # 5 (walks every day)
  subject # 9 (going to the gym)
  subject # 10 (going to the gym)
  subject # 12 (learned how to ride a bike)

c1200

- 76.9% do a lot less physical activity now than before their accident
  subject # 1, 2, 3, 4, 5, 6, 7, 8, 11, 12

- 7.7% do a lot more physical activity now than before their TBI
  subject # 13 (his girlfriend encourages him a lot)

- 7.7% do a bit more physical activity now than before their TBI
  subject # 9

- 7.7% do the same amount of physical activity now as they did before their TBI
  subject # 10

c1400

- 38.5% think that they are just as active as people their age concerning the methods of occupying leisure time
  subject # 3, 4, 5, 7, 8

- 23.1% think that they are a lot less active than people their age concerning the methods of occupy their leisure time
  subject # 1, 6, 12

- 15.4% think that they are moderately more active than people their age concerning the methods of occupy their leisure time
  subject # 9, 10

- 7.7% think that they are a lot more active than people their age concerning the methods of occupy their leisure time
  subject# 13

- 7.7% think that they are a bit to moderately less active than people their age concerning the methods of occupy their leisure time
  subject # 11

Note: subject # 2, does not know how other people occupy their leisure time therefor could not answer the question

c1500

- 69.2% normally participate in physical activity, that is done during leisure time, alone
  subject # 2, 3, 5, 6, 7, 8,10, 12, 13

- 23.1% normally participate in physical activity, that is done during leisure time, with friends
  subject # 4, 9, 11

- 7.7% normally participate in physical activity, that they do during their leisure time, with their parents
  subject # 1

c1600

- 46.2% engage in physical activity mostly in an area reserved for leisure activities
  subject # 7, 8, 9, 10, 12, 13

- 38.5% engage in physical activity mostly outdoors without specialized equipment
  subject# 1, 2, 3, 5, 11

- 7.7% engage in physical activity mostly at home
  subject # 6

- 7.7% engage in physical activity mostly in commercial areas or private clubs
  subject # 4

c1700

- 69.2% are interested in beginning a new physical activity next year
  - subject # 1: 1st choice is swimming and 2nd is joining a gym
  - subject # 2: Swimming during winter months since there are less people
  - subject # 5: Karate
  - subject # 7: Dirt biking/ 4 wheeler
  - subject # 9: Golf
  - subject # 10: Badminton
  - subject # 11: Skating
  - subject # 12: Biking
  - subject # 13: Cross country skiing

c1801

- 7.7% say that a lack of time due to work or studies slightly impede them from engaging in more physical activity
  subject # 1

c1802

- 100% say that lack of time due to family obligations does not impede them from engaging in more physical activity

c1803

- 15.4% say that a lack of time due to other interest slightly impedes them from engaging in more physical activity
  subject # 7, 9,

- 7.7% say that lack of time due to other interest moderately impedes them from engaging in more physical activity
  subject # 5 (watching TV)

c1804

- 38.5% say that a lack of energy & fatigue greatly impedes them from participating in more physical activity
  subject # 1, 3, 11, 12

- 30.8% say that a lack of energy & fatigue moderately impedes them from participating in more physical activity
  subject # 4, 6, 7, 8

- 30.8% say that a lack of energy & fatigue does not impede them from participating in more physical activity
  subject # 2, 5, 9, 10, 13

c1805

- 23.1% say that a lack of "natural talent" (aptitude Sportif) to do sports moderately impedes them from engaging in more physical activity
  subject # 2, 3, 9

- 15.4% say that a lack of "natural talent" (aptitude Sportif) to do sports slightly impedes them from engaging in more physical activity
  subject # 1, 7

- 7.7% say that a lack of "natural talent" (aptitude Sportif) to do sports greatly impedes them from engaging in more physical activity
  subject # 8

c1806

- 15.4% feel that the lack of programs, instructors, or easily accessible facilities impede them from engaging in more physical activity
  subject # 10
  subject # 8 (impedes her slightly)

c1807

- 92.3% said that a lack of a partner does not impede them from doing more physical activity

