

The effect of sports participation on the intensity of psychosocial problems of males with quadriplegia in Poland

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The main purposes of the study were (1) to evaluate the influence of sport participation on the intensity of psychosocial problems in males with quadriplegia, and (2) to determine the range of psychosocial problems encountered by physically active and sedentary individuals with quadriplegia, respectively. The Witkowski Psychosocial Problems Spinal Cord Injury Scale (PP-SCI) was used to assess the intensity of psychosocial problems among 35 physically active and 36 sedentary individuals with quadriplegia. The t-test analysis showed significantly higher values of mean global score ($t = -4.13$, $p = .000$) for the sedentary than for the physically active group. In addition, significantly higher scores were found in relation to four spheres of personality ($t = -3.69$, $p = .000$), family ($t = -3.94$, $p = .000$), social contacts ($t = -3.75$, $p = .000$) and occupational ($t = -3.67$, $p = .000$). This suggests that individuals with quadriplegia who are regularly involved in sport, are likely to experience less psychosocial problems than sedentary males with quadriplegia.

KEY WORDS: Psychosocial problems, Quadriplegia, Sport participation, Wheel-chair rugby

Introduction

Several studies have described the psychosocial benefits of sport for persons with disabilities over the past 50 years. Spinal cord injury (SCI) results in

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impairment or loss of motor and/or sensory function in the trunk and/or extremities due to damage to neural elements within the spinal canal. Injury to the cervical segments (C1-C8) results in quadriplegia, which causes impairment of function in the arms, trunk, legs, and pelvic organs (Figoni, 2009). Initially, research concerning benefits of physical activity for people with SCI focused on physiological responses to exercise in individuals with paraplegia (Shephard, 1990). Since the 1970s the psychosocial benefits of sport and physical activity for paraplegics have been analyzed in many studies (Block, 1999; Heflich-Piątkowska & Walicka, 1975; Hicks et al., 2003; Jacobs, Roswal, Horuat, & Gorman, 1990; Muraki, Tsunawake, Hiramatsu, & Yamasaki, 2000; North, 1999; Shephard, 1990; Tasiemski, Bergström, Savic, & Gardner, 2000; Tasiemski, Kennedy, Gardner, & Blaikley, 2004; Weiss & Beck, 1973; Witkowski, 1993). Jacobs et al. (1990) and Muraki et al. (2000) demonstrated that sports activity can improve the psychological status of persons with SCI.

Recently the number of individuals with traumatic quadriplegia has increased; alongside this, the numbers who survive following injury has increased (Wyndaele & Wyndaele, 2006; Yeo et al., 1998). There is a large variation in the number of cases of SCI from country to country. For example, following a review of literature published since 1995, Wyndaele and Wyndaele (2006) reported the incidence of SCI as lying between 10.4 and 83 per million inhabitants per year. However, within this group the ratio of individuals with quadriplegia to those with paraplegia, and the ratio between males and females, is comparable in different countries (Stedward, 1998; Stover & Fine, 1987; Wyndaele & Wyndaele, 2006). Moreover, the data from the review study by Wyndaele and Wyndaele (2006) showed that the reported incidence and prevalence have not changed substantially over the past 30 years. In Poland, approximately 50% of individuals with traumatic SCI have quadriplegia, and about 80% are males (Kiwierski, 1997).

In the perspective of the International Classification of Functioning (ICF) the theory of rehabilitation emphasizes the importance of viewing and understanding disability not only as a medical (biological) problem, but also as a psychosocial problem of the person with a disability. The ICF framework also leads us to look at people with disabilities as experiencing more functional limitation than physical difficulties (WHO, 2001). Functional limitations in different aspects of acting cause a range of psychosocial problems, which may vary depending on gender, age, marital status, socio-economical status, etc. In the last two decades there have been a number of studies, which state that different kinds of disability are related to a spectrum of psychosocial problems experienced by the person (Dewis, 1989; Gentile, Ten

Hoedt, & Bosch, 2010; Gulbrandsen, Hjortdahl, & Fugelli, 1998; Lezak, 1987; Livingstone, Rosenbaum, Russell, & Palisano, 2007; Loup et al., 2009; Proctor, Hasche, Morrow-Howell, Shumway, & Snell, 2008; Santo & Manuel, 2010).

