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OUTCOMES OF ACTIVITY PARTICIPATION IN INDIVIDUALS  
WITH SPINAL CORD INJURY.

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This study compared the influence of various types of activities an individual participates in one year after sustaining a spinal cord injury (SCI) with different levels of community integration (CI) one and five years post-discharge, and determined if there was longitudinal change in CI. CI was measured by Craig Handicap Assessment and Reporting Technique (CHART), with the Occupation domain representative of an individual's level of activity participation. Results from analyses (N=69) demonstrated that activity participation is correlated with all other CHART domains (Physical Independence, Social Integration, Mobility). While the three CHART domains were all predicted by hours spent in different activities, recreation was the only activity that significantly predicted Social Integration at year 1 and also influenced Mobility scores. The only longitudinal change found in CI was increased hours at a paid job. Results suggest the importance of utilizing various activities to address outcomes in the community during SCI rehabilitation.



OUTCOMES OF ACTIVITY PARTICIPATION IN  
INDIVIDUALS WITH SPINAL CORD INJURY

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## *Introduction*

Existing research demonstrates the importance of rehabilitation for individuals with spinal cord injury (SCI) (Inman, 1999). Rehabilitation programs typically address a variety of treatment goals related to increasing an individual's functional independence in physical, cognitive, social and emotional domains, which in turn allows for enhanced quality of life and community integration (Magasi, Heinemann, & Whiteneck, 2007). Recreational therapy (RT) is an important contributor to SCI rehabilitation, often focused to address community integration goals through a variety of activities (Sable & Gravink, 1999). However, there is very little known about specific time periods post-injury that are associated with increased activity participation and community integration in the years that follow. Therefore, the primary purpose of this study was to compare the influence of various types of activities (i.e., education, employment, home-making, home maintenance, and recreation) on different levels of community integration in individuals with spinal cord injury after one and five years post-discharge. The secondary purpose of this study was to determine if specific levels of community integration changed over a five year period.

## *Spinal Cord Injury*

Each year over 12,000 individuals experience spinal cord injuries (SCI) as a result of an accident typically involving a fall, vehicular crash, sporting accident, or act of violence (National SCI Statistical Center, 2010). Damage to the spinal cord can result in varying levels of injury, but conditions reported by the National SCI Statistical Center (2010) include incomplete tetraplegia (38.3%), complete paraplegia (22.9%), complete tetraplegia (16.9%), and incomplete paraplegia (21.5%). Of these 12,000 individuals, 80.8% are males with an average age of 40.2 years. However, due to advanced rehabilitation techniques, 87.8% of these individuals are

successfully discharged to a non-institutionalized residence and re-integrated into the community (National SCI Statistical Center, 2010).

### *SCI Treatment and Rehabilitation*

SCI rehabilitation programs focus mainly on goals to optimize physical function, assist in emotional adaptation, facilitate social independence, reduce both primary and secondary medical complications, and facilitate community reintegration (Inman, 1999). During SCI rehabilitation, patients typically work with a variety of professionals including physical therapists (PT), occupational therapists (OT), speech language pathologists (SLP), psychologists, and recreational therapists (RT).

Recreational therapy (RT) has quickly become a vitally important contributor to rehabilitation programs, including that of SCI rehabilitation (Inman, 1999). RT programs may include a variety of treatment interventions with goals to improve patient functional independence in the physical, cognitive, social, and emotional domains. RT programs also generally provide assistance in community reintegration and opportunities for activity participation (Inman, 1999). Researchers suggest that individuals with disabilities who remain active enjoy a variety of emotional and physical health benefits as well as increased levels of independence (Slater & Meade, 2004). Other studies demonstrate that participation in various activities can positively influence the quality of life, overall health, family life and social life of individuals with disabilities (Zabriskie, Lundberg, & Groff, 2005). However, individuals with SCI often face many barriers to community integration and activity participation including issues of accessibility, pain, lack of information, and psychological barriers (Martin et al., 2002). This further supports that community integration and activity participation are important goals for recreational therapists to address with patients during rehabilitation.

### *Community Integration*

Community integration refers to an individual's ability to be an active member of society (Whiteneck et al., 1999), and involves re-establishing previously existing roles and relationships (Charlifue & Gerhart, 2004). One measure of the success of SCI rehabilitation is the level of participation within the community post-discharge (Charlifue & Gerhart, 2004). Community integration has been identified as a key component and contributor to quality of life for individuals with SCI (Dijkers, 1997), even more so than functional performance or level of impairment (Magasi et al., 2007). Various studies have found there is a significant relationship between quality of life of individuals with SCI and scores of community integration (Chun et al., 2008) on both an individual and societal level (Charlifue & Gerhart, 2004). Stancliffe et al. (2001) also suggested that community integration is in fact the most effective method of promoting positive life experiences for individuals with disabilities.

It is also important to note that community integration may also relate to one's progression through the natural stages of aging. More specifically, it has been found that as individuals with SCI age, integration within the community decreases (Charlifue & Gerhart, 2004). Although social participation may change due to the typical transitions associated with aging (i.e., retirement, loss of family/friends), decline in community integration over time is also associated with decreased quality of life (Charlifue & Gerhart, 2004). In one particular longitudinal study, it was found that there is a general decline in community integration over time in terms of mobility, physical independence, social integration, and occupation (Charlifue & Gerhart, 2004). Although older adults may be associated with a decreased level of community integration, other longitudinal research indicates that longer periods post-injury are actually associated with *greater* community integration (Conroy & McKenna, 1999; Whiteneck, Tate, &

Charlifue, 1999). The study findings related to the passage of time and community integration are somewhat conflicting, which demonstrates a need for further research and clarification..

### *Influence of Activity Participation in SCI*

Several studies illustrate the importance of individuals with SCI being involved in various activities whether they are occupational, educational, recreational, or avocational in nature. One study confirmed that although many adjustments must be made following a SCI accident, participation in various activities can help the process of adjustment (Boschen, Tonack, & Gargaro, 2003). Further findings suggest that life satisfaction and self-perceived health are significantly greater for individuals who are actively involved in various activities (Richards et al., 2009). Some studies have demonstrated a strong correlation between employment-related activities, quality of life, and adjustment following injury (Krause, 1990). Other types of activities such as educational pursuits, home-making, and volunteering have also been associated with increased quality of life and adjustment to injury, but not to the same level as employment (Krause & Anson, 1997). McVeigh, Hitzig, and Craven (2009) noted that involvement in recreation and sports-related activities especially lead to increased community integration of individuals with SCI; scores on Community Integration Questionnaire (CIQ) were 4.75-7.00 times higher among sport participants compared to non-sport participants. When examining the benefits of a community-based therapeutic recreation and adaptive sports program for individuals with various disabilities, Zabriski et al. (2005) observed that participation influenced quality life, specifically family and social life and overall health. Furthermore, it has been reported that athletes have a lower incidence of hospitalizations and other medical complications (Levins, Redenback, & Dyck, 2004) and that maintaining good health actually requires an individual's involvement in different types of activities (Noreau & Fougere, 2000).

Researchers have also observed that individuals with SCI who are highly active show lower levels of depression and anxiety and increased levels of vigor (Muraki, Tsunawake, Hiramatsu, & Yamasaki, 2000).

### *Summary*

The research presented demonstrates that community integration is an important component of SCI rehabilitation and there are a variety of factors that can influence levels of community integration. Activity participation is only one facet of community integration; however, there is a multitude of supporting research that documents beneficial outcomes that can result from participation in various activities. What remains relatively unknown is the influence of participation in specific activities on community integration, in addition to specific time periods post-injury that are associated with increased participation and community integration in the years that follow. Therefore, the primary purpose of this study was to compare the influence of various types of activities an individual participates in one year after sustaining a spinal cord injury with different levels of community integration one and five years post-discharge. The secondary purpose of this study was to determine if specific levels of community integration changed over a five year period.

## METHODS

### *Sample*

The sample included 69 individuals with SCI who received treatment at a spinal cord injury rehabilitation facility in the western United States and completed a five year Craig Handicap Assessment and Reporting Technique (CHART) assessment between January 1, 2008 and December 31, 2009. The study facility is one of fourteen model SCI hospitals in the National Spinal Cord Injury Statistical Center (NSCISC) database. NSCISC provides data that represent

the approximately 259,000 individuals in the United States with SCI. Participant characteristics in this study included: (a) 73.9% male, (b) mean age at injury = 34.8 years (SD = 14.33) with a range of 16-78 years, (c) 50.7% single, (d) 68.1% working at time of injury, (e) 94.2% Caucasian, and (f) mean length of inpatient rehabilitation = 83.14 days (SD = 33.03).

#### *Data Collection Procedures*

Data were collected using preexisting electronic documentation records from the NSCISC database. Permission to use the electronic data was provided by the SCI Model System Data Coordinator for the purposes of this investigation. The electronic data included the following information for each individual: one and five year post-discharge CHART scores (individual responses and total domain scores), date of birth, marital status, level of education, occupational status, age at injury, gender, race, etiology of injury, length of stay (acute), length of stay (rehabilitation), neurologic level of function at discharge, category of neurologic impairment at discharge, American Spinal Injury Association (ASIA) impairment scale at discharge and ASIA Motor Index Score at discharge. All electronic data were stripped of identifiers by the rehabilitation facility before it was provided to the researcher to ensure patient anonymity.

#### *Instrumentation*

CHART is an instrument that measures an individual's level of handicap and quantifies how integrated he/she is in the community. CHART is typically given through interviews administered by a trained professional and takes approximately fifteen minutes to complete. Approximately 40-50% of the individuals at all of the fourteen Model SCI hospitals complete the CHART following discharge at the 1 year, 5 year, and 10 year intervals. CHART scores are

stripped of identifiers and stored in the database along with other demographic and treatment information for research purposes.

CHART consists of six domains: Mobility, Occupation, Social Integration, Physical Independence, Economic Self-sufficiency, and Orientation, which are based on six different dimensions that World Health Organization (WHO) uses to describe an individual's level of handicap. Each domain consists of multiple objective questions that are quantitatively scored. The score in each domain can be a maximum of 100 (indicating "no handicap"); the six scores are then added together for a total CHART score (maximum of 600) (Whiteneck et al., 1992).

The CHART data that are stored in the NCISCI database, however, contains scores for only four of these domains: Physical Independence, Mobility, Occupation, and Social Integration. The information in the other two domains (Economic Self-Sufficiency and Orientation) was collected in a different format for database records. Therefore, only these four sub scores were examined in the analyses. Since only four of the six domains are accessible, no total CHART score were able to be calculated. The following describes how each measure was collected: *Occupation scores* were determined by five questions regarding hours spent each week working, schooling, homemaking, volunteering, or in recreational pursuits. In this study, the Occupation domain was used as the activity participation variable. Since the word "occupation" is commonly associated with employment rather than all of the activities included in the CHART Occupation domain, the word activity participation was used as a term synonymous with all of the associated activities. *Physical Independence* was determined by two questions regarding the number of hours per day that care is provided. The *Mobility* domain was determined by three questions regarding hours per day out of bed and out of the house. Lastly, the *Social Integration*

domain was determined by five questions regarding household composition, contact with relatives and friends and romantic involvement.

Since each domain has a different number of questions, a weighting system was created so that each domain could have a maximum of 100 points (Whiteneck, 1992). When the CHART scoring system was created, a strategy developed by DeJong and Hughes (1982) was used to assign a higher weight to items that are considered more significant to society. For example, the developers of the instrument concluded that within the Occupation domain, there is often a higher societal value placed on work, school, or homemaking, rather than on volunteer work, recreation, or other self-improvement activities. Therefore, the items that were deemed of higher importance were given twice the weight than the other “less important” activities. However, in this particular study, the actual pre-weighted hours spent per week were examined in the occupation domain to avoid any statistical bias created by post-data collection weighting.

CHART has good test-retest reliability (Walker et al., 2003), established content validity, a satisfactory separation of items along the variable of handicap (Whiteneck et al., 1992) in addition to sound internal consistency, discriminant validity (Mellick et al., 1999), and concurrent validity (Segal & Schall, 1995).

### *Data Analysis and Results*

A series correlation and multiple regression analyses (employing the enter method) were used to determine if there was a relationship between the various types of activities an individual participates in one year after sustaining a spinal cord injury with different levels of community integration. Initially, correlation analyses were run between the demographic and total CHART score variables to determine if there were specific variables that explained a significant percentage of the variance and would subsequently need to be controlled in the regression



equations. The initial analyses between the demographic variables and total CHART scores showed that the only variable significantly correlated with all CHART scores was Hispanic status. However, since only 8 individuals (11.6%) were of Hispanic status, this variable was not entered into the regression equations because of the small population percentage.