- 7.7% said that a lack of a partner moderately impedes them from doing more physical activity
  subject # 1

c1808

- 100% said that lack of support on behalf of their girl/boyfriend or friends does not impede them from doing more physical activity

c1809

-100% said that a lack of day care services does not impede them from engaging in more physical activity

c1810

- 15.4% said that cost impedes them from engaging in more physical activity

  subject # 2, 7

c1811

- 53.85 said that a lack of personal discipline or "want" impedes them from engaging in more physical activity
  subject # 2, 3, 11 (impedes them greatly)
  subject # 5, 7, 8, 9 (impedes them moderately)

c1812

- 46.2% said that the feeling of shyness or uneasiness impedes them from doing more physical activity
  subject # 1, 2, 8 (moderately)
  subject # 4, 9 (between mod & great)
  subject # 6 (greatly)

c1813

- 84.6% feel that their injuries/ permanent disabilities limit them from doing more physical activities
  subject # 1 (their TBI limits them greatly)
  subject #2, 3, 6, 7, 8, 11, 12 (... greatly)
  subject # 4 (... moderately to greatly)
  subject # 5 (... moderately)
  subject # 9 (... slightly)
  subject # 10 mother said that ever since her accident she cannot do physical activities that require fast co-ordinated movements

c1814

- 38.5% say that the fear of getting hurt impedes them from engaging in more physical activity
  subject # 1 (slightly)
  subject # 2 (greatly)
  subject # 4, 6, 9 (moderately)

c1901

- 38.5% think that engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak is quite enjoyable
  subject # 1, 2, 4, 6, 13

- 46.2% think that engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak is sort of enjoyable
  subject # 3, 5, 7, 8, 9,10

- 7.7% think that engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak is not fun but not tedious either
  subject # 12

- 7.7% think that engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak is tedious
  subject # 11

c1902

- 92.3% think that engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak is beneficial

- 7.7% think that engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak has some benefits.
  subject # 6

c1903

- 69.3% think that engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak is pleasant
  subject # 1, 4, 5, 6, 8, 9, 10, 11, 13

The remaining 30.7% are neutral

c1904

- 92.3% think that engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak is practical

- 7.7% think that engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak is not practical
  subject # 3

c1905

- 69.2% think that engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak is not painful
  subject # 1, 2, 5, 6, 7, 8, 9, 10, 13

- 23.1% think that engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak is moderately painful
  subject # 3, 11,12

- 7.7% think that engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak is slightly painful
  subject # 4

c1906

- 46.2% think that engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak is not easy
  subject # 1, 2, 3, 7, 11, 12

- 46.2% think that engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak is easy
  subject # 4, 5, 6, 9, 10, 13

- 7.7% are neutral, they feel that it is not easy or difficult
  subject # 8

c2000

-76.9% feel that they are free to decide whether or not they want to engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak
  subject# 1, 2, 3, 4, 5, 8, 9, 10, 12, 13

- 23.1% feel that it is not completely their decision whether or not to engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak because some unavoidable circumstances limit them
  subject # 6, 7, 11

c2101

- 15.4% receive a lot of encouragement from their girl/boyfriend or friend to engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak
  subject # 4, 13

-7.7% receive some of encouragement from their girl/boyfriend or friend to engaging in physical activity at least 3/wk for at least 20 min. or more at a certain intensity that causes you to breath more rapidly while still able to speak
subject # 8

Note: every body else is either neutral or does not have a boy or girlfriend

c2102

- 23.1% have parents who greatly encouragement them to engaging in physical activity at least 3/wk for at least 20 minutes or more
subject #1, 5, 12

- 23.1% have parents who give them some encouragement to engaging in physical activity at least 3/wk for at least 20 min. or more
subject # 8, 9, 10

Note: for everybody else their parents were either neutral or the question did not apply

c2103

- 15.4% have children who give them a lot of encouragement to engaging in physical activity at least 3/wk for at least 20 min. or more
subject # 2, 3

- 15.4% have children who give them some of encouragement to engaging in physical activity at least 3/wk for at least 20 min. or more
subject # 1, 4

c2104

- 7.7% have other members of the family who greatly encourage them to engaging in physical activity at least 3/wk for at least 20 min. or more
subject # 5

- 15.4% have other members of the family who give them some encouragement to engaging in physical activity at least 3/wk for at least 20 min. or more
subject # 9, 10

Note: for everyone else, their family members are either neutral or they don't have any family

c2105

- 23.1% receive some encouragement from close friends to engaging in physical activity at least 3/wk for at least 20 min. or more
subject# 8, 9, 12,

- 7.7% receive a lot of encouragement from close friends to engaging in physical activity at least 3/wk for at least 20 min. or more
subject # 13

c2106 : this question does not apply since nobody had an employer

c2107

- 15.4% receive a lot of encouragement from their doctor to engaging in physical activity at least 3/wk for at least 20 min. or more
  subject # 1, 12

c2201

- 53.9% think that engaging in physical activity at least 3/wk for at least 20 min or more to the point of breathing more rapidly but still being able to speak ("a une grande depense énergétique") **greatly** help them to relax and forget about their problems
  subject # 1, 3, 4, 5, 9, 10, 12

- 30.8% think that engaging in physical activity at "une grande depense energetique" helps them **moderately** to relax and to forget about their problems
  subject # 2, 6, 7, 8