Several studies have investigated the effects of sports participation on the psychological and social status of individuals with SCI (Jacobs et al., 1990; Muraki et al., 2000; Tasiemski et al., 2000). However, it should be noted that sample sizes in these studies usually combined persons with quadriplegia and paraplegia, and as a result their conclusions are limited to commenting on differences between individuals with high and low spinal cord lesions (including individuals with quadriplegia and high paraplegia). The results of some other studies have been inconsistent. For example Hicks et al. (2003) reported a positive association between physical activity and well being, while Tasiemski, Kennedy, Gardner, & Taylor (2005) have observed much smaller and even insignificant associations. Noreau and Fougereyrollas (2000) reported that the impact of the level of injury (cervical vs thoracolumbar) on the realization of life habits was more apparent in people with quadriplegia. For example, the weakness of hand grip ability and dexterity in quadriplegia could be an obstacle to the realization of some activities or require much longer execution time. Limited scientific evidence has been found in relation to the intensity of psychosocial problems exclusively in individuals with quadriplegia (Block, 1999; Witkowski, 1993). Both Block (1999) and Witkowski (1993) used the Witkowski Psychosocial Problems Spinal Cord Injury Scale (PP-SCI) to assess the intensity of psychosocial problems in individuals with SCI. However, although they investigated individuals with paraplegia and quadriplegia, they did not focus on differences between sedentary and physically active individuals with quadriplegia, or on the specific psychosocial problems encountered by either group of individuals with quadriplegia.

Sports activity for individuals with disabilities should be considered not only as sport training but also as training for the activities of daily living including changing and transferring from an active wheelchair to a sports wheelchair, and locomotion training including the proper technique for wheelchair propelling and wheelchair manoeuvrability. In addition it should be conceived as psychosocial training including making contacts in a group; taking joint responsibility for a team, and overcoming mental barriers that arise as a result of the disability (Morgulec & Skrzypczyk, 2003). Therefore, it is important to analyze the impact of sports participation on psychological, as well as social aspects of individuals with quadriplegia. Because one of the most popular sports activity for individuals with quadriplegia is wheelchair

rugby - a team sport developed specifically to meet the needs of individuals with quadriplegia (Sherrill, 1998) it was decided to focus on wheelchair rugby players. Because of the above we decided to investigate the relationship between the range and intensity of psychosocial problems of sport participants and sedentary individuals with quadriplegia. In addition, by gathering demographic data, we were able to describe differences in the range and intensity of psychosocial problems that arise in relation to characteristics such as age and marital status, as well as length of time since injury.

The purposes of the present study were (1) to evaluate the influence of sport participation on the intensity of psychosocial problems among males with quadriplegia by comparing physically active and sedentary individuals; (2) to determine specific psychosocial problems encountered by physically active and sedentary individuals with quadriplegia, and (3) to establish the role of sport participation and other demographic characteristics (age, time since injury, lesion level, place of birth, marital status, education, place of living, employment) on the intensity of psychosocial problems of individuals with quadriplegia.

Method

PARTICIPANTS

Participants were recruited from the database of the (Polish) Foundation of Active Rehabilitation (FAR) a large national nongovernmental organization for individuals with spinal cord injury and organizer of the Polish Wheelchair Rugby League. Inclusion criteria were as follows: gender – male; age – below 50 years; diagnosis – traumatic cervical SCI (C4-C8); time since injury – minimum 1 year; locomotion – manual wheelchair. The potential candidates for this study were 197 individuals with quadriplegia (46 wheelchair rugby players and 151 non wheelchair rugby players) listed on the FAR Database. The Witkowski Psychosocial Problems Spinal Cord Injury Scale (PP-SCI Scale) was sent out to 197 individuals with quadriplegia, with a letter explaining the purpose of the study and consent form. The overall response rate was 39%. There were 35 responses from wheelchair rugby players, accounting for 45% of the returned sample, and 42 questionnaires were completed by sedentary wheelchair users (55% of returned sample). Six sedentary wheelchair users were excluded, because over the last year they had occasionally participated in sport (e.g. by participating in sport camp for one week). Overall, 71 males with quadriplegia took part in this study. The participants were divided into two groups according to their participation in sport. The sedentary group consisted of 36 individuals who had not participated in any sport for at least one year. The physically active group comprised 35 sport participants (Polish Wheelchair Rugby League players) who were involved in sport at least twice per week (each session 60 min) for a minimum of one year. Sedentary males ranged in age from 19 to 47 years ($M = 32.17$, $SD = 6.99$) and the mean time since injury was 10.78 years ($SD = 6.22$). Physically active males ranged in age from 20 to 49 years ($M = 30.29$, $SD = 6.75$) and mean time since injury was 10.34 years ($SD = 5.31$). Demo-

