The Effect of Sports on Level of Community Integration as Reported by Persons With Spinal Cord Injury

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Key Words: preventive health services (community) • sports and games equipment, adapted

Objective. The purpose of this study was to determine whether participation in sports by persons with spinal cord injuries (SCIs) affected level of community integration as defined by the World Health Organization and as measured by the Craig Handicap Assessment and Reporting Technique (CHART).

Method. Forty-eight participants were recruited from a camp for persons with physical disabilities as well as from SCI support groups. Participants were divided into groups of athletes (n = 30) and nonathletes (n = 18) on the basis of their self-reported level of sports participation.

Results. Athletes scored significantly higher on four of five subsections of the CHART (physical independence, mobility, occupation, social integration), indicating greater levels of community integration than nonathletes.

Conclusion. These findings extend the literature outlining the physical and psychological benefits of sports. Occupational therapists have a unique opportunity to use the occupation of sports to integrate the roots of the profession with the cultural demands of society.

In persons with spinal cord injury (SCI), it is unclear whether engagement in sports affects level of community integration. Yet, the use of sports in rehabilitation has increased over the years because engaging in sports has many physical and psychological benefits for persons with disabilities (Curtis, McClanahan, Hall, Dillon, & Brown, 1986; Hoffman, 1986; Stotts, 1986; Valliant, Bezzubyk, Daley, & Asu, 1985). A majority of the findings in research on sports benefits reveal primarily musculoskeletal gain. Although occupational therapists are concerned with this musculoskeletal performance component, their basic theoretical foundation focuses on returning function and satisfaction to their clients’ lives.

Because occupational therapists have professed that engagement in activities will lead to increased life satisfaction (Yerxa & Baum, 1986), sports could facilitate this process if interest or premorbid experience exists. Furthermore, because low scores on measures of life satisfaction have been linked to low levels of community integration (Fuhrer, Rintala, Hart, Clearman, & Young, 1992; Nosek, Fuhrer, & Potter, 1995), establishing a positive relationship between sports and level of community integration would support the use of sports to increase life satisfaction. Inherent in the notion of regained life satisfaction is reintegration into the community on both a micro (individual) and macro (societal) level. On a micro level, the occupational therapist may instruct in adaptive tech-
niques for completing various activities of daily living (ADL). When the therapist changes focus to the macro level and facilitates social interaction in the home and community, a broader, more holistic perspective is necessary.

The micro-level benefits of sports in rehabilitation have been well documented, but little research exists that demonstrates the effect of sports on the level of community integration of persons with disabilities. The World Health Organization’s (WHO’s, 1980) initial International Classification of Impairments, Disabilities and Handicaps (ICIDH) stated that being handicapped was because of the person not being able to carry out expected social roles. This divergence from fulfilling social roles, or lack of community integration, has been poorly measured because of the ambiguous nature of terms over the years. One of the outcomes of the WHO’s ICIDH was the formation of the Craig Handicap Assessment and Reporting Technique (CHART), which objectively measures a person’s level of community integration (Whiteneck, Charlifue, Gerhart, Overholser, & Richardson, 1992b). With a standardized method of measuring degree of community integration, the impact of activities, such as sports, can be evaluated. Using the CHART, this study focused on determining whether there were differences in CHART scores between athletes and nonathletes with SCI.

Literature Review

Because of the lack of precise rehabilitation terms, communication between health professionals has been an arduous task. In 1980, the WHO published the ICIDH in an effort to develop uniformity in the language around the terms impairment, disability, and handicap. The WHO developed a series of codes to classify a continuum for these terms. To meet the changes arising over the past 2 decades, the WHO is currently revising the ICIDH (ICIDH-2). Despite the change, the purpose of the classification remains the same in that it aims to "provide a unified and standard language" for communicating the "consequences of health conditions" (WHO, 1997, p. 2). In the ICIDH-2, handicap will be replaced with the more neutral term participation, and limiting conditions in this area will be described as participation restriction (WHO, 1997). In the context of health, participation is defined in the beta version of the ICIDH-2 as "the nature and extent of a person’s involvement in life situations in relation to impairments, activities, health conditions and contextual factors. Participation may be restricted in nature, duration and quality" (WHO, 1997, p. 9).