- 15.4% think that engaging in physical activity at "une grande depense energetique" does **not** help them to relax and to forget about their problems
  subject # 11,13

c2202

- 53.9% think that engaging in physical activity at "une grande depense energetique" **greatly** helps them to get together with other people
  subject # 2, 3, 4, 5, 6, 9, 10

- 23.1% think that engaging in physical activity at "une grande depense energetique" **moderately** helps them to get together with other people
  subject # 1, 8, 11

- 15.4% think that engaging in physical activity at "une grande depense energetique" **does not** helps them at all to get together with other people
  subject # 7, 13

- 7.7% think that engaging in physical activity at "une grande depense energetique" **slightly** helps them to get together with other people
  subject # 12

c2203

- 69.3% think that engaging in physical activity at "une grande depense energetique" **greatly** helps them to have fun
  subject# 1, 3, 4, 5, 6, 9, 10, 11, 13

- 15.4% think that engaging in physical activity at "une grande depense energetique" **sightly** helps them to have fun
  subject # 7, 8

- 7.7% think that engaging in physical activity at "une grande depense energetique" **does not** helps them to have fun
  subject # 2

- 7.7% think that engaging in physical activity at "une grande depense energetique" **moderately** helps them to have fun
  subject # 12

c2204

- 100% think that engaging in physical activity at "une grande depense energetique" **does not** helps them to make money

c2205

- 38.5% think that engaging in physical activity at "une grande depense energetique" **greatly** helps them "vivre au grand air"
  subject # 1, 3, 5, 9, 11

- 38.5% think that engaging in physical activity at "une grande depense energetique" **does not** help them "vivre au grand air"
  subject # 2, 8, 10, 12, 13

-23.1% think that engaging in physical activity at "une grande depense energetique" **moderately** helps them "vivre au grand air"
  subject # 4, 6, 7

c2206

- 46.2% think that engaging in physical activity at "une grande depense energetique" **does not** help them at all to "soutenir la concurrence, a gagner"
  subject # 2, 5, 8, 11, 12, 13

- 30.8% think that engaging in physical activity at "une grande depense energetique" **greatly** helps them "soutenir la concurrence, a gagner"
  subject # 1, 3, 6, 10

- 15.4% think that engaging in physical activity at "une grande depense energetique" **moderately** helps them "soutenir la concurrence, a gagner"
  subject # 4, 9

- 7.7% think that engaging in physical activity at "une grande depense energetique" **slightly** helps them "soutenir la concurrence, a gagner"
  subject # 7

c2207

- 38.5% think that engaging in physical activity at "une grande depense energetique" **greatly** helps them to feel independent
  subject # 1, 2, 3, 6, 7

- 42.9% think that engaging in physical activity at "une grande depense energetique" **does not** help them to feel independent
subject # 5, 8, 10, 11, 12, 13

- 7.7% think that engaging in physical activity at "une grande depense energetique" **slightly** helps them to feel independent
subject # 4

- 7.7% think that engaging in physical activity at "une grande depense energetique" **moderately** helps them to feel independent
subject # 9

c2208

- 53.9% think that engaging in physical activity at "une grande depense energetique" **greatly** helps them to feel better mentally or "a vous sentir mieux mentalement"
subject # 1, 2, 3, 5, 6, 9, 10

- 23.1% think that engaging in physical activity at "une grande depense energetique" **slightly** helps them to feel better mentally or "a vous sentir mieux mentalement"
subject # 8, 12, 13

- 15.4% think that engaging in physical activity at "une grande depense energetique" **moderately** helps them to feel better mentally or "a vous sentir mieux mentalement"
subject # 4, 7

- 7.7% think that engaging in physical activity at "une grande depense energetique" **does not** help them to feel better mentally or "a vous sentir mieux mentalement"
subject # 11

c2209

- 76.9% think that engaging in physical activity at "une grande depense energetique" **greatly** helps them to feel better physically
subject # 1, 2, 3, 5, 8, 9, 10, 11, 12, 13

- 15.4% think that engaging in physical activity at "une grande depense energetique" **moderately** helps them to feel better physically
subject # 6, 7

- 7.7% think that engaging in physical activity at "une grande depense energetique" **slightly** helps them to feel better physically
subject # 4

c2210

- 46.2% think that engaging in physical activity at "une grande depense energetique" **greatly** helps them to learn new things and to challenge themselves to try new things
subject # 2, 3, 5, 7, 8, 9

- 23.1% think that engaging in physical activity at "une grande depense energetique" **moderately** helps them to learn new things and to challenge themselves to try new things
  subject # 4, 6, 12