graphics and injury characteristics of participants (lesion level, place of birth, marital status, education, place of living and employment) are provided in Table I.

The study was conducted in accordance with national research ethics governances and requirements. Written informed consent was obtained from each participant and the Ethics Committee of Józef Piłsudski University of Physical Education in Warsaw approved the study.

INSTRUMENTATION

The Witkowski Psychosocial Problems Spinal Cord Injury Scale (PP-SCI) (Witkowski, 1993) was used to assess the intensity of subjectively experienced psychosocial problems in individuals with quadriplegia. The PP-SCI Scale was developed using the Polish version of Wright and Remmers' Handicap Problems Inventory (HPI) (Wright & Remmers, 1960). The PP-SCI Scale contains 60 items grouped into four spheres: personality; family; social contacts,

TABLE I
Demographics And Injury Characteristics Of Physically Active And Sedentary Males With Quadriplegia

	Physically active (n = 35)	Sedentary (n = 36)
	f (%)	f (%)
<i>Lesion level</i>		
High quadriplegia ¹	15 (43%)	24 (67%)
Low quadriplegia ²	20 (57%)	12 (33%)
<i>Place of birth</i>		
Village	6 (17%)	4 (11%)
Town (< 50 000 people)	9 (26%)	9 (25%)
Town (50 000–150 000 people)	5 (14%)	9 (25%)
City (> 150 000 people)	15 (43%)	14 (39%)
<i>Education</i>		
Primary	0 (0%)	2 (6%)
Vocational	15 (43%)	15 (42%)
Secondary	16 (46%)	15 (42%)
Higher (bachelor degree)	1 (3%)	2 (6%)
Higher (master degree)	3 (9%)	2 (6%)
<i>Marital status</i>		
Single	28 (80%)	32 (89%)
Married	7 (20%)	4 (11%)
<i>Place of living</i>		
Village	6 (17%)	8 (22%)
Town (< 50 000 people)	6 (17%)	9 (25%)
Town (50 000–150 000 people)	4 (11%)	5 (14%)
City (> 150 000 people)	19 (54%)	14 (39%)
<i>Employment status</i>		
Employed ³	29 (83%)	21 (58%)
Unemployed	6 (17%)	15 (42%)

¹participants with lesion level C5/6 and higher, ²participants with lesion level lower than C6, ³includes: students and homemakers.

and occupational (vocational/school related). Each item is rated using a 6-point scale: it does not concern me; the problem intensity is very low; the problem intensity is low; the problem intensity is moderate; the problem intensity is high, and the problem intensity is very high, with values ranging from 0 to 5, respectively. Scores in relation to each sphere range from 0 to 75, where 0 corresponds to the absence of subjectively experienced problem and 75 corresponds to the highest intensity of experienced problems. Thus, the higher the score in each area, the higher the intensity of problems and the greater the impact of the disability on that area of one's functioning (Block, 1999; Witkowski, 1993). The global score is the arithmetic mean of the values corresponding to the 60 items. Global scores are divided by four in order to compare them with the results from four spheres. The PP-SCI has been shown to be reliable (ranging from .91 to .95 for the scales and .92 for the global score). Due to the procedure of choosing the items from HPI to construct the Witkowski Psychosocial Problems Spinal Cord Injury Scale, it was assumed that the validity is even higher for the PP-SCI than for the HPI (Witkowski, 1993).