The ICIDH has succeeded in providing a framework for the development of tools to measure societal functioning. For example, the CHART was primarily designed for the SCI population; however, certain adaptations can be made to accommodate other disabilities (Whiteneck et al., 1992b). Menter et al. (1991) used the CHART to examine participation restriction and cost of care as related to age and number of years postinjury with a group of 205 patients with SCI. Gerhart, Bergstrom, Charlifue, Menter, and Whiteneck (1993) expanded on this study by using the CHART to compare quality of life of patients with SCI as they aged. Of the 279 participants tested, those whose quality of life decreased with aging needed more physical assistance as measured by the self-care and mobility questions of the CHART.

The CHART has also been used to examine psychological issues in persons with SCI. It helps to show that gender differences in depression in persons with SCI were partly because of mobility differences within the home and community (Fuhrer, Rintala, Hart, Clearman, & Young, 1993). Tate, Forchheimer, Maynard, and Dijkers (1994) supported these findings in their study on predicting depression and psychological distress in persons with SCI on the basis of indicators of participation restriction. They found that CHART scores were significantly associated with both distress and depression. In their use of the CHART, Prince, Manley, and Whiteneck (1995) reported that persons who independently care for themselves had significantly better health outcomes with fewer rehospitalizations and complications than those needing physical assistance. Mattson-Prince (1997) subsequently used the CHART to show that high levels of independence resulted in reduced financial burden on the individual and society as well as less emotional burden borne by the person with the SCI.

Benefits of Sports

Research of the 1980s, an active period for studying sports and disability, showed that engagement in sports led to improvement in strength, coordination, balance, endurance, pulmonary function, and weight control for persons with SCI (Curtis et al., 1986; Hoffman, 1986; Stotts, 1986; Walker, Cooney, & Norton, 1989). In addition to physiological gains, Valliant et al. (1985) found that persons with SCI who engaged in sports showed higher levels of self-esteem, greater life satisfaction, and enhanced mood. In a recent review of research, Heath and Fentem (1997) remarked that studies have shown evidence that regular physical activity has improved functional status and quality of life in persons with disabilities. They stated, “Regular physical activity, sports participation, and active recreation are essential behaviors for the prevention of disease, promotion of health, and maintenance of functional independence” (p. 195). Blinde and McClung (1997) found that persons with physical disabilities who engaged in recreational activities had enhanced perceptions of their physical and social self in addition to having a greater sense of control in their lives. Using a semistructured questionnaire that addressed four domains, Pluym, Keur, Gerritsen, and Post (1997) surveyed 44 wheelchair athletes about their vocational status, leisure time activities, social functioning, and relationship with partner. They discovered that the athletes
were leading a life comparable in all four domains to that before their disability. Reports of other projects involving persons with disabilities have emphasized the need for health-promotion programs to be designed to reduce secondary conditions, such as obesity and pressure sores, as well as to maintain functional independence (Johnson, Klaas, & Vogel, 1999; Rimmer, 1999).

Because of the documented benefits of sports, their use in rehabilitation has gradually gained popularity over the years (Miller & Rucker, 1997). Considering the value of sports across cultures worldwide, it makes sense to offer opportunities that allow persons to engage in sports if there is interest or premorbid experience. Previous research studies clearly demonstrate the physiological and psychological benefits of sports to the person; the logical extension of this research is to find out whether active engagement in sports contributes to an increased level of community integration.

The purpose of this study was to determine whether athletic persons with SCI exhibit a higher level of community integration (as defined by the WHO and measured by the CHART) than nonathletic persons with SCI. It was hypothesized that athletic persons with SCI would demonstrate higher scores on the CHART (greater community integration) than nonathletic persons with SCI. Establishing a positive connection between sports participation and community integration would further support the use of sports in rehabilitation and would endorse occupational therapy theory on using sports and leisure activities to improve functioning. In the current literature, no studies were found that used the CHART to examine this relationship.

Method

Participants

Brochures were mailed statewide to hospitals, Centers for Independent Living (CILs), support groups, transitional living facilities, and rehabilitation centers to recruit participants for an annual camp for adults with physical disabilities—GatorSport Exploration Camp—directed by the University of Florida’s Department of Occupational Therapy (see Figures 1 and 2). In addition to providing sports instruction, the camp has been a vehicle for collecting data on volunteer participants in research projects regarding sports and disability. Study participants were also recruited from SCI support groups and CILs in Florida with an emphasis on obtaining nonathletic persons. All participants were wheelchair users with an SCI who were at least 18 years of age, medically stable, and cognitively intact.