- 23.1% think that engaging in physical activity at "une grande depense energetique" **does not** helps them to learn new things and to challenge themselves to try new things
  subject # 1, 11, 13

- 7.7% missing data - subject did not answer the question
  subject # 10

2211

- 61.5% think that engaging in physical activity at "une grande depense energetique" **greatly** helps improve appearances
  subject # 1, 2, 3, 6, 9, 10, 12, 13

- 23.1% think that engaging in physical activity at "une grande depense energetique" **does not** helps improve appearances
  subject # 4, 8, 11

- 15.4% think that engaging in physical activity at "une grande depense energetique" **moderately** helps improve appearances
  subject # 5, 7

c2212

- 69.2% think that engaging in physical activity at "une grande depense energetique" **greatly** helps them to maintain or loose weight
  subject # 1, 2, 3, 6, 7, 9, 10, 11, 12

- 23.1% think that engaging in physical activity at "une grande depense energetique" **moderately** helps them to maintain or loose weight
  subject # 5, 8, 13

- 7.7% think that engaging in physical activity at "une grande depense energetique" **slightly** helps them maintain or loose weight
  subject # 4

c2213

-69.2% think that engaging in physical activity at "une grande depense energetique" **does not** helps them to face difficult situations or look for adventure
  subject # 1, 2, 3, 5, 6, 8, 10, 11, 13

- 23.1% think that engaging in physical activity at "une grande depense energetique" **slightly** helps them to face difficult situations or look for adventure
  subject # 4, 9, 12

- 7.7% think that engaging in physical activity at "une grande depense energetique" **greatly** helps them to face difficult situations or look for adventure
subject # 7

c2214

- 84.6% think that engaging in physical activity at "une grande depense energetique" **greatly** helps improve or maintain physical fitness

- 15.4% think that engaging in physical activity at "une grande depense energetique" **moderately** helps improve or maintain physical fitness
subject # 7, 8

c2215

- 76.9% think that engaging in physical activity at "une grande depense energetique" **greatly** helps improve or maintain cardiovascular fitness
subject # 1, 2, 4, 5, 6, 9, 10, 11, 12, 13

- 15.4% think that engaging in physical activity at "une grande depense energetique" **does not** help improve or maintain cardiovascular fitness
subject # 3, 8

- 7.7% think that engaging in physical activity at "une grande depense energetique" **moderately** helps improve or maintain cardiovascular fitness
subject # 7

c2216

- 69.2% think that engaging in physical activity at "une grande depense energetique" **greatly** helps to develop muscle strength and endurance or maintain it at the same level
subject # 2, 3, 4, 6, 9, 10, 11, 12, 13

- 30.8% think that engaging in physical activity at "une grande depense energetique" **moderately** helps to develop muscle strength and endurance or maintain it at the same level
subject # 1, 5, 7, 8

c2217

- 53.9% think that engaging in physical activity at "une grande depense energetique" **greatly** helps to increase or maintain flexibility
subject # 1, 3, 4, 6, 9, 12, 13

- 30.8% think that engaging in physical activity at "une grande depense energetique" **moderately** helps to increase or maintain flexibility
subject # 2, 5, 7, 11

- 15.4% think that engaging in physical activity at "une grande depense energetique" **does not** helps to increase or maintain flexibility
subject # 8, 10

c2300

- 61.5% agree that they are free to decide that if they wanted to, they could easily participate in physical activity 3/wk for at least 20 min at a certain intensity that causes you to breath more rapidly while still able to speak
  subject # 1, 5, 7, 8, 9, 10, 12, 13

- 23.1% totally disagree that they are free to decide that if they wanted to, they could easily participate in physical activity 3/wk for at least 20 min at a certain intensity that causes you to breath more rapidly while still able to speak
  subject # 2, 3, 4

- 15.4% feel that they have some degree of freedom to decide that if they wanted to, they could easily participate in physical activity 3/wk for at least 20 min at a certain intensity that causes you to breath more rapidly while still able to speak
  subject # 6, 11

c2400

- 38.5% think that in the coming year they will start to participate in physical activity at least 3/wk, for at least 20 min. or more each time
  subject # 7, 8, 9, 12, 13

- 30.8% think that in the coming year they will start to participate in physical activity at least 1-2/wk, for at least 20 min. or more each time
  subject # 1, 2, 5, 10

- 30.8% will not start exercising in the coming year
  subject # 3, 4, 6, 11

2500

- 84.6% think that it is **very important** to engage regularly in physical activities such as sport, exercise, or games

- 15.4% think that it is **important** to engage regularly in physical activities such as sport, exercise, or games
  subject # 4, 7