In the first series of correlation analyses, year 1 CHART Occupation scores were correlated with Social Integration, Mobility, and Physical Independence Year 1 and 5 CHART scores. The results of the correlation analyses indicated that all CHART domains at 1 and 5 years were significantly correlated with Year 1 Occupation CHART scores (See Table 1).

*Table 1: Correlation Analyses between Year 1 Occupation CHART Scores and Year 1 and 5 Social Integration, Mobility and Physical Independence CHART Score*

Year 1 Occupation CHART Score		
CHART Score Variables	<i>r</i>	<i>p</i>
Year 1 Social Integration	.263	.000
Year 1 Mobility	.467	.000
Year 1 Physical Independence	.239	.000
Year 5 Social Integration	.114	.007
Year 5 Mobility	.177	.001
Year 5 Physical Independence	.189	.000

To specifically determine what contribution different types of activities influenced Social Integration, Mobility, and Physical Independence scores, a series of multiple regression analyses were run. The independent variables (IV) entered into the regression equation were: hours spent in the five activities (at 1 year) that made up the CHART Occupation domain (paid job, school/study, homemaking, home maintenance, and recreation). The dependent variables (DV) were Physical Independence, Social Integration and Mobility Year 1 and 5 CHART scores. The

Year 1 regression analyses indicated that Recreation was the only activity that significantly predicted Social Integration scores ( $\beta = .334, p = .008$ ). Mobility scores were most predicted by hours at a paid job ( $\beta = .395, p = .001$ ) hours in school/study ( $\beta = .400, p = .000$ ), and hours in recreation ( $\beta = .245, p = .024$ ). Year 1 Physical Independence CHART scores were most predicted by hours in a paid job ( $\beta = .279, p = .031$ ), in school/study ( $\beta = .251, p = .032$ ), and homemaking ( $\beta = .305, p = .009$ ). Results of the regression analyses of the Year 5 series provided evidence that none of the activities significantly predicted Social Integration scores, and only hours at a paid job predicted Mobility ( $\beta = .302, p = .025$ ) and Physical Independence ( $\beta = .328, p = .018$ ) CHART scores (See Table 2).

*Table 2: Activity Influence on Social Integration, Mobility, & Physical Independence*

Variable	Social Integration		Mobility		Physical Independence	
	Year 1 <sup>a</sup>	Year 5 <sup>b</sup>	Year 1 <sup>c</sup>	Year 5 <sup>d</sup>	Year 1 <sup>e</sup>	Year 5 <sup>f</sup>
	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$
Paid Job	.242	.102	.395**	.302*	.279*	.328*
School/Study	.204	.261	.400**	.166	.251*	.052
Homemaking	.178	.221	.197	.122	.305**	.082
Home Main.	.106	.106	.185	.147	.127	.138
Recreation	.334**	.056	.245*	.079	-.005	.202

<sup>a</sup>R<sup>2</sup> = .127\* <sup>b</sup>R<sup>2</sup> = .056 <sup>c</sup>R<sup>2</sup> = .317\*\* <sup>d</sup>R<sup>2</sup> = .092\* <sup>e</sup>R<sup>2</sup> = .178\*\* <sup>f</sup>R<sup>2</sup> = .089

\*\* $p < .01$ . \* $p < .05$

To determine if there were longitudinal changes of community integration that occurred between one and five years, independent paired samples t-tests were run to examine changes in all four CHART domains. Results of these t-tests demonstrated that significant changes occurred only in the Occupation domain ( $p = .016$ ) (See Table 3). Mean total CHART scores at year 1 and 5 for the four domains were: Physical Independence (75.04 and 76.54), Mobility (83.13 and

83.58), Occupation (67.87 and 79.14) and Social Integration (95.71 and 94.02). A second set of paired samples t-tests were then run to determine specific changes that occurred in participation of the five activities provided in the Occupation domain. Result of these t-tests demonstrated that hours spent at a paid job was the only activity that demonstrated significance ( $p = .000$ ) (See Table 4). Average hours spent in the five activities provided in the Occupation domain at year 1 and 5 were: Paid Job (7.41 and 12.55), School/Study (3.91 and 6.22), Homemaking (10.26 and 12.22), Home Maintenance (2.59 and 2.26) and Recreation (22.39 and 24.07).

*Table 3: Summary of T-Tests Comparing One and Five Year CHART Scores*

Variables Tested	Physical Independence		Mobility		Occupation		Social Integration	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Year 1 Score	75.04	35.81	83.13	21.67	67.87*	34.95	95.71	13.03
Year 5 Score	76.54	33.02	83.58	23.21	79.14*	30.17	94.02	14.43

\*\* $p < .01$ . \* $p < .05$

*Table 4: Summary of T-Tests Comparing Hours of Specific Activity Participation at 1 & 5 Years*

Variables Tested	Paid Job		School/Study		Homemaking		Home Main.		Recreation	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Year 1	7.41**	16.81	3.91	8.47	10.26	14.93	2.59	7.13	22.39	19.76
Year 5	12.55**	20.22	6.22	14.84	12.22	14.50	2.26	4.81	24.07	23.74

\*\* $p < .01$ . \* $p < .05$

## DISCUSSION

The purpose of this study was to compare the influence of various types of activities an individual participates in one year after sustaining a spinal cord injury with different levels of community integration one and five years post-discharge. A secondary purpose of this study was to determine if specific levels of community integration changed over a five year period. Using

CHART Occupation domain scores to represent an individual's level of activity participation, it was found that Occupation scores were significantly correlated with Social Integration, Physical Independence, and Mobility CHART Scores at both 1 and 5 years. Results also demonstrated that the three CHART domains were all predicted by hours spent in different activities. The only measure of community integration that was found to significantly change over a five year period was the Occupation (activity participation) domain. When examining hours spent in specific activities within the Occupation domain, it was found that hours spent in a paid job significantly increased between one and five years.

### *Outcomes of Activity Participation*

In this study, activity participation was measured by the CHART Occupation domain. Results of the initial correlation analyses signify that Occupation (i.e., Activity Participation) scores were correlated with scores of Social Integration, Physical Independence, and Mobility at both one and five years. This relationship demonstrates the importance of being active in the realms of employment, schooling, home activities, and recreation. Individuals with SCI who are engaged in various activities are perhaps given more opportunities to socialize than those who have lower levels of activity involvement. Being involved in different activities is also associated with increased mobility within the community and higher levels of physical independence. However, these particular outcomes that result from activity participation are not well documented. Much of the research that examines levels of employment, education, or recreation in individuals with SCI typically measures these variables as the outcome or dependent on another variable. For example, Foreman, Cull, and Kirby (1997) reported that individuals who participate in recreation related activities are typically younger, sustained the SCI at a younger age, have a lower level injury, and a higher outcome than non-participants. In terms of

employment, it has been found that the being Caucasian, having more years of education and a lower level of injury are associated with increased likelihood of having a paid job (Krause et al., 1999). In studies that do examine outcomes of activity participation, dependent variables that are measured are typically subjective, psychological, or social in nature. It has been found that employment and education are associated with increased quality of life for individuals with SCI (Krause & Anson, 1997), and that recreation is often associated with various psychological gains and social benefits (Blinde & McClung, 1997).

#### *Outcomes of Specific Activity Participation in Community Integration*

After initial correlation analyses were performed, regression analyses were run to determine what contribution hours spent in different types of activities in the Occupation domain influenced Year 1 and 5 Social Integration, Mobility, and Physical Independence CHART scores. Results demonstrated that recreation was the only activity to significantly predict year 1 Social Integration scores. Previous studies have documented the importance of a social aspect in recreation participation for individuals with SCI. Levins et al. (2004) found that involvement in physical activity, including recreation activities, was important for not only social aspects of life, but for physical, spiritual, and emotional reasons. Additionally, Levins et al. found that the attitude and help of other participants in the physical activities was a large factor in regards to the social environment and in positively impacting overall life domain.

What is interesting to note, however, is that there was no longer a relationship between hours spent in recreation related activities and 5 year Social Integration CHART scores. In fact, results suggested that none of the five activities in the Occupation domain significantly predicted year 5 Social Integration scores. One explanation may be that once an individual with SCI is discharged from the rehabilitation hospital, they are typically provided with many different

resources in the community. They may still be in contact with their therapists and doctors, and have follow-up appointments at the hospital every couple months within that first year. In this first year, they are typically encouraged to get involved in different activities within their community. It has been suggested by Dattilo et al. (1998) that availability of different support networks decreases over time upon discharge of the rehabilitation hospital, but that recreation activity can help in establishing and developing social contacts.

In terms of identifying the specific activities that were associated with Year 1 outcomes in the Mobility and Physical Independence CHART domains, it was found that hours spent at a paid job, in school/study related activities, and recreational activities significantly predicted Mobility scores. The activities that significantly predicted Physical Independence scores were hours spent at a paid job, in school/study, and hours spent homemaking. Mobility outcomes resulting from having a job, being in school and recreating were not surprising. The mobility domain itself is measured by the number of hours out of bed and out of the house every week. If an individual with SCI has a job or is pursuing further education, he/she is probably leaving the home to participate in these activities. Additionally, since recreation activities predicted Year 1 Social Integration scores, it is likely that individuals are recreating and subsequently socializing outside of the home. Individuals with jobs, enrolled in school or recreating would probably need to at least be out of their bed, and in most situations away from home to successfully pursue these activities. Therefore, individuals who are active in home maintenance and home-making would have lower scores in this domain.

Similarly, it was not surprising that the regression analyses indicated hours spent a paid job and school were activities that predicted Year 1 Physical Independence scores. If a person is working or pursuing further education which will probably lead to future work, it would be

expected that these individuals would require less paid assistance. The homemaking variable was more surprising in predicting year 1 Physical Independence scores. A variable that could perhaps be partially responsible for these findings is environmental/living conditions of the individuals with SCI. If appropriate resources or living situations were not available or accessible to carry out basic activities within the home, the individual's level of handicap may increase (Noreau & Fougheyrollas, 2000). Since CHART measures handicap levels which then essentially translate into levels of community integration, it is possible that individuals who do *not* spend much time in homemaking related activities, are unable to do so if they do not live in a fully accessible environment. Therefore, if one does not have the means to an accessible living environment, it is possible that levels of physical independence will be indirectly influenced. Furthermore, level of injury was not correlated with CHART Physical Independence scores (which are measured by amounts of paid and unpaid assistance), so it is probable that even if individuals had a lower level of injury, but did not live in a fully accessible home, that they would require more assistance, thereby participating in less home related activities. Richards et al. (1999) actually found that access to the environment explained more variance than demographic variables and health complications in CHART Occupation and physical functioning scores in individuals with SCI. In this particular study, the dataset did not include information related to the environmental conditions of the individuals, so it is unknown the possible influence that accessible living had on total CHART scores.

In terms of specific activities predicting Year 5 CHART scores, hours at a paid job was the only activity that significantly predicted Mobility and Physical Independence scores. Since Year 1 Mobility scores were predicted by the same variable, the reasons probably remain the same five years later. Similarly, when individuals of any ability have a job, it is usually

associated with more independence. Therefore, the fact that hours spent in a paid job at year 1 predicted year 5 Physical Independence scores was not surprising.

### *Longitudinal Changes in Community Integration*

When changes in community integration were examined between one and five years, results indicated that the only CHART domain to change significantly was Occupation. The Occupation (i.e., Activity Participation) scores were found to significantly increase from a mean score of 67.87 to 79.14. These results were inconsistent with previous findings of Charlifue and Gerhart (2004) who found that there was a decline, although subtle, in levels of community integration over time (as measured by the four CHART domains). It must be acknowledged, however, that the sample size in the current study was relatively small (N=69) when compared to the sample in the Charlifue and Gerhart study (N=178).

When additional t-tests were run to examine what activities changed the most within the Occupation domain, it was found that hours at a paid job was the only activity to significantly increase over time. Conroy and McKenna (1999) found similar employment trends in a study as their results indicated that increased time post-injury was associated with increased rates of employment. It is possible that the more time that passes; the more adjusted an individual becomes to the injury, and the greater likelihood of returning/starting work.