Participants were divided into two groups (athlete, nonathlete) on the basis of information collected during the evaluation process regarding their involvement in sports and exercise. Previous studies have defined athlete and nonathlete for comparing groups of persons with an SCI (Paulsen, French, & Sherrill, 1990; Stotts, 1986). The present study used a more specific definition to serve the majority of the participants who were involved in sports on a recreational level as opposed to a professional level. For a participant to be included in the athlete group, sports needed to be integrated into their weekly routine but not dominate their life. Consequently, athlete was defined as a wheelchair user with an SCI who participated in aerobic wheelchair sports at least 4 hr per week (e.g., all in one day or twice a week for 2 hr each session) or exercised at least three times per week for a minimum of 30 min each session. Nonathlete was defined as a wheelchair user with an SCI who either does not participate in sports regularly or did not meet the other criteria for athlete.

Of the 48 participants recruited, 22 attended the camp (15 athletes, 7 nonathletes), and 26 came from other sites (15 athletes, 11 nonathletes). The 30 athlete participants (23 men, 7 women) ranged in age from 26 to 53 years ($M = 37.47$ years, $SD = 7.46$). The 18 nonathlete participants (13 men, 5 women) ranged in age from 18 to 52 years ($M = 36.56$ years, $SD = 9.46$). Table 1 presents level of injury and years postinjury for the participants.

Figure 1. Racing on the track. Gernot Aistrop (second from left) is an occupational therapist with a spinal cord injury as well as a racing coach.

Figure 2. Wheelchair basketball session at GatorSport Exploration Camp in Gainesville, Florida.
The CHART was used to measure level of community integration. The instrument consists of five subsections that correspond with the WHO's definition of participation restriction. The subsections are physical independence, mobility, occupation, social integration, and economic self-sufficiency. Administration of the CHART can be in the form of an interview or a questionnaire. The subsections were reported previously as having good reliability and validity in the SCI population (Whiteneck et al., 1992b). Of 135 subjects, test–retest reliability was found to be .92 for physical independence, .95 for mobility, .89 for occupation, .81 for social integration, .80 for economic self-sufficiency, and .93 for the total score. In addition, overall differences between the high community integration group and the low community integration group (as rated by the subjects' rehabilitation professionals) supported the discriminant validity of the CHART scores (Whiteneck et al., 1992b).

The CHART consists of 27 items that are based on objective behavioral criteria (number of hours spent out of bed daily, number of business or organizational associates contacted monthly, etc.). CHART items include 3 questions regarding physical independence, 9 regarding mobility, 7 regarding occupation, 6 regarding social integration, and 2 regarding economic self-sufficiency. A weighted mathematical formula is used to calculate a score for each subsection of the instrument (Whiteneck, Charlifue, Gerhart, Overholser, & Richardson, 1992a). A total score is obtained by adding the subsections together. Each subsection is worth 100 points for a maximum total CHART score of 500 points, which indicates no participation restriction. The CHART assessment guide states that individual subsections can be totaled or “interpreted individually” (Whiteneck et al., 1992a, p. 1). However, using only the total CHART score for interpreting the level of community integration has been found to be a potentially misleading form of analysis because of the differential impact of age, time postinjury, level of injury on the subsections and missing data from the economic self-sufficiency subsection (Hall, Dijkers, Whiteneck, Brooks, & Krause, 1998). Consequently, most studies have used individual subsections for data analysis. Tables are available in the guide from the pilot study used to develop the CHART (Whiteneck et al., 1992a). The tables show means of scores across persons with different levels of injury and for persons without disabilities. The tables are not intended to be interpreted as norms; they are only to assist in identifying trends in CHART scores.

### Data Analysis

A preliminary analysis showed that almost all the scores in each CHART subsection for the two independent groups were negatively skewed. The skewness was more prominent in the athlete group than in the nonathlete group. Therefore, nonparametric Mann-Whitney U tests were used to test differences in each of subsection between the athlete and nonathlete groups. The Bonferroni-Holms step-down procedure was used to adjust for inflated Type I error as a result of multiple significance tests (Holland & Copenhaver, 1988). Level of significance was preset at .05, one-tailed.

### Results

Results of the Mann Whitney U test indicated that members of the athlete group reported significantly higher scores (greater community integration) on four of five subsections of the CHART (physical independence, mobility, occupation, social integration) than the nonathlete group. Only economic self-sufficiency (p = .062) was found to have no significant difference between the groups according to the preset level. Results of the Mann Whitney U tests are summarized in Table 2. The hypothesis stating that athletes with SCI would score higher on the subsections of the CHART than nonathletes with SCI was supported.