Physical Activity Levels Post-Injury Compared to Pre-Injury Levels

Variables	Sedentary (n=5)	Moderately Active (n=3)	Active (n=5)	Total %
- Participating in less of physical activity compared to pre-injury levels	5	3	2	76.92
- No change in physical activity level compared to pre-injury levels	0	0	1	7.69
- Participating in more physical activity compared to pre-injury level	0	0	2	15.38

Spearman Rho Correlations Coefficients Among Barriers Towards Physical Activity Participation and Demographic Data

Barriers Towards Physical activity	Age	Glasgow Coma Scale	Duration of Coma (days)	Duration of Rehabilitation (years)	Duration of Community Re-entry (years)	Time Since Injury (years)
- out of breath	-.3388 (.257)	-.3322 (.267)	.2168 (.477)	.5768 (.039)*	.4060 (.169)	.4737 (.102)
- fatigue	-.4956 (.085)	-.5905 (.034)*	.3717 (.211)	.1034 (.737)	.4124 (.161)	.4536 (.119)
- manual dexterity	-.1113 (.717)	.6128 (.026)*	-.1423 (.643)	.2911 (.335)	-.1606 (.600)	-.0124 (.968)
- avoids meeting others	-.4986 (.083)	-.2278 (.454)	-.5774 (.039)*	-.2847 (.346)	-.0874 (.777)	-.0349 (.910)
- lack of initiative	.1350 (.660)	-.5996 (.030)*	.1906 (.533)	-.0557 (.856)	.2224 (.465)	.0842 (.784)
- lack of transportation	-.5460 (.054)*	.2263 (.457)	-.3798 (.201)	-.1664 (.587)	-.4899 (.089)	.4425 (.130)
- leisure program of interests not in neighbourhood	-.2761(.361)	.0757 (.806)	-.5741 (.040)*	-.4299 (.143)	-.5380 (.058)*	-.4943 (.086)
- adapted leisure program not accessible	-.2437 (.422)	-.1653 (.589)	-.5711 (.041)*	-.4601 (.114)	-.2935 (.330)	-.3010 (.318)
- winter climate	-.3804 (.200)	-.1042 (.735)	.0557 (.857)	.4460 (.127)	.4633 (.111)	.5745 (.040)*

* $p<0.05$

Spearman Rho Correlation Coefficients Among Barriers Towards Pysical Activity and Community Integration Questionnaire (pvalues)

Barriers	Run Errands	Meal Preparation	House-Work	Plan Social Arrangement	Personal Finances	Frequency of Shopping	Frequency of Leisure Activities	Home Integration	Total Community Integration
- fatigue	-.1016 (.741)	-.2983 (.322)	-.0443 (.886)	.1108 (.719)	.0000 (1.00)	-.6464 (.017)*	.4130 (.161)	.0415 (.893)	.2062 (.499)
- talking/self expression	.5394 (.057)*	-.1675 (.584)	-.0834 (.787)	.4365 (.136)	.3674 (.217)	.1430 (.641)	.0457 (.882)	.2477 (.415)	.5839 (.036)*
- vision	-.2864 (.343)	-.2488 (.412)	.3125 (.299)	-.5545 (.049)*	.5575 (.048)*	-.4051 (.170)	.0979 (.750)	.3268 (.276)	-.2866 (.343)
- equilibrium	-.1944 (.524)	.0878 (.775)	.6038 (.029)*	-.3394 (.257)	-.4541 (.119)	-.2750 (.363)	-.0659 (.831)	.0137 (.964)	-.0182 (.953)
- walking	-.1336 (.664)	-.1473 (.631)	.1869 (.541)	-.2246 (.461)	-.3762 (.205)	-.6167 (.025)*	.0657 (.831)	-.2037 (.505)	-.2073 (.497)
- manual dexterity	.1217 (.692)	.2955 (.327)	.8300 (.000)*	-.0730 (.813)	-.0711 (.818)	-.0215 (.944)	-.2612 (.389)	.3913 (.186)	.2594 (.392)
- lack initiative	-.1577 (.607)	-.4349 (.138)	-.6592 (.014)*	.1413 (.645)	.1454 (.636)	.0469 (.879)	.2943 (.329)	-.3727 (.210)	.0034 (.991)
- scared anxious	-.3578 (.230)	-.2176 (.475)	.0140 (.964)	.2663 (.379)	-.1179 (.701)	-.7590 (.033)*	.0560 (.856)	-.3315 (.269)	-.3017 (.316)
- organisation	.4491 (.124)	.0647 (.834)	-.1571 (.608)	.1132 (.713)	-.0543 (.860)	.0931 (.762)	.5754 (.040)*	.1012 (742)	.1760 (.565)
- avoid meeting others	-.2797 (.355)	-.4423 (.130)	-.1456 (.635)	-.4273 (.145)	-.0251 (.935)	-.5934 (.033)*	.3159 (.293)	-.5227 (.067)	-.2184 (.473)
- get angry quickly	.3951 (182)	.6441 (.017)*	.5439 (.055)*	.3307 (.270)	-.1678 (.584)	.1270 (.679)	.1931 (.527)	.6114 (.026)	.3587 (.229)
- lack transportation	-.2725 (.368)	-.5891 (.034)*	-.0934 (.761)	-.6031 (.029)*	-.0455 (.883)	-.6331 (.020)*	.3605 (.226)	-.5482 (.052)*	-.4267 (.146)
- lack personal discipline	-.1219 (.692)	.1183 (.700)	.3459 (.247)	.0642 (.835)	.0000 (1.00)	-.0964 (.754)	-.7274(.005)*	.0000 (1.00)	.1572 (.608)