It must be noted that there is very little known about specific behavioral and participation-related changes that occur over a period of time post-discharge from rehabilitation. It is suggested that the amount of time that passes post-injury is often associated with a variety of beneficial factors. Some researchers suggest that time since injury is positively correlated with acceptance of disability (Kerr & Thompson, 1972), psychosocial and functional outcomes (Gerhart et al., 1993), favorable adjustment outcomes (Krause & Crewe, 1991), and increased



employment activities (Krause, 1997). However, it is also possible that there is a certain period of time that most of these changes will occur; some sources suggest that the majority of progress and change in individuals with SCI will occur in a one year period post injury. For example, Alfred, Fuhrer, and Rossi (1997) found that gradual improvement in vocational development gradually occurred six months post-injury. Richards (1986) also found that individuals with SCI demonstrated a significant increase in comfort levels of their disability over a one year period. Individuals who are involved in wheelchair athletics are actually found to show an even greater rate of change in the domains of acceptance of disability, social satisfaction, self-perception, and self-concept (Patrick, 1986). All of these studies, however, examined changes that occurred directly after discharge from rehabilitation. It remains relatively unknown what changes occur over a greater period of time. In the current study, it was found that changes in employment changed over a five year period, but it remains relatively unknown what the primary catalyst for change was in these individuals. It is possible that something significant occurs in that first year after discharge that could affect long term outcomes. This is an area that is in need of future research.

### *Limitations*

One of the primary limitations of this study was the use of existing data for analyses, which therefore prevented the control of some variables included in the data collection process. In addition, the relationships found between the amount of activity participation and community integration were not proof of a *causal* relationship. Individuals with SCI may participate in a variety of different pastimes, and it is therefore difficult to determine which activities influence which outcomes. Also, some of the recreation variables were questionable in how they were defined. For example the CHART Occupation asked: “*How many hours per week do you spend*

*in recreational activities such as sports, exercise, playing cards, or going to the movies? Please do not include time spent watching TV or listening to the radio.”* This was a very broad definition of recreation, and even though results from the regression analyses suggested that hours spent in recreation predicted year 1 Social Integration outcomes, it remains unknown what *type* of recreation was being performed. There is a good chance that outcomes would be different if for example an individual spent 10 hours a week playing wheelchair basketball as part of an organized team, vs. a person who spent 10 hours a week playing cards with a family member. Since these would be classified as being the same thing, it is impossible to determine what recreation experience is producing the most beneficial outcomes.

#### *Implications for Practice and Research*

In SCI rehabilitation, recreational therapists address many different treatment goals through a variety of activities. It becomes important to understand what specific activities most effectively address different physical, social, and occupational outcomes. The fact that recreation involvement was the only activity in this study that influenced year 1 Social Integration CHART scores is extremely significant to the field of RT. The results of this study indicate that while recreation is important to all individuals with SCI post-rehabilitation, the social element that recreation opportunities provide may be particularly important to individuals as they return home within that first year. There is fairly limited research that documents social outcomes that result from recreation participation. Loy et al. (2003) found that social support was a significant factor following SCI, and that the diversity and physical intensity of recreation activities was related to depression levels, yet there is a great need for further research in this area.

It is also possible that recreation has a stronger presence early in the community integration process while individuals who have been injured are re-developing job skills or are

searching for other vocational interests that fit functional abilities. Since the only significant change in community integration from year 1 to year 5 was hours at a paid job, recreation could very likely provide a transitional type of activity to the time an individual finds an appropriate job. If rehabilitation programs address the importance of recreation and sport involvement, in addition to job related skills post rehabilitation, perhaps the prospect of employment could be increased for individuals with SCI.

Additionally, length of stay in rehabilitation hospitals is decreasing, and many individuals with SCI are being discharged with only a brief exposure to skills rather than a full mastery of skills necessary to make a successful transition to the community (Sable & Gravink, 1999). These individuals are not only being discharged with an incomplete skill set, they are not given enough time to adjust to psychosocial changes in their lives (Loy, Dattilo, & Kleiber, 2003). It is possible that opportunities for social integration that recreation participation entails may provide additional assistance with these issues in that first year post discharge. Sable & Gravink (1999) state the importance of this transitional period following injury in that the first year is a “critical window” (p. 33) in which appropriate interventions can prevent depression, isolation, secondary medical complication, and alcohol abuse.

If practitioners can better understand what activities influence long term community integration outcomes, it becomes possible to more effectively help in the adjustment and reintegration process of individuals with SCI post-discharge. When examining the different influences of activity participation on community integration at both one and five years, it appeared that activities were more influential at one year as opposed to five years post-discharge. Rehabilitation programs need to establish methods of follow-up to ensure that individuals are thoroughly utilizing community resources and maintaining a beneficial level of community

integration. One method to address this need is to create transitional programs within the community that assist individuals with disabilities in this process. There are a few transitional programs that currently exist that function in this capacity and are greatly successful. For example, Project PATH (Promoting Access Transition and Health) is a program designed specifically for individuals with SCI that is meant to: 1) decrease individual's dependence on the health care system, 2) promote positive health behaviors, and 3) empower the consumer to take responsibility for their own health (Sable & Gravink, 1999). The Shepherd Center also has a Bridge Program that offers post-discharge education, guidance and referrals to individuals with various types of injuries (Loy, Broach, King, & Hufstetler, 2002). This particular program addresses psychosocial, career, or medical issues that tend to arise in the first year following discharge. There is a need for not only additional research that examines what specific occurrences in that first year influence long term community integration outcomes, but also for the existence of more transitional community based programs.

### *Conclusion*

The purpose of this study was to compare the influence of various types of activities an individual participates in one year after sustaining a spinal cord injury with different levels of community integration and also to determine if specific levels of community integration change over a five year period. The research presented demonstrated that increased activity participation was associated with increased social integration, physical independence and mobility 1 and 5 years post SCI discharge. Results also demonstrated that the different domains of community integration were all predicted by hours spent in different activities. The only measure of community integration that was found to significantly change over a five year period was the amount of activities an individual participated in, and more specifically the hours spent in a paid

job. These results further demonstrated the importance of recreational therapists utilizing various activities to address treatment goals in SCI rehabilitation, and also that there is a need for future research to examine outcomes that are associated with specific activities.

## EXTENDED LITERATURE REVIEW

### *SCI Rehabilitation*

Rehabilitation programs for individuals with SCI have advanced greatly in the past few decades, and as a result, life expectancy of these individuals is increasing (Inman, 1999). There are many studies that document the effectiveness and functional outcomes that result from SCI rehabilitation:

Authors	Charlifue, Weitzenkamp, & Whiteneck (1999)
Title	<i>Longitudinal Outcomes in SCI: Aging, Secondary Conditions, and Well-Being</i>
Objective	To specify the degree to which current age, duration of injury, and neurologic status affect the frequency of secondary health and psychosocial conditions in persons with long term SCI
Methods	N=439; Data were collected through a combo of medical history interview and physical examination 5, 10 and 15 years post-injury; Cross sectional and longitudinal analyses
Results	There are different reports of various conditions when analyzing by neurologic groups, duration of injury, and age. Cross-sectional and longitudinal analyses also demonstrate different patterns of complications.
Conclusion	The longitudinal method, like cross-sectional research, allows for identification of physical and psychosocial changes soon after they occur. Longitudinal research, however, also makes possible the development of predictive models of various long-term outcomes

Authors	Inman (1999)
Title	<i>Effectiveness of spinal cord injury rehabilitation</i>
Objective	To discuss the marked improvement in outcome from SCI that has occurred with the development of specialist rehabilitation programs
Methods	Review and discussion of evidence
Results	N/A
Conclusion	Strong support for effectiveness of rehabilitation

Authors	Schonherr & Mulder (1999)
Title	<i>Functional outcome of patients with SCI: rehabilitation outcome study</i>
Objective	To increase our knowledge of neurological recovery and functional outcomes of patients with spinal cord injuries in order to make more successful rehabilitation programs based on realistic goals
Methods	N=55; Descriptive analysis of data gathered in an info system examine functional improvement in terms of progress in independence in 9 daily activity skills; IV=ASIA scores, DV=independence (4 point scale)
Results	Significant progress in independence was made in self-care, ambulation and bladder and bowel control; differences were found between subgroups of patients; Patients with complete paraplegia did not achieve maximal independence in self care. Independent walking was only attained by patients with incomplete lesions; poor results were found in bladder and bowel control outcomes
Conclusion	Results of the study provided more insight into the functional outcome of a group of patients with SCI; more research is needed to evaluate the rehabilitation programs for these patients

Authors	Yarkony, Roth, Heinemann, Yeongchi, Katz, & Lovell (1987)
Title	<i>Benefits of Rehabilitation for Traumatic SCI</i>
Objective	To evaluate changes in functional ability during initial inpatient rehabilitation for SCI; to support the continued use of comprehensive inpatient rehabilitation programs for the 10,000 persons who sustain SCIs in the US every year
Methods	N=711 (389=quads; 322=para); Review the data base of the Midwest Regional Spinal Cord Injury Care System (MRSCICS); MANOVA; IV=Level of injury; basic demographics; DV=change in Barthel Index
Results	Each of the 4 patient groups, defined by level and completeness of injury, made functional improvements during rehabilitation hospitalization and demonstrated various degrees of functional improvement over different lengths of hospitalization; depends on neurologic level and completeness of injury;

Conclusion	A comprehensive rehab program that provides a full range of services & maximum patient participation enhances the likelihood of achieving favorable outcomes, promotes the resumption of meaningful life roles & facilitates opportunities for comm. Reintegration
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Authors	Sable & Gravink (1999)
Title	<i>Project PATH (Promoting Access Transition and Health): A Health Promoting Intervention for People with SCI</i>
Objective	To provide participants with the health promoting behaviors and health protective skills necessary to prevent the development of costly and common secondary conditions including skin break downs, infections, substance abuse and depression; to decrease dependence on the healthcare system, promote positive health behaviors and empower individuals to take responsibility for their own health
Methods	The PATH intervention focuses on empowerment and regaining a sense of purpose and meaning in life through active participation in leisure and recreation through: 1) Intake Assessment 2) Wellness Education Series 3) Individualized Fitness Program 4) Individual/Family Recreation Skill Development and Pursuit of Leisure 5) Practical Functional Skill Development 6) Community Re-Integration in Home Community 7) Resource File & Development 8) Peer Mentoring Program
Results	There has been limited systematic documentation of effects of the recreation and leisure outcomes for individuals with SCI; offers an evaluative research design to examine PATH's impact on the quality of life of newly SCI programs
Conclusion	N/A

Functional outcomes can be attained when rehabilitation programs address the psychosocial, vocational and recreational needs of patients; this then fosters a sense of independence and community participation for individuals with SCI (Inman, 1999).

Rehabilitation is also important to reduce secondary complications including infections, skin breakdown, depression and substance abuse (Sable & Gravink, 1999). Although rehabilitation procedures are increasing functional outcomes and life expectancy, aging with SCI can also be associated with increased risk for various health conditions and increased need for assistance (Charlifue, Weitzenkamp, & Whiteneck, 1999).

### *SCI Community Integration*

Community integration is a very important component of SCI rehabilitation and involves re-establishing previously existing relationships and roles (Charlifue & Gerhart, 2004).