### Table 1

<table>
<thead>
<tr>
<th>Level of Injury</th>
<th>Athlete</th>
<th>Nonathlete</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical</td>
<td>20 (67%)</td>
<td>11 (61%)</td>
<td>31 (65%)</td>
</tr>
<tr>
<td>Thoracic</td>
<td>6 (20%)</td>
<td>5 (28%)</td>
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<tr>
<td>Lumbar</td>
<td>4 (13%)</td>
<td>2 (11%)</td>
<td>6 (12%)</td>
</tr>
<tr>
<td>Years Postinjury</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>14.90</td>
<td>11.43</td>
<td>13.60</td>
</tr>
<tr>
<td>Range</td>
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*Note:* n = 30, n = 18.

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Ongoing participation in society and personal world is a critical outcome of rehabilitation. A comprehensive measure of community integration would be a potentially mis-

Before the GatorSport Exploration Camp, the 22 participants completed the CHART either in the form of an interview or by writing on the assessment itself. The 26 participants recruited from support groups and CILs were administered the CHART by the second author in the form of an interview; the interviews were either in person or by telephone. Segal and Gillard (1997) found adequate agreement between telephone interviews and in-person interviews, allowing the second author to administer the CHART in the manner that was most convenient to the participants. Scoring of the CHART was performed according to the assessment guide (Whiteneck et al., 1992a).

### Procedure

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### Inspection of the data revealed that personal characteristics such as supporting a family, maintaining a job, and going to school were observed more frequently in the athlete group. Because high levels of community integration imply that typical social roles are being filled, participants who did not engage in some type of productive activity but who still recorded a high score in the economic self-sufficiency subsection cannot be considered as productive as their counterparts who worked or attended school.

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*Note:* n = 30, n = 18.
were employed or enrolled in an educational program. Of all the athletes in the study, 76% were employed or enrolled in an educational program. In the nonathlete group, only 28% were employed or enrolled in an educational program.

Discussion

Intuitively, it would seem that sports would affect the four CHART subsections of physical independence, mobility, occupation, and social integration more readily than economic self-sufficiency. Leading an independent life, maneuvering the wheelchair, interacting with team members, and occupying time meaningfully all characterize sports participation.

Several factors should be considered when interpreting the results. First, the decreased incidence of productivity for the nonathletes may be due to unknown factors, such as lack of transportation, secondary medical complications, or lower levels of education. Educational level of the participants was not requested, but higher levels of education have been associated with increased economic self-sufficiency (Hall et al., 1998; Whiteneck, Tate, & Charlifue, 1999) and with engagement in sports (Valliant et al., 1985). Second, to contrast with the athletes expected at GatorSport Exploration Camp (a camp dedicated to sports exploration for adults with SCI), we originally sought inactive persons with SCI to take part in this study, but these persons do not commonly access community services, making them difficult to locate. It was presumed that persons who rarely leave home would have participation restrictions in all CHART subsections, whereas athletes would be using recreational facilities and forging connections with other persons in the community when engaging in sports. As previously noted, 22 of the 48 participants came from GatorSport. By nature, the 7 nonathletes who chose to attend the camp were more active than other persons with SCI who chose not to leave their homes. Most of the nonathletes in this study engaged in some form of sport or exercise, although not frequently enough or not at an aerobic level to be classified as an athlete. Combining physically active persons (not active enough to be classified as athletes) with sedentary persons with SCI was a limitation in this study.

A post hoc analysis, therefore, was conducted to determine whether sports participation was related to occupation (defined in this instance as paid employment or enrollment in an educational program). Results of the chi-square analysis supported the contention that group depends on engagement in productive activities ($p = .001$). Of all the athletes in the study, 76% were employed or enrolled in an educational program. In the nonathlete group, only 28% were employed or enrolled in an educational program.

### Table 2
Independent Sample Comparison of CHART Scores

<table>
<thead>
<tr>
<th>CHART</th>
<th>Athlete</th>
<th>Nonathlete</th>
<th>U</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>Range</td>
<td>Median</td>
</tr>
<tr>
<td>Physical independence</td>
<td>95.28</td>
<td>8.77</td>
<td>66–100</td>
<td>100</td>
</tr>
<tr>
<td>Mobility</td>
<td>98.03</td>
<td>4.98</td>
<td>80–100</td>
<td>100</td>
</tr>
<tr>
<td>Occupation</td>
<td>86.30</td>
<td>21.68</td>
<td>14–100</td>
<td>100</td>
</tr>
<tr>
<td>Social integration</td>
<td>94.67</td>
<td>12.13</td>
<td>45–100</td>
<td>100</td>
</tr>
<tr>
<td>Economic self-sufficiency</td>
<td>85.00</td>
<td>27.54</td>
<td>0–100</td>
<td>100</td>
</tr>
</tbody>
</table>

*Note.* CHART = Craig Handicap Assessment and Reporting Technique.