*$p \leq 0.05$

Spearman Rho Correlations Between Community Integration and Other Variables

Variables	Age	Duration of Coma (days)	Duration of Community Reintegration	Time since Injury	Home Integration	Social Integration	Productive Activity	Total Community Integration
Home Integration	-.0788 (.798)	.3195 (.287)	.4088 (.165)	.4890 (.090)		-1182 (.701)	.0816 (.791)	.6409 (.018)*
- running errands	.2507 (.409)	.1830 (.550)	.3654 (.220)	.4466 (.126)	.8165 (.001)*	.1516 (.621)	-.0833 (.787)	.6902 (.009)*
- plan social arrangements	.2543 (.402)	.6861(.010)*	.6940 (.008)*	.6822 (.010)*	.6622 (.014)*	.2376 (.434)	.4219 (.151)	.7206 (.005)*
Social Integration	-.0210 (.946)	-.1401(.648)	.1958 (.521)	.1287 (.675)	.1182 (.701)		.2860 (.344)	.6295 (.021)*
- frequency of shopping	.4696 (.105)	.1150 (.708)	.2488 (.421)	.2105 (.490)	.5196 (.069)	.3460 (.247)	-.1532 (.617)	.5933 (.033)*
Productive Activity	.0203 (.947)	.3456 (.247)	.3722 (.210)	.3383 (.258)	.0816 (.791)	.2860 (.344)		.4398 (.133)
Total Community Integration	-.0083 (.979)	.1651 (.590)	.4505 (.122)	.4780 (.098)	.6409 (.018)*	.6295 (.021)*	.4398 (.133)	

* $p<.0.05$

ANNEXE D

REPAR Conference

Physical Activity Profile of Individuals Who Have Sustained a Traumatic Brain Injury - Post Community Re-Integration

Concetta Pantalena, B.Sc.; John S. Sullivan, Ph.D.; Elisabeth Dutil, M.Sc.

INTRODUCTION

Physical activity (PA) can play an important role in a multidisciplinary rehabilitation program for individuals who have sustained a traumatic brain injury (TBI). Reduced physical work capacity and fatigue is an important and common problem for this clientele (Becker et al., 1979). It can be a limiting factor to performing activities of daily living, leisure and work, influencing quality of life. The basic purpose of PA is to enhance the quality of life by reducing the period of convalescence, improving physical work capacity and decreasing fatigability (Jankowski & Sullivan,1990). Physical activity may also aid in the development of psychological aspects such as self-concept, self-esteem, body image and social adjustment (Silva & Klalsky, 1984).

Few studies have evaluated PA habits of persons who have sustained a TBI post community re-integration. A better understanding of PA habits and limiting factors is needed in order to provide better services. The present research describes the PA profile of adults who have sustained a moderate or severe TBI, who have been re-integrated in society for at least 1 year.

METHODS

A sample of thirteen (8 men, 5 women) subjects between 21-55 yrs of age, who had sustained a moderate (Glasgow Coma Score(GCS) 8-12) or severe (GCS 3-7) TBI, were recruited from the same Centre, in which PA was an integral aspect of their rehabilitation program. Data was collected on one occasion only, in a calm, distraction free environment. Data was obtained by administering two questionnaires, the Campbell Survey which was adapted from the Canada Fitness Survey (Stephens & Craig, 1990) and The Leisure Profile (Dutil & Forget, 1991) in the same order, during a semi-structured interview, with a five minute break between each questionnaire. Each interview and analysis was conducted by the same evaluator.

Descriptive statistics were calculated for the following variables: level and type of PA, area of participation and with whom they participated and barriers towards PA.