Community integration has been identified as a key component and contributor to quality of life for individuals with SCI (Dijkers, 1997). There are many studies that: provide methods of measuring levels of community integration, examine changes that may occur over an individual's lifetime and document the importance of being integrated in a community:

Authors	Whiteneck, Tate, & Charlifue (1999)
Title	<i>Predicting Community Reintegration After SCI from Demographic and Injury Characteristics</i>
Objective	To determine the influence of demographic and injury characteristics on the community reintegration of people with SCI
Methods	N=3,835; Cross sectional and longitudinal examination of individuals in National SCI Database; Subscales of CHART; IV=Level of injury; DV=CHART
Results	Neurologic classification, age, years postinjury, ethnicity, and education explain 29% of the variance in physical independence; 29% of the variance in mobility; 28% of the variance in occupation, 9% of the variance in social integration, and 18% of the variance in economic self-sufficiency
Conclusion	Although these factors are inadequate to explain most of the variation in community reintegration (handicap) after SCI, they might appropriately be used to adjust for case-mix differences when comparing rehabilitation facilities and techniques

Authors	Dijkers (1998)
Title	<i>Community Integration: Conceptual issues and measurement approaches in rehabilitation research</i>
Objective	To review definitions of the concept of community integration and dimensions of community integration that could be included in a measurement instrument
Methods	<b>Community Integration Instruments:</b> Personal Integration Inventory (comprehensive instrument: scoring algorithm was never developed; Community Integration Questionnaire (CIQ): the most commonly used instrument to measure overall community integration; <b>Handicap Instruments:</b> Craig Handicap Assessment and Reporting Technique (CHART); Perceived Handicap Questionnaire (PHQ); <b>ADL Instruments:</b> Frenchay Activities Index; Nottingham Extended ADL Index; <b>Independent Living Instrument:</b> DeJong and Hughes ratings; <b>Social Health Instruments:</b> Rand Social Health Battery, SF-36; <b>Social Adjustment Instrument:</b> Groningen Social Disabilities Schedule (GSDS); <b>Quality of Life Instrument:</b> Health Related Quality of Life (HRQOL), Reintegration to Normal Living Index (RNL)
Results	Measures of closely related concepts such as instrumental ADLs, independent living, social health, social adjustment, and quality of life are described, with a focus on their potential use as measures of community integration or its aspects
Conclusion	In order to improve study of the impact of SCI on the social and psychological functioning as well as quality of life of persons who incur this injury, there is a need to develop better instruments; and while some fairly comprehensive measures are available, they need improvement

Authors	Tate & Forchheimer (1998)
Title	<i>Enhancing community reintegration after inpatient rehabilitation for persons with SCI</i>
Objective	To examine factors associated with outcomes after hospital discharge into the community and evaluate an inpatient independent living (IL) program for persons with SCI
Methods	N=234; interviews at admission to rehab, at discharge and 1 year after injury; The Independent Living Program Questionnaire (ILPQ) and CHART; t tests, x-analyses and ANOVA; IV=demographic, neurologic, and psychosocial characteristics; DV=ILPQ and CHART scores)
Results	Program participation was not a significant predictor of any of the selected outcomes, but CHART scores were best predicted by neurologic impairment, age, and education; subjects w/ less impairment & greater education & younger age reported less handicap
Conclusion	Findings suggest that those who participated in the program showed increased knowledge about IL and community resources available to them and considered the program helpful

Authors	Chun, Lee, Lundberg, McCormick & Heo (2008)
Title	<i>Contribution of community integration to quality of life for participants of community-based adaptive sports programs</i>
Objective	To examine the contribution of community integration to quality of life (QOL) for people with disabilities who were the participants of community-based adaptive sport programs
Methods	N=93; questionnaire that measured community integration and quality of life mailed out to Adaptive Sports Center participants; multiple regression analysis controlling for age, gender, and marital status; WHO Quality of Life Assessment (WHOQOL); Community Integration Measurement (CIM) IV=CIM, DV=WHOQOL
Results	Community integration was the only factor that significantly predicted psychological domain, social relationships, and environment domain; however community integration did not predict to an overall QOL
Conclusion	Shows connections between community integration and QOL for participants of community-based adaptive sport programs. Further investigation on the relationship between community integration and the specific domains of QOL is necessary in the future for a better understanding of the phenomena



Authors	Dattilo, Caldwell, Lee, & Kleiber (1998)
Title	<i>Returning to the Community with a SCI: Implications for TR Specialists</i>
Objective	To examine the relevance of leisure and social relationships to the community integration of people with recent SCI
Methods	N=14; in depth interview w/ participants 1-8 mo. After discharge from rehab center; constant comparative method
Results	Participants communicated enjoyment associated w/ "getting out" and being w/ friends and family members; constraints to leisure participation w/in communities related to support, companionship, transportation, physical ability, and physical accessibility; identified problems associated w/ TR and the entire process of rehab experienced at the center
Conclusion	Leisure can be a context for the establishment and perhaps the maintenance and development of social contacts; strategies that utilize inclusive leisure services may be especially useful; TR services can be designed to enhance the social support of people w/ SCI in ways that facilitate their return to the community

Authors	McVeigh, Hitzig, & Craven (2009)
Title	<i>Influence of sport participation on community integration &amp; quality of life: comparison btwn sport and non-sport participants with SCI</i>
Objective	To determine whether community integration and/or quality of life (QoL) among people living with chronic SCI are superior among sport participants vs. non-sport participants
Methods	N=90 (sport part.=45; nonsport=45); Interview; Community Integration Questionnaire (CIQ) and Reintegration to Normal Living Index (RNL); t-tests; Regression; IV=level of sports participation; DV=community integration, quality of life
Results	Total mean scores were higher among sport participants (P<0.05); Significant correlation btwn CIQ and RNL scores found for all participants (P<0.01); Regression revealed unadjusted odds ratio of high CIQ mean score was 4.75 (95% CI 1.7, 13.5) among current sport participants; regression adjusted odds ratios of high CIQ and high RNL scores were 1.36 and 0.15. Odds ratio for pre-SCI sport participation predicting post-SCI sport participation was 3.06.
Conclusion	CIQ and QoL scores were higher among sport participants compared to non-sport participants. Sport participants were 4.75 to 7.00 times as likely to have high CIQ and QoL scores. Individuals who participated in sports prior to SCI were more likely to participate in sports post-SCI

Authors	Charlifue & Gerhart (2004)
Title	<i>Community integration in spinal cord injury of long duration</i>
Objective	To examine longitudinal changes in community reintegration among people aging with spinal cord injury, and to determine if these changes are related to demographic variable and scores on psychosocial measure of stress, life satisfaction, depression, psychological well-being and perceived quality of life
Methods	N=178; individuals injured ≥20 yrs when between 15-55 yrs old; CHART assessment (longitudinal over a 9 year period), LSI-Z, IPWB, CES-D, PSS, ANOVA. IV=LSI-Z, IPWB, CES-D, PSS; DV=CHART
Results	Findings indicate a general decline in community reintegration over time in terms of physical independence, mobility, occupation and social integration
Conclusion	Community integration declined overtime, but was also a relationship between perceived life satisfaction and community integration

There are many different ways to measure levels of community integration including the CIQ, CHART and RNL; some of which have shown that increased levels of integration are associated with increased satisfaction and quality of life (Chun et al., 2008). Individuals with SCI who participate in sports and recreation activities are found to be more integrated within their community (McVeigh, Hitzig, & Craven, 2009). However, some conflicting findings exist that suggest older adults are less integrated in the community, but also that longer periods post-injury are associated with greater community integration (Whiteneck, Tate, & Charlifue, 1999).

## Activity Participation

Research demonstrates that there are many beneficial outcomes that can result from involvement in productive activities for individuals with SCI (Richards et al., 1999; Blinde & McClung, 1997). These activities may be employment, education, recreation or home related. Most research examines activity participation as an outcome of a different variable; very few studies examine outcomes that are associated with participation in these various activities. In the research that does exist, much of it recreation related:

Authors	Wu & Williams (2001)
Title	<i>Factors influencing sport participation among athletes with SCI</i>
Objective	To examine the relationships between pre and post injury sport participation among active individuals with SCI
Methods	N=143; Disability Sport Participation Questionnaire; Frequencies; chi-square; t-test; IV=personal, impairment, health/fitness, socialization, participation variables; DV=sport participation
Results	Active pre-injury: in-hospital rehab/sport club more important contexts for introducing sports post-injury; Friends/peers w/ disabilities=more influential than rehab therapists; Reasons to participate=fitness, fun, health, competition plus social aspects and rehabilitation
Conclusion	Results may offer directions for improvements in rehab programs for people w/ SCI and also help the development of appropriate strategies to encourage people w/ SCI to participate in sports and leisure activities

Authors	Kirkby, Cull, & Foreman (2009)
Title	<i>Association of prelesion sports participation and involvement in wheelchair sports following SCI</i>
Objective	To investigate the relationship between prelesion sports participation and involvement in wheelchair sports following injury
Methods	N=116; Survey; Chi-Square; IV=pre-injury sport participation; DV=post-injury sport participation
Results	89 involved in sport pre-injury; 38 involved in sport post-injury; 13 have since become involved in sport
Conclusion	No significant association between pre/post injury involvement in sport ( $X^2=.25, p=.62$ ); Tendency for individuals w/ SCI to be involved in wheelchair sports was not related to pre-injury sports participation

Authors	Muraki, Tsunawake, Hiramatsu, & Yamasaki (2000)
Title	<i>The effect of frequency and mode of sports activity on the psychological status in tetraplegics and paraplegics</i>
Objective	To examine whether the psychological benefits of sports activity differ between tetraplegics and paraplegics with SCI, and to investigate the effect of frequency and modes of sports activity on the psychological benefits
Methods	N=169 (53 tetra, 116 para) Self-Rating Depression Scale (SDS); State-Trait Anxiety Inventory (STAI); Profiles of Mood States (POMS); ANOVA; IV=level of injury; DV=psychological benefits of sport activities
Results	Significant differences in depression for SDS, trait anxiety for STAI and depression and vigor for POMS among groups. High-active group showed lowest depression and anxiety and highest vigor. No sig differences between any psychological measures between tetra/para. No significant difference for psych measures among sport modes
Conclusion	Sports activity can improve the psychological status, irrespective of tetraplegics and paraplegics, and psychological benefits are emphasized by sports activity at high frequency

Authors	Tasiemski, Bergstrom, Savic, & Gardner (2000)
Title	<i>Sports, recreation and employment following SCI- A Pilot Study</i>
Objective	To examine the levels of sporting/recreational activities, education and employment in people with SCI and to assess if involvement in sport and recreation is associated with higher levels of education and employment
Methods	N=45; Postal Survey; Descriptive Statistics; Z-tests; Chi-Square; IV=level of sport activity; DV=education, employment
Results	47% participate in physical activities; 33% employed; 18.5% further education. Sport participation decreased post-injury ( $p<0.01$ ) because of poor access to sports and work facilities; 4% started physical activity; 42% stopped PA

Conclusion	Levels of sporting/recreational activities and employment decreased significantly after injury. No significant correlation was found between sport/recreation involvement and education/employment status.
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Authors	Magasi, Heinemann, & Whiteneck (2008)
Title	<i>Participation Following Traumatic SCI: An Evidence-Based Review for Research</i>
Objective	To report an evidence-based review of participation instruments that have been used in SCI clinical practice and research
Methods	Rehabilitation literature was searched for instruments used by at least 2 independent SCI researchers since 2000. Each instrument was reviewed by 2 committee members.
Results	3 instruments met the review criteria: CHART, LIFE-H, IPA. Each instrument incorporates different perspectives in the measurement of participation. The LIFE-H used a qualitative approach; CHART adopts a quantitative approach; both are based on societal norms of participation, whereas IPA integrates individual choice and control in defining participation
Conclusion	Continuing research is needed to develop conceptually and psychometric valid measures of participation for use with people w/ SCI. Priorities include understanding the relationship between objective and subjective indicators of participation, describing the dimensions of participation, and identifying appropriate measurement models and psychometric approaches to evaluate the nonhierarchical character of participation

Authors	Foreman, Cull, & Kirkby (1997)
Title	<i>Sports participation in individuals with SCI: Demographic and psychological correlates</i>
Objective	To identify organic, demographic, social, educational, and vocational factors of individuals with SCI, as well as psychological adjustment variables that distinguished sport participants from non-participants
Methods	N=121; Questionnaire; Depression Scale; State Trait Anxiety Inventory; Univariate analysis; IV=sport participation; DV=depression/ anxiety
Results	Sport participants (n=67) did not differ significantly from nonparticipants (n=54) on any psychometric measures; however were younger, sustained injury @ younger age, reported higher incomes, and were less likely to have sustained cervical level damage. Significant predictors discriminating sport from nonsport participants were age and income
Conclusion	Post-injury involvement in sport was not specifically associated with indices of psychological adjustment

Authors	Slater & Meade (2004)
Title	<i>Participation in recreation and sports for persons w/ SCI: Review and Recommendations</i>
Objective	To provide a review of available literature focused upon participation in recreation and sports among persons with SCI
Methods	Issues of participation, technology and safety are discussed and recommendations are provided
Results	The use of sport and recreation is beneficial to individuals across age ranges and disability types but safety considerations must be observed; studies that examine the benefits of such participation are often retrospective in design and small cohorts
Conclusion	The interdisciplinary rehabilitation team should encourage participation in sport and recreation stressing safety, enjoyment cooperation and camaraderie; however, they should also realize that peers w/ SCI will have more influence and should be utilized for recruitment whenever possible