In order to collect data for the description of the sample (age, time since injury, lesion level, place of birth, marital status, education, place of living and employment) the Inventory of Demographic Data (IDD) developed by Witkowski (1993) was used.

DATA ANALYSIS

Data were analyzed statistically by using the STATISTICA 7.1 package (StatSoft, Poland). Non-parametric statistics (the Mann Whitney test and the Spearman rank order correlation coefficient) were used to analyze ordinal data (lesion level; place of birth; marital status; education; place of living, and employment status). Parametric statistics (the t-test for independent samples and the Pearson correlation coefficient) were used with the interval and ratio data (age, time since injury and SCI Scale results). The Mann Whitney test was applied to analyze difference in both groups with respect to the lesion level, place of birth, marital status, education, place of living and employment status. The t-test for independent samples was applied to test for differences in global score in each of the four spheres (personality; family; social contacts, and occupational) between the physically active and sedentary group. The effect size was determined by calculating the Cohen's *d* for all statistically significant results. Values of *d* > .80, > .50 and > .20 were typically considered to represent high, medium, and low meaningfulness of results, respectively.

To determine the specific psychosocial problems encountered by physically active and sedentary individuals, two approaches were used. The first used the determination of scores that suggested problem intensity. For example, an item with a score of 4 or more was taken to indicate high intensity, while 5 indicated very high intensity of the experienced problem. The second approach was related to the number/percentage of individuals in both groups who indicated high or very high intensity of experienced problems. Based on these, the psychosocial problems that were most frequently rated as high and very high intensity, were listed in each group (twenty). The above mentioned literature finding suggested that different kinds of demographic variables and injury characteristic lead to variations in psychosocial problem experienced by the person with disability. Correlations between age and time since injury and PP-SCI results were computed using Pearson's correlation coefficient within each group. Spearman rank order correlation coefficients were computed between lesion level; place of birth; marital status; education; place of living; employment, and SCI Scale results within each

group. The magnitude of the effect was determined by calculating the coefficient of determination (r^2) for all statistically significant results. Values of $r^2 > .25$, $> .05$ and $> .01$ were typically considered to represent high, medium and low strength of relationships, respectively. The level of $p \leq .05$ was considered significant.

Results

The population was homogenous. No statistically significant differences between the physically active and sedentary groups were found for demographic and injury characteristic variables such as: age ($t = -1.15$, $p = .25$); time since injury ($t = -0.32$, $p = .75$); lesion level ($U = 480$, $p = .08$); place of birth ($U = 611$, $p = .83$); educational level ($U = 587.5$, $p = .62$); marital status ($U = 574$, $p = .52$); place of living ($U = 532$, $p = .26$) and employment status ($U = 475.5$, $p = .08$). The intensity level of psychosocial problems in each group (physically active and sedentary) measured as the global PP-SCI score ($M = 28.05$, $M = 39.95$, respectively) as well as the scores for each sphere were found as moderate (Table II). This means that there were neither very low scores belonging to the lowest level (0-15) nor very high scores belonging to the highest level (60-75). Although both groups presented moderate levels of psychosocial problems, the scores of physically active males with quadriplegia were lower than those of sedentary males. The t-test analysis showed significantly higher values of mean global score ($t = -4.13$, $p = .000$, $d = -.98$) for sedentary than for physically active quadriplegics. In addition, it showed significantly higher results in the four spheres of personality ($t = -3.69$, $p = .000$, $d = -.88$); family ($t = -3.94$, $p = .000$, $d = -.94$); social contacts ($t = -3.75$, $p = .000$, $d = -.89$) and occupational ($t = -3.67$, $p = .000$, $d = -.87$) for sedentary than for physically active quadriplegics (Table II). The effect magnitude (d value) indicated a large difference between both groups for four spheres and the global score.