$\text{Range} = 30$. $\text{Median} = 18$.

$p < .05$, one-tailed, with Bonferroni-Holms correction applied for multiple significance tests.

Strengthening the interpretation of the findings was the fact that there were a moderately larger number of higher level injuries in the athlete group than the nonathlete group (see Table 1). Whiteneck et al. (1992b) illustrated that individual CHART scores varied by level of SCI, with higher levels of injury (e.g., high cervical SCI) generally resulting in lower scores, demonstrating participation restriction. Assuming the impact of other variables being equal, members in the athlete group should have had marginally lower scores than they obtained. Additionally, despite having many minimally active participants classified as nonathletes instead of athletes, the results of this study support the hypothesis that sports participation is associated with a higher level of community integration as measured by the CHART. This finding provides the impetus for therapists to integrate sports into rehabilitation; the challenge is how to harmonize the two.

For the 10,000 persons who will incur an SCI every year in the United States (National Spinal Cord Injury Statistical Center, 1997), the road to recovery starts in the hospital. The hospital is where outreach programs promoting sports can begin. During all the time spent interviewing participants, one common theme emerged—participants in the athlete group wished that they had been exposed to sports at an earlier stage of their rehabilitation. With regard to sports, participant comments included, “It’s changed my life,” and “I wish I got off my couch earlier.” Exposing persons with an SCI to sports during the early stages of rehabilitation could provide the opportunity for many to carry on their premorbid social roles.

Although findings from this study have demonstrated that participation in sports may affect community integration, further research in this area is needed. In future studies, a larger sample size should be used with participants matched by level of injury, gender, and other demographic information. Dividing participants into three groups (athletes, moderate exercisers, sedentary persons) may clarify whether sports participation at a certain level of intensity affects community integration. Interpretation of this study’s findings would also be strengthened if the research were replicated at other sports camps. Because the CHART can be adapted for other disabilities, these findings could be replicated to determine the impact of sports on different disabilities.
populations (e.g., persons with brain injury). Other possible variables to consider would be time postinjury, premorbid level of sports participation, functional status, and access to transportation. Results of this study and future research will provide the groundwork for using sports with persons with SCI to prevent loss of social roles, which are imperative to the return of function and quality of life.

Conclusion
This study demonstrates the importance of sports as a therapeutic tool in the rehabilitation of persons with SCI. Sports are a major part of culture worldwide. Simple adaptive techniques can expose a person with SCI to sports that he or she may have thought lost as a result of the injury. Because some patients can lose interest with the routines of rehabilitation, it is plausible that integrating sports into their recovery would be welcomed as a refreshing change to the day-in-and-day-out rigors of rehabilitation. In fact, Hedrick and Broadbent (1996) found that patients were more likely to engage in enjoyable physical activities than in “prescriptive” health-promotion programs. Therapist roles in these events could range from being an administrator (planning camp activities, arranging for sponsors, training volunteers), being a clinician (helping campers with ADL before and after camp, assisting with adapted sports instruction), and being a researcher (conducting outcome studies on the effects of sports on function).

Engagement in sports has many advantages for rehabilitation, including teaching “discipline and sportsmanship” and “assisting in developing mastery in certain areas that can transfer to accomplishing life tasks” (Hanson, 1998, p. 35). Outreach programs sponsored by major rehabilitation companies and universities can provide experiences for persons to explore sports traditionally abandoned after injury. Moreover, by employing persons with SCI who are experts in their given sports as camp trainers and coaches, the camps provide true testimonials about what sports can do for other persons with similar disabilities and the ease at which they can be performed.

Occupational therapists are in an excellent position to promote sports in rehabilitation because of their knowledge and skills in activity analysis, equipment adaptation, and psychosocial issues—essential components involved in introducing a person with SCI to sports. As we enter the new millennium, occupational therapists have a unique opportunity to use the occupation of sports to integrate the roots of the profession (i.e., occupation-based treatment) with the cultural demands of society. ▲

Acknowledgments
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