Authors	Tasiemski, Kennedy, & Gardner (2006)
Title	<i>Examining the Continuity of Recreation Engagement in Individuals with SCI</i>
Objective	To examine the continuity of recreation engagement in individuals with SCI who use wheelchairs, and to explore how factors related to injury impacted on changes in recreation engagement
Methods	N=985; database from 3 spinal injury centers were used; 26 item questionnaire; chi-square, ANOVA, qualitative analysis; IV=basic demographic, level of injury; DV=current involvement in sport/physical recreation
Results	Almost 40% of participants discontinue engagement in sports activities after SCI, followed by traveling (24%), socializing (21.5%), and going to concerts of cinemas (19.6%); However (61.7%) of individuals w/ SCI were able to continue socializing, and 43% continued sports activities after SCI.
Conclusion	Older people with SCI, individuals with quadriplegia, and those with more hours of help needed from other people require special attention from healthcare professionals in order to get back to enjoyable recreational activities after SCI

Authors	Blinde & McClung (1997)
Title	<i>Enhancing the Physical and Social Self Through Recreational Activity: Account of Individuals with Physical Disabilities</i>
Objective	To explore the impact of participation in recreational activities on the perceptions of the physical and social selves

	of individuals with physical disabilities
Methods	N=33; participation in individualized recreational programs; tape-recorded interviews; content analyses
Results	Respondents perceptions of the social self were reflected in two themes: (a) expanding social interactions and experiences, and (b) initiating social activities in other contexts
Conclusion	The gains discussed by respondents suggest that individuals developed an enhanced sense of control in both their physical and social lives

Authors	Zabriski, Lundberg, & Groff (2005)
Title	<i>Quality of life and identity: The Benefits of a community-based therapeutic recreation and adaptive sports program</i>
Objective	To examine perceived outcomes of participation in a community-based therapeutic recreation and adapted sports program on the quality of life and athletic identity of individuals with disabilities.
Methods	N=129; participation in either an alpine skiing program or a horseback riding program provided by the National Ability Center; 28 item questionnaire distributed on the last day of the program; consisted of 5 items regarding perceptions of QOL, and ten item Athletic Identity Measurement Scale (AIMS); Descriptive statistics and bivariate correlations IV=sport participation; DV=perceptions on QOL, and athletic identify
Results	The influence on QOL items indicated that the majority of participants thought that these programs had a positive impact; Total AIMS scores ranged from 10-63 w/ a mean score of 37.43 (SD=10.18)
Conclusion	Participation positively influenced quality of life, overall health, quality of family life, and quality of social life; the impact of these programs on various dimensions of QOL supports the need to expand community-based sport programs for individuals w/ disabilities

Authors	Martin et al. (2002)
Title	<i>Sustaining Exercise Motivation and Participation Among People with Spinal Cord Injuries</i>
Objective	To explore the perceived benefits to exercise and barriers that must be overcome in order to exercise
Methods	N=15; three focus discussion groups were held; transcription
Results	Barriers to Exercise: Accessibility, Pain, Psychological Barriers, Time, Lack of Information. Benefits to Exercise: Physical gains, Improved Sense of Well-being
Conclusion	Recommendations: Encourage self-monitoring, set "SMART" objectives, provide safe environment, Minimize Pain, Resolve transportation problems, provide supportive environment, promote the program extensively

Authors	Cahow, Skolnick, Joyce, Jug, Dragon, & Gassaway (2009)
Title	<i>SCIRehab Project Series: The Therapeutic Recreation Taxonomy</i>
Objective	Outcomes research of TR activities and interventions for SCI rehab is made more difficult by a lack of uniform descriptions and the absence of a formal treatments classification system (taxonomy); to describe a taxonomy developed by CTRS
Methods	TR lead clinicians and researchers from 6 SCI rehab centers developed a TR documentation system to describe the details of each TR sessions involving patients with SCI enrolled in the SCI rehab study.
Results	The TR taxonomy consists of 6 activities and activity-specific interventions, as well as time spent on each activity. Activity descriptions are enhanced w/ additional details that focus on assistance needs for each activity, patient ability to direct care, and patient/family involvement, which may help to determine TR activity selection
Conclusion	Development and application of a TR taxonomy, which is comprehensive for patients w/ SCI and efficient to use, are feasible despite significantly different TR programs at the 6 SCI rehab centers

Authors	Noreau & Fougeyrollas (2000)
Title	<i>Long-term consequences of SCI on social participation: The occurrence of handicap situations</i>
Objective	To identify the occurrence of potential handicap situations in individuals with SCI and to determine the potential associations between the level of social participation and some characteristics of the person
Methods	N=482; mailed questionnaire that comprised the 'assessment of life habits' tool; IV=demographic variables; VD=social participation
Results	Significant disruptions were particularly observed in home maintenance, participation in recreational and physical activities as well as in productive activities and the achievement of sexual relations
Conclusion	The severity of injury seems to significantly increase the occurrence of handicap situations as the individuals with tetraplegia reported carrying out their life habits with much more difficulty or requiring more assistance than those with a less severe impairment.

Authors	Levins, Redenback, & Dyck (2004)
Title	<i>Individual and societal influences on participation in physical activity following SCI: A Qualitative Study</i>
Objective	To explore the experiences of individuals with SCI during participation in physical activities

Methods	N=8 (5 male; 3 female); semi structured ethnographic interviews to explore barriers and enablers to participation in physical activity following SCI; Qualitative analysis
Results	Two themes were identified: (1) Individual influences, defined as a period of loss of "able identity" and subsequent redefinition of self in which participation in physical activity may be a vehicle or an outcome, and (2) societal influences, which included environmental and attitudinal barriers
Conclusion	The participants' experiences offer insight for therapists regarding physical activity following SCI

Authors	Krause & Anson (1996)
Title	<i>Employment after SCI: Relations to selected participant characteristics</i>
Objective	To investigate the relations between selected participant characteristics and employment outcomes after SCI.
Methods	N=362; field study of employment history; participants were grouped into cohorts and ANOVA and Chi Square analysis were run; IV=demographics; DV=employment
Results	The most successful employment outcomes were obtained by Caucasian women, persons up to the age of 29 years at injury, participants with incomplete injuries, and participants who had completed at least 16 years of education; least successful outcomes were observed in minority men, participants age 50 years or older at injury, persons with complete quadriplegia, and participants with fewer than 12 years of education
Conclusion	Results point to the need for rehabilitation professionals to make special efforts to maximize employability after SCI among people with biographic characteristics that place them at greatest risk for unemployment

Authors	Richards et al. (1999)
Title	<i>Access to the environment and life satisfaction after SCI</i>
Objective	To determine the potential relation between satisfaction with life after SCI and access to environment as measured by selected items from CHART
Methods	N=350; prospective, correlational/predictive study using cross-sectional and longitudinal data from 18 Model SCI Systems of Care
Results	Access to the environment was positively and linearly associated with satisfaction with life, demonstrated both positive and negative change over time, and was positively associated with subject's neurologic status. Access to the environment added to the explanatory model to predict life satisfaction even after all other independent measures were accounted for
Conclusion	Access to the environment is important in predicting satisfaction with life for personal with SCI.

Authors	Krause et al. (1999)
Title	<i>Employment after SCI: An analysis of cases from the model SCI Systems</i>
Objective	To describe the relationship of multiple biographic, injury-related and educational factors with employment outcomes after SCI
Methods	N=3,756 individuals who completed Form II data collection during annual follow-up @ years 1, 2, 3, 10, 15, 20, or 25 years; cross-sectional; IV=demographic variables; DV=employment outcomes
Results	Being Caucasian, younger at injury, having lived more years with SCI, having a less severe injury, and having more years of education were all predictive of being employed
Conclusion	High rate of unemployment in the SCI population; much needs to be done to improve vocational outcome

Authors	Conroy & McKenna (1999)
Title	<i>Vocational outcome following SCI</i>
Objective	To investigate variables influencing vocational outcome, to identify barriers to gaining and sustaining employment and to identify the effects of variables on the type of work engaged in following SCI.
Methods	N=440; surveys and medical records; forward stepwise logistic regression/standard multiple regression analysis; IV=individual and injury related factors; DV=vocational outcomes
Results	Having ever worked or studied post-injury was associated with all individual and injury-related factors except pre-injury occupation; current employment was associated with all circumstantial factors as well as age at injury and pre-injury occupation. Post-injury occupation was correlated with all individual and related factors as well as means of transport and perceived workplace discrimination
Conclusion	Tailored rehabilitation programs for individuals with characteristics associated with less successful vocational outcomes may facilitate their employment status after injury

Authors	Krause (1997)
Title	<i>Adjustment after spinal cord injury: Relationship to participation in employment or educational activities.</i>
Objective	To compare the life adjustment of participants with SCI who were either (a) gainfully employed, (b) unemployed, but attending school, or (c) unemployed and not attending school.
Methods	N=362; Multidimensional Profile (MAP) was administered; MANOVA w/ follow-up Bonferroni correction was used to compare scores on 7 outcome scales between the 3 groups; IV=employment status; DV=MAP Scores

Results	The employed participants reported superior adjustment scores to the unemployed/nonstudents on 4 of the 7 scales, but superior scores to the students on only one scale (Career Satisfaction); In contrast to the unemployed/nonstudents, the students reported higher overall adjustment scores and fewer problems with skills deficit.
Conclusion	Results point to the strong association of both education and employment with Quality of Life after SCI; and clearly confirm the importance of pursuing education and return to gainful employment as primary rehabilitation objectives after SCI.

Authors	Krause (1990)
Title	<i>The relationship between productivity and adjustment following spinal cord injury.</i>
Objective	To examine several aspects of adjustment as related to different levels of productivity achieved by persons with SCI.
Methods	N=344; Life Situation Questionnaires; ranking hierarchy system was used to classify participants who were engaged in more than one type of productive activity: (a) working, (b) students, (c) volunteer, (d) homemaker, (e) unemployed; MANOVA analyses; IV=type of productive activity; DV=level of adjustment
Results	45% were gainfully employed; 14% engaged in unpaid productive activities (school, volunteering, or homemaking); 41% were not engaged in any productive activities; MANOVA indicated that persons who were employed had the best overall adjustment, followed by persons engaged in unpaid productive activities and those who were unemployed.
Conclusion	It is suggested that counselors need to consider individual differences in adjustment when assisting clients vocational goals.

Authors	Krause (1997)
Title	<i>Personality and traumatic spinal cord injury: Relationship to participation in productive activities.</i>
Objective	To identify the relationship between personality, employment, and productivity after SCI using a nonpathological measure of personality.
Methods	N=242; questionnaires: Multi-dimensional Personality Questionnaire (MPQ) and Life Situation Questionnaire (LSQ); classified into 1 of 3 productivity groups: (1) Employed, (2) Productive, but unemployed, (3) nonproductive-unemployed;
Results	51% participants were employed; 16% productive, but unemployed; 33% unemployed and unproductive; IV=MPQ Scores; DV=LSQ/Productivity; <b>Employed Group:</b> Scored higher on Achievement, Control, Positive Affectivity and Constraint/lower on Alienation and Aggression; <b>Productive Unemployed Group:</b> Scored higher on Control and lower on stress, alienation and negative affectivity
Conclusion	Results suggest that traits often associated with SCI onset are correlated with poor personal adjustment and non-productivity after SCI. These results are a testament to the importance of personality to adaptation after traumatic disability.

Authors	Anderson, Lawrence, & Vogel (2002)
Title	<i>Employment outcomes of adults who sustained spinal cord injuries as children or adolescents</i>
Objective	To determine employment outcomes of adults with pediatric-onset spinal cord injury (SCI) and factors associated with those outcomes.
Methods	N=195; structured interview, including standardized measures of: FIM, CHART, Medical Outcomes Study 12-Item Short-Form Health Survey, and the Satisfaction with Life Scale; Predictive model of employment
Results	51% were employed, 40% unemployed, 6% students, 3% homemakers. There were 4 factors associated with employment: education, community mobility, functional independence, and decreased medical complications. Other variables significantly associated with employment included community integration, independent driving, independent living, higher income, and life satisfaction.
Conclusion	Compared with the general population, the high rate of unemployment among adults with pediatric-onset SCI is a cause for concern. Risk factors associated with adult unemployment provide guidelines for targeting rehabilitation resources and strategies.