RESULTS

Subjects were classified as active, moderately active and sedentary according to the frequency of participation as defined in the Canada Fitness Survey: active >3/wk for >9 mth/yr, moderately active <3/wk for > 9 mth/yr, and sedentary <3/wk for <9 mth/yr. A greater percentage of the participants enjoy an active (38,46%) or a moderately active (23,08%) lifestyle and 38,46% were sedentary. Gender did not appear to influence PA level, however age does seem to have an influence with the older subjects (42-55 yrs old) being more sedentary. All the subjects participate in solitary type PA, the most popular being: biking, swimming. physical conditioning, gardening and skiing. The majority participate in these activities alone. Fifty percent of the actives and moderately active subjects engage regularly in PA at their former rehabilitation centre. Others participate regularly in PA either outside or at a public physical conditioning

This work was completed in partial fulfilment of Mrs. Pantalena's Masters thesis supervised by S. John Sullivan and Elisabeth Dutil at Université de Montréal.

centre, without specialized equipment (Table 1). All subjects believe it is important to engage in regular PA and believe that it can improve/maintain physical fitness, muscle strength and endurance. However, the subjects were not as aware of the possible positive influence of regular PA on cognitive abilities, social relations and behavioural abilities such as: feeling better mentally, getting together with other people and having fun. Physical impairments are the primary obstacle that limits PA participation irrelevant of their PA classification level. Fatigue and equilibrium limit the majority of sedentary and moderately active subjects, manual dexterity limits all the subjects and visual disabilities limits some of the active participants. Winter climate was the main environmental barrier towards PA participation for most moderately active and sedentary subjects.

Table 1.
Areas of Physical Activity Participation

Area	Active	Moderate	Sedentary
- outside	20%	33.3%	60%
- rehabilitation centre	40%	66.7%	0%
- public physical conditioning centre	40%	0%	0%
- home	0%	0%	20%
- no PA	0%	0%	20%

DISCUSSION

Fatigue was the main limitation towards participating in more PA for most moderately active and sedentary individuals. Not surprisingly, fatigue was not a limiting factor for any of the active subjects. This lends support that regular PA decreases fatigability and increase physical work capacity. Therefore individuals perform activities of daily living more efficiently, thus having ample reserved energy for other activities. Surprisingly, half of the moderately active and active individuals have not adapted to their environment but kept returning to the security of their former rehabilitation centre to participate in PA even after one year post discharge. Most claim to return to the Centre because they feel "at home". Not only do they return to a protective environment but they also only participate in solitary PA. These results suggest that this clientele needs to develop social skills and how to use PA not only as a means to increase and maintain health but as a milieu to in courage social interaction.

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ANNEXE E

12 th International Conference Of The World Federation Of Occupational Therapy

Physical Activity Profile Towards Community Reintegration of Individuals Who Have Sustained a Traumatic Brain Injury

(Abstract 1164)

Concetta Pantalena, B.Sc.,[1-2] S. John Sullivan, Ph.D.,[2-3] Elisabeth Dutil, M.Sc., O.T. (C)[1-2]

1. École de Réadaptation, Faculté de Médecine, Université de Montréal
2. Centre de Recherche, Institut de Réadaptation de Montréal
3. School of Physiotherapy, Division of Health Science, University of Otago, New Zealand

INTRODUCTION

Traumatic brain injury (TBI) may cause temporary or permanent physical, cognitive and behavioural impairments and disabilities. The combination of the latter and environmental factors can create situations of handicap (ICIDH International Network, 1991) which can greatly impact on successful community reintegration and the overall quality of life. The primary goal of rehabilitation is to ensure the individual acquires the necessary skills and the level of independence to assure optimal community reintegration. Physical activity (PA) can play an important role in a multidisciplinary rehabilitation program for individuals who have sustained a TBI. Reduced physical work capacity and fatigue is an important and common problem for this clientele (Becker et al., 1979). It can be a limiting factor in performing activities of daily living, leisure and work, influencing quality of life. The basic purpose of PA is to enhance the quality of life by reducing the period of convalescence, improving physical work capacity and by decreasing fatigability (Jankowski & Sullivan,1990). Physical activity may also aid in the establishment of psychological factors such as self-concept, self-esteem, body image and social adjustment (Silva & Klalsky, 1984).

Few if any studies have evaluated PA habits of persons with a TBI post discharge from a rehabilitation centre and its possible influence on community reintegration. The present research describes the PA profile and the level of community reintegration of adults who have sustained a moderate or severe TBI, who have been reintegrated in society for at least 1 year.

METHODS

A sample of thirteen (8 men, 5 women) subjects between 21-55 yrs of age, who had sustained a moderate (Glasgow Coma Score (GCS) 8-12) or severe (GCS 3-7) TBI, were recruited from the same Centre, where PA was an integral aspect of their rehabilitation program. Data were collected on one single occasion, in a calm, distraction free environment. Data were obtained by administering 3 questionnaires, the Campbell Survey which was adapted from the Canada Fitness Survey (Stephens & Craig, 1990), the Leisure Profile (Dutil & Forget, 1991) and the Community Integration Questionnaire (Allen et al., 1990), in the same order, during a semi-structured interview. Each interview and analysis was conducted by the same evaluator.