Many individuals with SCI feel that physical activity in general provides more benefits than just physical well-being; it is also important for the social, emotional and spiritual aspects of life (Levins, Redenback, & Dyck, 2004). Research also demonstrates a strong association of both

employment and education with the quality of life of individuals with SCI (Krause, 1997) as well as between productivity and adjustment to injury (Krause, 1997). However, it has been found that maintained involvement in tasks such as employment, recreation and home maintenance is difficult for many individuals with SCI (Noreau & Fougereyrollas, 2000), but the best time to assess the potential of such vocational attributes is 2-10 years post injury (Conroy & McKenna, 1999).

There is much research that specifically examines benefits of recreation and sports participation for individuals with SCI. Researchers have observed an association between participation in recreation and increased levels of community integration (McVeigh, Hitzig, & Craven, 2009), increased satisfaction with life (Chun et al., 2008) and various psychological gains and social benefits (Blinde & McClung, 1997) across various age ranges and ability types (Slater & Meade, 2004). One of the primary issues for individuals with SCI is discontinued engagement in recreation and sports programs post-injury. Research shows that almost 40% of individuals who get injured will no longer pursue involvement in different recreation programs (Tasiemski, Kennedy, & Gardner, 2006). Many individuals need to be aware of community resources and opportunities that are available for such participation. Some participants also need to be encouraged and persuaded to continue his/her involvement in recreation programs. Research demonstrates that peers/friends with disabilities are more influential in getting participants involved, and rehabilitation teams should utilize such methods (Slater & Meade, 2004; Wu & Williams, 2001). Also, individuals with a higher level of injury, and older adults with SCI may require additional attention of healthcare professionals to ensure optimal involvement in sports and recreation (Tasiemski, Kennedy, & Gardner, 2006). Although it is well understood that recreation and sports participation is beneficial to individuals with SCI,

there exist multiple obstacles that need to be overcome by participants, including issues of accessibility, pain, time, lack of information and psychological barriers (Martin et al., 2002).

### *Changes Post Injury*

There is very little research that examines specific behavioral and participation related changes that occur over a period of time post-discharge from rehabilitation. Some studies suggest that there is a certain period of time post-injury that the majority of changes will occur; usually within a one year period after sustaining a spinal cord injury, but other studies document changes that occur over a greater period of time:

Authors	Patrick (1984)
Title	<i>Comparison of novice and veteran wheelchair athletes' self-concept and acceptance of disability.</i>
Objective	To empirically describe the novice wheelchair athlete with regard to acceptance of disability and self-concept by comparing novice to veteran wheelchair athletes.
Methods	N=22 (10 novice; 12 veterans); Acceptance of Disability Scale (AD) and Tennessee Self-Concept Scale (TSCS) administered; two-tailed <i>t</i> tests were computed; IV=time post injury; DV=AD/TSCS
Results	Difference between novice and veteran groups on AD was found to be statistically significant; The data support the assertion that those with continued experience in athletics better accept their disability than novices in the exploratory stages of preparation for sport competition. Difference between TSCS score was not statistically significant.
Conclusion	Results suggest that novice disabled athletes have lower self-concept scores than those of veteran athletes. Furthermore, novice adjustment to disability is significantly lower than that of the veteran disabled athlete. Results also lend credence to the value of wheelchair athletics as a positive experience for those participating.

Authors	Krause (1997)
Title	<i>Adjustment after spinal cord injury: A 9-year longitudinal study.</i>
Objective	To generate longitudinal data on the stability of life adjustment over a 9-year period among a sample of participants with SCI.
Methods	N=235; field study was conducted by surveying the adjustment of individuals in 1985 and again in 1994; Life Situation Questionnaire (LSQ) was used which contains 7 scales and 40 individual items that were of interest;
Results	Declines were identified over the 9-year period in several aspects of subjective well-being, even though there were no declines in overall activity level and some limited increases in participation in employment related activities.
Conclusion	The results of this study were in contrast to previous longitudinal follow-ups that identified positive changes over time in both subjective and objective aspects of quality of life; changes suggest that participants had a less optimistic outlook in 1994 than they did in 1985.

Authors	Richards (1986)
Title	<i>Psychologic adjustment to spinal cord injury during first post discharge year.</i>
Objective	To examine changes in Psychologic adjustment after initial rehabilitation hospitalization.
Methods	N=65 (36 SCI; 29 able bodied); Completed a questionnaire designed to study such adjustment at 3 weeks, 3 months, and 1 year post discharge; Outcomes measures used were the Beck Depression Inventory, Wiggins Hostility Scale, and Handicap Problems Inventory; IV=time; DV=adjustment
Results	Moderately increased depression and hostility in the SCI group compared to the able-bodied were found immediately post-discharge, but these differences were gone within a year. On a specific measure of adjustment to disability, the SCI group showed significantly increasing comfort with disability status over the same period.
Conclusion	While there are reports of Psychologic adjustment difficulties for persons with SCI post-discharge, the severity of these difficulties may have been overestimated and our findings suggest that problems appearing immediately after discharge appear to resolve rapidly.



Authors	Patrick (1986)
Title	<i>The effects of wheelchair competition on self-concept and acceptance of disability in novice athletes.</i>
Objective	To determine the effect of wheelchair athletic participation on self-concept and acceptance of disability of novices in comparison to (a) veteran wheelchair athletes, and (b) similar wheelchair-users who chose not to participate in athletics.
Methods	N=34; given 2 psychological tests-Acceptance of Disability (AD) scale and Tennessee Self Concept Scale (TSCS); Non-randomized three group (novice, veteran, and non-athlete) repeated measures design was used; IV=group; DV=AD; TSCS
Results	Significant differences between veteran and novice wheelchair athletes (before competition) on acceptance of disability, global self-concept, social satisfaction, social comparison, and consistently of self-perception; Novice wheelchair athletes rated themselves lower than veterans in all these variables.
Conclusion	Novice participation in wheelchair athletics has a powerful positive influence upon self-concept and acceptance of disability as defined by the TSCS and AD. Results support the encouragement of wheelchair athletic completion with recently traumatically injured clients who have some proclivity for, interest in, or inclination to participate in such activities.

Authors	Alfred, Fuhrer, & Rossi (1987)
Title	<i>Vocational development following severe spinal cord injury: a longitudinal study.</i>
Objective	To examine differences in the course of vocational development by level of functional independence, and predicting vocational outcomes 2 years after injury.
Methods	N=33 (17 quadriplegics; 16 paraplegics); Goldberg Scale of Vocational Development was used to measure changes in vocational development over time; Barthel Index was used to measure level of functional independence; IV=time post-discharge; functional independence; DV=vocational development
Results	Vocational development was markedly depressed during initial inpatient rehabilitation and for six months after injury. Gradual improvement occurred after 6 months, but 2 years after discharge the level of vocational development remained lower than that before injury
Conclusion	Changes in vocational development over time did not differ significantly by level of functional independence. Best predictors of successful vocational outcomes were educational attainment, educational plans made before injury, and origin of interests in work.

It is suggested that time since injury is positively correlated with acceptance of disability (Kerr & Thompson, 1972), psychosocial and functional outcomes (Gerhart et al., 1993), favorable adjustment outcomes (Krause & Crewe, 1991), and increased employment activities (Krause, 1997). For example, Alfred, Fuhrer and Rossi (1997) found that gradual improvement in vocational development gradually occurred six months post-injury. Richards (1986) found that individuals with SCI demonstrated a significant increase in comfort levels of their disability over a one year period. Individuals who are involved in wheelchair athletics are actually found to show an even greater rate of change in the domains of acceptance of disability, social satisfaction, self-perception and self-concept (Patrick, 1986) in a 5 month period after injury than individuals who were not involved in wheelchair athletics (Patrick, 1986).

## *Conclusion*

The research presented demonstrates that community integration is an important component of SCI rehabilitation, and there are a variety of factors that can influence levels of community integration. Activity participation is only one facet of community integration; however, there is a multitude of supporting research that documents beneficial outcomes that can result from participation in various productive activities. What remains relatively unknown is the influence of participation in specific activities on community integration, in addition to specific time periods post-injury that are associated with increased participation and community integration in the years that follow.

## EXTENDED DISCUSSION

The purpose of this study was to compare the influence of various types of activities an individual participates in one year after sustaining a spinal cord injury with different levels of community integration one and five years post-discharge. A secondary purpose of this study was to determine if specific levels of community integration changed over a five year period. Using CHART Occupation domain scores to represent an individual's level of activity participation, it was found that Occupation scores were significantly correlated with Social Integration, Physical Independence and Mobility CHART Scores at both 1 and 5 years. Results also demonstrated that the three CHART domains were all predicted by hours spent in different activities. The only measure of community integration that was found to significantly change over a five year period was the Occupation domain. When examining hours spent in specific activities within the Occupation domain, it was found that hours spent in a paid job significantly increased between one and five years.

### *Outcomes of Activity Participation*

In this study, activity participation was measured by the CHART Occupation domain. Results of the initial correlation analyses signify that Occupation (i.e., Activity Participation) scores were correlated with scores of Social Integration, Physical Independence, and Mobility at both one and five years. This relationship demonstrates the importance of being active in the realms of employment, schooling, home activities, and recreation. Individuals with SCI who are engaged in various activities are perhaps given more opportunities to socialize than those who have lower levels of activity involvement. Being involved in different activities is also associated with increased mobility within the community and higher levels of physical independence. However, these particular outcomes that result from activity participation are not well

documented. Much of the research that examines levels of employment, education, or recreation in individuals with SCI typically measures these variables as the outcome or dependent on another variable. For example, Foreman, Cull, and Kirby (1997) found that typically individuals who participate in recreation related activities are younger, sustained the SCI at a younger age, have a lower level injury, and a higher outcome. In terms of employment, it has been found that the being Caucasian, having more years of education and a lower level of injury are associated with increased likelihood of having a paid job (Krause et al., 1999). In studies that do examine outcomes of activity participation, dependent variables that are measured are typically subjective, psychological, or social in nature. It has been found that employment and education are associated with increased quality of life for individuals with SCI (Krause, 1997), and that recreation is often associated with various psychological gains and social benefits (Blinde & McClung, 1997). If outcomes such as mobility, physical independence, and social integration are indeed associated with being active, there is a great need for future research to examine this particular relationship.

#### *Outcomes of Specific Activity Participation in Community Integration*

After initial correlation analyses were run, regression analyses were run to determine what contribution hours spent in different types of activities in the Occupation domain (i.e. education, employment, home-making, home maintenance, and recreation) influenced Year 1 and 5 Social Integration, Mobility, and Physical Independence CHART scores. Results demonstrated that recreation was the only activity to significantly predict year 1 Social Integration scores. Previous studies have documented the importance of a social aspect in recreation participation for individuals with SCI. Levins et al. (2004) found that involvement in physical activity, including recreation activities, was important for not only social aspects of life,

but for physical, spiritual, and emotional reasons. Additionally, Levins et al. found that the attitude and help of other participants in the physical activities was a large factor in regards to the social environment and in positively impacting overall life-domains. The fact that recreation involvement was the only activity that influenced Year 1 Social Integration is extremely significant to the field of RT. Although recreational therapists address a variety of goals through activity involvement of patients, there is limited research that actually documents different outcomes associated with specific activities.

What is interesting to note, however, is that there was no longer a relationship between hours spent in recreation related activities and 5 year Social Integration CHART scores. In fact, results suggested that none of the five activities in the Occupation domain significantly predicted year 5 Social Integration scores. One explanation may be that once an individual with SCI is discharged from the rehabilitation hospital, they are typically provided with many different resources in the community. They may still be in contact with their therapists and doctors, and have follow-up appointments at the hospital every couple months within that first year. In this first year, they are typically encouraged to get involved in different activities within their community. It has been suggested by Dattilo et al. (1998) that availability of different support networks decreases over time upon discharge of the rehabilitation hospital, but that recreation activity can help in establishing and developing social contacts. Perhaps rehabilitation programs need to establish additional methods of follow-up to ensure that individuals are truly integrated within the community, and that they also maintain this level of integration.

In terms of identifying the specific activities that were associated with Year 1 outcomes in the Mobility and Physical Independence CHART domains, it was found that hours spent at a paid job, in school/study related activities, and recreational activities significantly predicted

Mobility scores. The activities that significantly predicted Physical Independence scores were hours spent at a paid job, in school/study, and hours spent homemaking. Mobility outcomes resulting from having a job, being in school and recreating were not surprising. The mobility domain itself is measured by the number of hours out of bed and out of the house every week. If an individual with SCI has a job or is pursuing further education, he/she is probably leaving the home to participate in these activities. Additionally, since recreation activities predicted Year 1 Social Integration scores, it is likely that individuals are recreating and subsequently socializing outside of the home. Individuals with jobs, enrolled in school or recreating would probably need to at least be out of their bed, and in most situations away from home to successfully pursue these activities. Therefore, individuals who are active in home maintenance and home-making would have lower scores in this domain.

Similarly, it was not surprising that the regression analyses indicated hours spent a paid job and school were activities that predicted Year 1 Physical Independence scores. If a person is working or pursuing further education which will probably lead to future work, it would be expected that these individuals would require less paid assistance. The homemaking variable was more surprising in predicting year 1 Physical Independence scores. A variable that could perhaps be partially responsible for these findings is environmental/living conditions of the individuals with SCI. If appropriate resources or living situations were not available or accessible to carry out basic activities within the home, the individual's level of handicap may increase (Noreau & Fougheyrollas, 2000). Since CHART measures handicap levels which then essentially translate into levels of community integration, it is possible that individuals who do *not* spend much time in homemaking related activities, are unable to do so if they do not live in a fully accessible environment. Therefore, if one does not have the means to an accessible living environment, it is

possible that levels of physical independence will be indirectly influenced. Furthermore, level of injury was not correlated with CHART Physical Independence scores (which are measured by amounts of paid and unpaid assistance), so it is probable that even if individuals had a lower level of injury, but did not live in a fully accessible home, that they would require more assistance, thereby participating in less home related activities. Richards et al. (1999) actually found that access to the environment explained more variance than demographic variables and health complications in CHART Occupation and physical functioning scores in individuals with SCI. In this particular study, the dataset did not include information related to the environmental conditions of the individuals, so it is unknown the possible influence that accessible living had on total CHART scores.

In terms of specific activities predicting Year 5 CHART scores, hours at a paid job was the only activity that significantly predicted Mobility and Physical Independence scores. Since Year 1 Mobility scores were predicted by the same variable, the reasons probably remain the same five years later. Similarly, when individuals of any ability have a job, it is usually associated with more independence. Therefore, the fact that hours spent in a paid job at year 1 predicted year 5 Physical Independence scores was not surprising.

#### *Longitudinal Changes in Community Integration*

When changes in community integration were examined between one and five years, results indicated that the only CHART domain to change significantly was Occupation. The Occupation (i.e., Activity Participation) scores were found to significantly increase from a mean score of 67.87 to 79.14. These results were inconsistent with previous findings of Charlifue and Gerhart (2004) who found that there was a decline, although subtle, in levels of community integration over time (as measured by the four CHART domains). It must be acknowledged,

however, that the sample size in the current study was relatively small (N=69) when compared to the sample in the Charlifue & Gerhart study (N=178), and using larger sample sizes in the future could be greatly beneficial to confirm findings. When additional t-tests were run to examine what activities changed the most within the Occupation domain, it was found that hours at a paid job was the only activity to significantly increase over time. Conroy and McKenna (1999) found similar employment trends in a study as their results indicated that increased time post-injury was associated with increased rates of employment. It is possible that the more time that passes; the more adjusted an individual becomes to the injury, and the greater likelihood of returning/starting work. Krause et al. (1999) also found that having lived more years with SCI was associated with a greater likelihood of working. However, Krause et al. additionally found that individuals who work are typically younger, have a lower level of injury and have more education. In this study, none of these particular variables were significantly correlated with Occupation scores, which could be attributed to the small sample size or inconsistencies with data collection methods.

It must be noted that there is very little known about specific behavioral and participation related changes that occur over a period of time post-discharge from rehabilitation. It is suggested that the amount of time that passes post-injury is often associated with a variety of beneficial factors. Some researchers suggest that time since injury is positively correlated with acceptance of disability (Kerr & Thompson, 1972), psychosocial and functional outcomes (Gerhart et al., 1993), favorable adjustment outcomes (Krause & Crewe, 1991), and increased employment activities (Krause, 1997). However, it is also possible that there is a certain period of time that most of these changes will occur; some sources suggest that the majority of progress and change in individuals with SCI will occur in a one year period post injury. For example,



Alfred, Fuhrer, and Rossi (1997) found that gradual improvement in vocational development gradually occurred six months post-injury. Richards (1986) also found that individuals with SCI demonstrated a significant increase in comfort levels of their disability over a one year period. Individuals who are involved in wheelchair athletics are actually found to show an even greater rate of change in the domains of acceptance of disability, social satisfaction, self-perception, and self-concept (Patrick, 1986). When novice and veteran wheelchair athletes were asked to rate themselves in these domains, it was not only found that novices rated themselves significantly lower than the veterans, but that the novice's scores in all of the domains significantly improved over a five month period, whereas non-athletes with disabilities made no progress in the same time period (Patrick, 1986). All of these studies however, examined changes that occurred directly after discharge from rehabilitation. It remains relatively unknown what changes occur over a greater period of time. In the current study, it was found that changes in employment changed over a five year period, but it remains relatively unknown what the primary catalyst for change was in these individuals. It is possible that something significant occurs in that first year after discharge that could affect long term outcomes. This is an area that is in need of future research.

### *Limitations*

One of the primary limitations of this study was the use of existing data for analyses, which therefore prevented the control of some variables included in the data collection process. The relationships that were found between the amount of activity participation and community integration were not proof of a causal relationship. Individuals with SCI may participate in a variety of different pastimes, and it is therefore difficult to determine which activities influence which outcomes. This difficulty in distinguishing outcomes also occurs during and after SCI

therapy; individuals with SCI receive multiple types of therapy during rehabilitation and the same difficulty in determining which type of therapy produces which outcomes often occurs. This difficulty in distinguishing outcomes between therapeutic interventions is often referred to as the “black-box phenomenon” (Whiteneck, Gassaway, Dijkers, & Jha, 2009) which is a limitation in most studies that examine therapeutic outcomes.

Also, some of the recreation variables were questionable in how they were defined. For example, the CHART Occupation asked: *“How many hours per week do you spend in recreational activities such as sports, exercise, playing cards, or going to the movies? Please do not include time spent watching TV or listening to the radio.”* This was a very broad definition of recreation, and even though results from the regression analyses suggested that hours spent in recreation predicted year 1 Social Integration outcomes, it remains unknown what *type* of recreation was being performed. There is a good chance that outcomes would be different if for example an individual spent 10 hours a week playing wheelchair basketball as part of an organized team, vs. a person who spent 10 hours a week playing cards with a family member. Since these would be classified as being the same thing, it is impossible to determine what recreation experience is producing the most beneficial outcomes.

Another limitation is that of missing data. For example, some of the questions and demographic variables are missing or labeled as “unknown”. Due to the small sample size, if an individual was missing certain items, the data was not completely deleted from the dataset; the data for that particular variable was not included in individual analyses. It is also unknown what method of data collection was used to gather some of the variables in the study. For example, one of the primary instruments being utilized in this study (Craig Handicap Assessment and Reporting Technique) was originally designed as an interview tool which can be administered

face-to-face or by telephone. However, it is also possible to use the instrument as a mailed questionnaire, but there is then potential to lose valuable data in the absence of interaction with a trained interviewer providing consistent prompts. Since the method of data collection is unknown, it is impossible to determine how valid and reliable the data is.

### *Implications for Practice and Research*

In SCI rehabilitation, recreational therapists address many different treatment goals through a variety of activities. It becomes important to understand what specific activities most effectively address different physical, social, and occupational outcomes. The fact that recreation involvement was the only activity in this study that influenced year 1 Social Integration CHART scores is extremely significant to the field of RT. The results of this study indicate that while recreation is important to all individuals with SCI post-rehabilitation, the social element that recreation opportunities provide may be particularly important to individuals as they return home within that first year. There is fairly limited research that documents social outcomes that result from recreation participation. Loy et al. (2003) found that social support was a significant factor following SCI, and that the diversity and physical intensity of recreation activities was related to depression levels, yet there is a great need for further research in this area.

It is also possible that recreation has a stronger presence early in the community integration process while individuals who have been injured are re-developing job skills or are searching for other vocational interests that fit functional abilities. Since the only significant change in community integration from year 1 to year 5 was hours at a paid job, recreation could very likely provide a transitional type of activity to the time an individual finds an appropriate job. If rehabilitation programs address the importance of recreation and sport involvement, in

addition to job related skills post rehabilitation, perhaps the prospect of employment could be increased for individuals with SCI.

Additionally, length of stay in rehabilitation hospitals is decreasing, and many individuals with SCI are being discharged with only a brief exposure to skills rather than a full mastery of skills necessary to make a successful transition to the community (Sable & Gravink, 1999). These individuals are not only being discharged with an incomplete skill set, they are not given enough time to adjust to psychosocial changes in their lives (Loy et al., 2003). It is possible that opportunities for social integration that recreation participation entails may provide additional assistance with these issues in that first year post discharge. Sable and Gravink (1999) state the importance of this transitional period following injury in that the first year is a “critical window” (p. 33) in which appropriate interventions can prevent depression, isolation, secondary medical complication, and alcohol abuse.

If practitioners can better understand what activities influence long term community integration outcomes, it becomes possible to more effectively help in the adjustment and reintegration process of individuals with SCI post-discharge. When examining the different influences of activity participation on community integration at both one and five years, it appeared that activities were more influential at one year as opposed to five years post-discharge. Rehabilitation programs need to establish methods of follow-up to ensure that individuals are thoroughly utilizing community resources and maintaining a beneficial level of community integration. One method to address this need is to create transitional programs within the community that assist individuals with disabilities in this process. There are a few transitional programs that currently exist that function in this capacity and are greatly successful. For example, Project PATH (Promoting Access Transition and Health) is a program designed

specifically for individuals with SCI that is meant to: 1) Decrease individual's dependence on the health care system, 2) Promote positive health behaviors, and 3) Empower the consumer to take responsibility for their own health (Sable & Gravink, 1999). The Shepherd Center also has a Bridge Program that offers post-discharge education, guidance and referrals to individuals with various types of injuries. This particular program addresses psychosocial, career or medical issues that tend to arise in the first year following discharge. There is a need for not only additional research that examines what specific occurrences in that first year influence long term community integration outcomes, but also for the existence of more transitional community based programs.

### *Conclusion*

The purpose of this study was to compare the influence of various types of activities an individual participates in one year after sustaining a spinal cord injury with different levels of community integration and also to determine if specific levels of community integration change over a five year period. The research presented demonstrated that increased activity participation was associated with increased social integration, physical independence and mobility 1 and 5 years post SCI discharge. Results also demonstrated that the different domains of community integration were all predicted by hours spent in different activities. The only measure of community integration that was found to significantly change over a five year period was the amount of activities an individual participated in, and more specifically the hours spent in a paid job. These results further demonstrated the importance of recreational therapists utilizing various activities to address treatment goals in SCI rehabilitation, and also that there is a need for future research to examine outcomes that are associated with specific activities.

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## APPENDIX A: CHART INSTRUMENT

### CHART Short Form - Interview

#### WHAT ASSISTANCE DO YOU NEED?

People with disabilities often need assistance. We would like to differentiate between personal care for physical disabilities and supervision for cognitive problems. First, focus on physical "hands on" assistance: This includes help with eating, grooming, bathing, dressing, management of a ventilator or other equipment, transfers etc. Keeping in mind these daily activities...

1. How many hours in a typical 24-hour day do you have someone with you to provide physical assistance for personal care activities such as eating, bathing, dressing, toileting and mobility?

\_\_\_\_\_ hours paid assistance  
\_\_\_\_\_ hours unpaid (family, others)

Now, focus on supervision for cognitive problems instead of physical assistance. This includes remembering, decision making, judgment, etc..

2. How much time is someone with you in your home to assist you with activities that require remembering, decision making, or judgment?

- [1] \_\_\_\_\_ Someone else is always with me to observe or supervise.  
[2] \_\_\_\_\_ Someone else is always around, but they only check on me now and then.  
[3] \_\_\_\_\_ Sometimes I am left alone for an hour or two.  
[4] \_\_\_\_\_ Sometimes I am left alone for most of the day  
[5] \_\_\_\_\_ I have been left alone all day and all night, but someone checks in on me.  
[6] \_\_\_\_\_ I am left alone without anyone checking on me.

3. How much of the time is someone with you to help you with remembering, decision making, or judgment when you go away from your home?

- [1] \_\_\_\_\_ I am restricted from leaving, even with someone else.  
[2] \_\_\_\_\_ Someone is always with me to help with remembering, decision making or judgment when I go anywhere.  
[3] \_\_\_\_\_ I go to places on my own as long as they are familiar.  
[4] \_\_\_\_\_ I do not need help going anywhere.