This work was completed in partial fulfilment of Mrs. Pantalena's Masters thesis supervised by S. John Sullivan and Elisabeth Dutil at the Université de Montréal.

Descriptive statistics were calculated for; the level and type of PA; area of participation; with whom they participated; home integration; social integration and productive activity involvement.

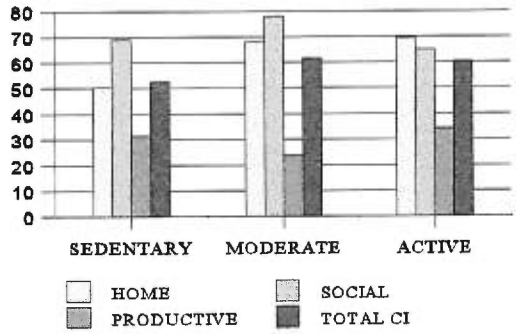

Figure 4: Level of Community Reintegration

RESULTS

Subjects were classified as active, moderately active and sedentary according to the frequency of participation as defined in the Canada Fitness Survey: active >3/wk for >9mth/yr, moderately active <3/wk for >9mth/yr or >3/wk for <9mth/yr and sedentary <3/wk for <9 mth/yr. A greater percentage of the participants enjoyed an active (38,46%) or a moderately active (23,08%) lifestyle and 38,46% were sedentary. All the subjects participated in solitary type PA and the majority participated in these activities alone. Fifty percent of the active and moderately active subjects engaged regularly in PA at their former rehabilitation centre. Others participated regularly in PA either outside or at a public physical conditioning centre, without specialized equipment. All subjects believed it was important to engage in regular PA and believed that it could improve/maintain physical fitness, muscle strength and endurance. Physical impairments are the primary obstacle that limits PA. Fatigue and equilibrium limit the majority of sedentary and moderately active subjects, manual dexterity limits all the subjects and visual disabilities limits some of the active participants.

Home integration was assessed by evaluating whether the following 5 items were performed by the client alone, with help or performed by someone else: running errands, cooking, housework, child care and planning social arrangements. The majority of subjects were well integrated into the home. Furthermore results showed that sedentary individuals were less integrated in the home ($\bar{x}$ = 50,36), when compared to moderately active ($\bar{x}$ = 68,10) and active subjects ($\bar{x}$ = 69,46) (see figure 1).The level of social integration was evaluated by assessing the frequency of participation in activities outside the home and with whom they participated. Results showed that more than half participated in social activities more than once per month and that 53,9% had not developed relationships outside of their family or with persons without head injuries with whom they could participate in leisure activities. In addition, active persons ($\bar{x}$ = 65,00) were least socially integrated when compared to moderately active ($\bar{x}$ = 77,81) and sedentary persons ($\bar{x}$ = 69,34) (see figure 1). Furthermore, 100% were not engaged in competitive employment, were not looking for work and were not attending school. Only, 15,38% participated in volunteer work 5 or more times per month and 7,69% participated 1-4 times per month. Total community integration was assessed by combining the 3 subdivisions listed above. The results indicate that physically active and moderately active persons were better integrated ($\bar{x}$ = 60,26 and $\bar{x}$ = 61,56 respectively) when compared to sedentary persons ($\bar{x}$ = 52,54) (see figure 1).

DISCUSSION

Fatigue was the main limitation towards participating in more PA for most moderately active and sedentary individuals. Not surprisingly, fatigue was not a limiting factor for any of the active subjects which lends support that regular PA decreases fatigability and increases physical work capacity. However, active individuals were the least socially integrated. This

may be because most moderate and active persons returned to their formal rehabilitation centre 2-3 times per week to participate in PA. Most claim to return to the Centre because they feel "at home". Not only do they return to a protective environment but they also only participate in solitary PA which collectively reduces their opportunity to meet and develop new relationships.

Due to the small sample size it was not surprising that 100% were unemployed and furthermore, the employed persons eligible for the study refused to participate due to a lack of time and fatigue. Nonetheless, other studies have reported a low return to work rate post brain injury (Dawson & Chipman, 1995). Furthermore, 15,38 % of persons who participated in volunteer work were physically active and overall, active and moderately active persons were better integrated into the community than sedentary persons, thus indicating that there may be a relationship between PA level and community reintegration. Further studies need to be conducted to determine how and to what extent PA may possibly influence community reintegration. In addition, even one year post discharge from a rehabilitation program this clientele still needs to be followed by occupational therapists to ensure better community reintegration.

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