Now, I have a series of questions about your typical activities.

#### ARE YOU UP AND ABOUT REGULARLY?

4. On a typical day, how many hours are you out of bed? \_\_\_\_\_ hours
5. In a typical week, how many days do you get out of your house and go somewhere? \_\_\_\_\_ days
6. In the last year, how many nights have you spent away from your home (excluding hospitalizations?)  
[0] \_\_\_\_\_ none [1] \_\_\_\_\_ 1-2 [3] \_\_\_\_\_ 3-4  
[5] \_\_\_\_\_ 5 or more

#### HOW DO YOU SPEND YOUR TIME?

7. How many hours per week do you spend working in a job for which you get paid? hours \_\_\_\_\_  
(occupation: \_\_\_\_\_)
8. How many hours per week do you spend in school working toward a degree or in an accredited technical training program (including hours in class and studying)? \_\_\_\_\_ Hours

9. How many hours per week do you spend in active homemaking including parenting, housekeeping, and food preparation? \_\_\_\_\_ Hours
10. How many hours per week do you spend in home maintenance activities such as gardening, house repairs or home improvement? \_\_\_\_\_ Hours
11. How many hours per week do you spend in recreational activities such as sports, exercise, playing cards, or going to movies? Please do not include time spent watching TV or listening to the radio.  
Hours

**WITH WHOM DO YOU SPEND TIME?**

12. How many people do you live with? \_\_\_\_\_
13. Is one of them your spouse or significant other?  
[1]\_\_\_\_Yes [0]\_\_\_\_No [9]\_\_\_\_Not applicable (subject lives alone)
14. Of the people you live with how many are relatives?  
\_\_\_\_\_
15. How many business or organizational associates do you visit, phone, or write to at least once a month?  
\_\_\_\_\_ associates
16. How many friends (non-relatives contacted outside business or organizational settings) do you visit, phone, or write to at least once a month? \_\_\_\_\_friends
17. With how many strangers have you initiated a conversation in the last month (for example, to ask information or place an order)?  
[0]\_\_\_\_ none [1]\_\_\_\_ 1-2 [3]\_\_\_\_ 3-5 [6]\_\_\_\_ 6 or more

**WHAT FINANCIAL RESOURCES DO YOU HAVE?**

18. Approximately what was the combined annual income, in the last year, of all family members in your household? (consider all sources including wages and earnings, disability benefits, pensions and retirement income, income from court settlements, investments and trust funds, child support and alimony, contributions from relatives, and any other source.)
  - a. Less than 25,000 - If no ask e; if yes ask b
  - b. Less than 20,000 - If no code 22500; if yes ask c
  - c. Less than 15,000 - If no code 17500; if yes ask d
  - d. Less than 10,000 - If no code 12500; if yes code 5000
  - e. Less than 35,000 - If no ask f; if yes code 30000
  - f. Less than 50,000 - If no ask g; if yes code 42500
  - g. Less than 75,000 - If no code h; if yes code 62500
  - h. 75,000 or more code 80000
19. Approximately how much did you pay last year for medical care expenses? (Consider any amounts paid by yourself or the family members in your household and not reimbursed by insurance or benefits.)
 

"Would you say your unreimbursed medical expenses are...."

  - a. Less than 1000 if "no" ask b if "yes" code 500.
  - b. Less than 2500 if "no" ask c if "yes" code 1750.
  - c. Less than 5000 if "no" ask d if "yes" code 3750.
  - d. Less than 10000 if "no" code e if "yes" code 7500.
  - e. 10000 or more code 15000

For information regarding CHART please contact:  
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 Research Department  
 3425 S. Clarkson Street  
 Englewood, Colorado 80110  
 (303) 789-8202  
 dmellink@craighospital.org

## APPENDIX B: CHART SCORE FORM

### Craig Handicap Assessment and Reporting Technique Scoring Short Form

<p>1. How many hours in a typical 24-hour day do you have someone with you to provide physical assistance for personal care activities such as eating, bathing, dressing, toileting and mobility?          _____ hours paid assistance    _____ hours unpaid (family, others)</p>	<p>A. Total the hours of paid and unpaid care, multiply by 4, and subtract that number from 100.</p>	<p><b>PHYSICAL INDEPENDENCE</b>          100          minus          _____          =          _____</p>
<div style="border: 1px solid black; width: 100px; height: 20px;"></div>		
<p>2. How much time is someone with you in your home to assist you with activities that require remembering, decision making, or judgment?</p> <p>1 _____ Someone else is always with me to observe or supervise.          2 _____ Someone else is always around, but they only check on me now and then.          3 _____ Sometimes I am left alone for an hour or two.          4 _____ Sometimes I am left alone for most of the day.          5 _____ I have been left alone all day and all night, but someone checks in on me.          6 _____ I am left alone without anyone checking on me.</p>	<p>A. Assign points as follows: response #1 = 0 points; response #2 = 1 point; response #3 = 2 points; response #4 = 3 points; response #5 = 4 points; and response #6 = 5 points.</p> <p>B. Multiply points in "A" by 11.</p>	<p><b>COGNITIVE INDEPENDENCE</b>          _____          x11          =          _____          +          _____          x15          =          _____          =          _____</p>
<p>3. How much of the time is someone with you to help you with remembering, decision making, or judgment when you go away from your home?</p> <p>1 _____ I am restricted from leaving, even with someone else.          2 _____ Someone is always with me to help with remembering, decision making or judgment when I go anywhere.          3 _____ I go to places on my own as long as they are familiar.          4 _____ I do not need help going anywhere.</p>	<p>C. Assign points as follows: response #1 = 0 points; response #2 = 1 point; response #3 = 2 points; and response #4 = 3 points.</p> <p>D. Multiply points in "C" by 15.</p>	
<p>Add the sums of "B" and "D". If the total sum is greater than 100, enter 100.</p>		
<div style="border: 1px solid black; width: 100px; height: 20px;"></div>		

4. On a typical day, how many hours are you out of bed? \_\_\_\_\_ hours
5. In a typical week, how many days do you get out of your house and go somewhere? \_\_\_\_\_ days
6. In the last year, how many nights have you spent away from your home (excluding hospitalizations?)  
 \_\_\_\_ none \_\_\_\_ 1-2 \_\_\_\_ 3-4 \_\_\_\_ 5 or more

- A. Multiply the number of hours out of bed by 3.
- B. Multiply the number of days per week out of the house by 7.
- C. Assign points as follows: no nights out = 0; 1-2 nights out = 10; 3-4 nights out = 15; 5 or more nights = 20. If the total sum is greater than 100, enter 100.

**MOBILITY**

\_\_\_\_\_  
 +  
 \_\_\_\_\_  
 +  
 \_\_\_\_\_  
 =

Add the sums of "A", "B", and "C". If the total sum is greater than 100, enter 100.

7. How many hours per week do you spend working in a job for which you get paid? \_\_\_\_\_ hours
8. How many hours per week do you spend in school working toward a degree or in an accredited technical training program (including hours in class and studying)? \_\_\_\_\_ hours
9. How many hours per week do you spend in active homemaking including parenting, housekeeping, and food preparation? \_\_\_\_\_ hours
10. How many hours per week do you spend in home maintenance activities such as gardening, house repairs or home improvement? \_\_\_\_\_ hours
11. How many hours per week do you spend in recreational activities such as sports, exercise, playing cards, or going to movies? Please do not include time spent watching TV or listening to the radio. \_\_\_\_\_ hours

- A. Multiply the number of hours working by 2.5.
- B. Multiply the number of hours in school by 2.5.
- C. Multiply the number of hours in active homemaking by 2.5.
- D. Multiply the number of hours in home maintenance by 2.5.
- E. Multiply the number of recreational activities by 1.25

**OCCUPATION**

\_\_\_\_\_  
 +  
 \_\_\_\_\_  
 +  
 \_\_\_\_\_  
 +  
 \_\_\_\_\_  
 +  
 \_\_\_\_\_  
 =

Add the sums of "A", "B", "C", "D", and "E". If the total sum is greater than 100, enter 100.



		SOCIAL INTEGRATION
12. How many people do you live with?	A. Assign 38 points if living with spouse/partner. Assign 25 points if living with unrelated roommate and/or an attendant.	_____ +
13. Is one of them your spouse or significant other?		_____ +
14. of the people you live with how many (others) are relatives?	Add an additional six points for every relative that lives in the household.	_____ +
15. How many business or organizational associates do you visit, phone, or write to at least once a month? _____ Associates	B. Multiply number of business associates by 2.5. A maximum score for this component is 25 points.	_____ +
16. How many friends (non-relatives contacted outside business or organizational settings) do you visit, phone, or write to at least once a month? _____ Friends	C. _____ Multiply by 13. A Maximum score for this component is 65 points.	_____ +
17. With how many strangers have you initiated a conversation in the last month (for example, to ask information or place an order)?  none ____ 1-2 ____ 3-5 ____ 6 or more	D. Assign points as follows: none = 0 points; 1-2 = 15 points; 3-5 = 23 points; 6 or more = 30 points.	_____ +
		=
Add the sums from "A", "B", "C", and "D". If the total sum is greater than 100, enter 100.		

**ECONOMIC  
SELF  
SUFFICIENCY**

18. Approximately what was the combined annual income, in the last year, of all family members in your household? (consider all sources including wages and earnings, disability benefits, pensions and retirement income, income from court settlements, investments and trust funds, child support and alimony, contributions from relatives, and any other source.)

- a. Less than 25,000 - If no ask e; if yes ask b
- b. Less than 20,000 - If no code 22500; if yes ask c
- c. Less than 15,000 - If no code 17500; if yes ask d
- d. Less than 10,000 - If no code 12500; if yes code 5000
- e. Less than 35,000 - If no ask f; if yes code 30000
- f. Less than 50,000 - If no ask g; if yes code 42500
- g. Less than 75,000 - If no code h; if yes code 62500
- h. 75,000 or more code 80000

19. Approximately how much did you pay last year for medical care expenses? (Consider any amounts paid by yourself or the family members in your household and not reimbursed by insurance or benefits.)

- a. Less than 1000 if "no" ask b if "yes" code 500.
- b. Less than 2500 if "no" ask c if "yes" code 1750.
- c. Less than 5000 if "no" ask d if "yes" code 3750.
- d. Less than 10000 if "no" code e if "yes" code 7500.
- e. 10000 or more code 15000

A. Calculate family size by adding respondent, plus partner (if living with respondent), plus other relatives in household.

B. Subtract the unreimbursed medical expenses from the annual income (amount in question #19 minus amount in question #20).

C. Determine poverty level from family size calculated in "A".

D. Divide the value from "B" by the poverty level from "C".

E. Multiply by 50

If the total sum is greater than 100, enter 100.

\_\_\_\_\_

Family size

\_\_\_\_\_

(#19)

minus

\_\_\_\_\_

(#20)

=

\_\_\_\_\_

divided by

\_\_\_\_\_

Poverty level

\_\_\_\_\_

\*50

=

\_\_\_\_\_

=

## APPENDIX C: IRB APPROVAL FORM



### EAST CAROLINA UNIVERSITY

University & Medical Center Institutional Review Board Office  
1L-09 Brody Medical Sciences Building • 600 Moyer Boulevard • Greenville, NC 27834  
Office 252-744-2914 • Fax 252-744-2284 • [www.ecu.edu/irb](http://www.ecu.edu/irb)

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**Date:** January 6, 2011

**Principal Investigator:** Tonia Zyburt, BA  
**Dept./Ctr./Institute:** RCLS  
**Mailstop or Address:** 2405 Belk Building

**RE:** Exempt Certification  
**UMCIRB#:** 11-011 JTC  
**Funding Source:** Unfunded

**Title:** Outcomes of Recreation Participation for Individuals with SCI

Dear Tonia:

On 1/5/11, the University & Medical Center Institutional Review Board (UMCIRB) determined that your research meets ECU requirements and federal exemption criterion #4 which includes the collection or study of existing data.

It is your responsibility to ensure that this research is conducted in the manner reported in your Internal Processing Form and Protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

The UMCIRB Office will hold your exemption application for a period of five years from the date of this letter. If you wish to continue this protocol beyond this period, you will need to submit an Exemption Certification Request at least 30 days before the end of the five year period.

Sincerely,

Chairperson, University & Medical Center Institutional Review Board