TABLE II
Differences In SCI Scale In Physically Active And Sedentary Group

SCI Scale	Physically active (n = 35)	Sedentary (n = 36)	t value	p value	d value
	M (SD)	M (SD)			
Global score	28.05 (10.73)	39.95 (13.36)	-4.13	.000 ***	-.98
Personality	26.97 (10.65)	38.92 (16.02)	-3.69	.000 ***	-.88
Family	27.63 (12.46)	40.39 (14.71)	-3.94	.000 ***	-.94
Social contacts	24.71 (11.16)	36.67 (15.34)	-3.75	.000 ***	-.89
Occupational	32.89 (13.41)	43.83 (11.71)	-3.67	.000 ***	-.87

d value represents the effect size. *** $p \leq .001$

The most frequently indicated 20 psychosocial problems with high and very high intensity scores (with score 4 and 5) by sedentary and physically active individuals are listed in Table III and IV, respectively. In both groups the majority of problems (8 of 20) were related to the occupational sphere. Six were common for both sedentary and physically active males with quadriplegia (for example: Find some jobs are beyond physical ability; Dislike depending on others at work; Need to get extra education for suitable job). In addition, sedentary individuals found it hard to make a living and felt unsure about earning a good income, while physically active individuals indicated that they would like to work where disability will be less noticed, and believed that it is important to try harder to please their "boss".

For both sedentary and physically active individuals, two items from 20 with high and very high intensity PP-SCI scores in the personal sphere, were common: "to do work the disability makes difficult" and "daydream about things beyond ability". Moreover, sedentary individuals could not accept the fact that disability is permanent; envied people who are not disabled; worried about overcoming disability, and needed extra courage, while those who were physically active felt comforted by the fact that some disabilities are worse; tried to forget about being disabled, and needed to feel more valued.

TABLE III
The Most Frequently Indicated 20 Psychosocial Problems With High And Very High Intensity Score (Score ≥ 4) By Sedentary Individuals With Quadriplegia

SCI Scale sphere	SCI Scale item	n	%
Occupational	Find some jobs are beyond physical ability	25	69
	Miss out on getting suitable work due to disability	21	58
	Work harder to succeed than if not disabled	20	56
	Dislike depending on others at work	20	56
	Need to get extra education for suitable job	20	56
	Need to get work suited to physical limits	19	53
	Find it hard to make a living	17	47
	Feel unsure about earning a good income	16	44
Personality	Daydream about things beyond ability	25	69
	Envy people who aren't disabled	20	56
	Can not accept fact that disability is permanent	20	56
	Worry about overcoming disability	19	53
	Feel it important to do work the disability makes difficult	19	53
	Need extra courage	18	50
Family	Fear losing loved someone	25	69
	Cannot physically do some things around the house	24	67
	Regret not being able to do enough for family	22	61
	Fear may need to depend on loved ones for a living	19	53
Social contacts	Feel more need to help others	16	44
	Need to live where there are people who will help	16	44

TABLE IV
*The Most Frequently Indicated 20 Psychosocial Problems With High And Very High Intensity Score
 (Score ≥ 4) By Physically Active Individuals With Quadriplegia*

SCI Scale sphere	SCI Scale item	n	%
Occupational	Miss out on getting suitable work due to disability	15	43
	Dislike depending on others at work	15	43
	Find some jobs are beyond physical ability	13	37
	Need to get work suited to physical limits	13	37
	Work harder to succeed than if not disabled	13	37
	Want work where disability will be less noticed	12	34
	Need to get extra education for suitable job	11	31
	Try harder to please "boss"	10	29
Personality	Feel it important to do work the disability makes difficult	15	43
	Feel comforted by fact that some disabilities are worse	11	31
	Try to forget about being disabled	11	31
	Daydream about things beyond ability	10	29
	Need feel of more value	10	29
Social contacts	Get annoyed by people wanting to help too much	17	49
	Feel more need to help others	14	40
	Lack of opportunities to do sports	12	34
	Need friends to encourage	11	31
Family	Worry because disability works a hardship on family	12	34
	Regret not being able to do enough for family	11	31
	Fear losing loved someone	10	29

In the family sphere two items from 20 with high and very high-intensity PP-SCI scores were common for both groups: "regret not being able to do enough for family" and "fear losing loved someone". Additionally, physically active individuals worried because disability imposes hardship on family, while sedentary individuals could not physically do some things around the house and feared that they may need to depend on loved ones for a living.

Only one item in the sphere of social contacts from 20 with high and very high intensity PP-SCI scores was common for both groups: "feel more need to help others". Moreover, sedentary individuals needed to live where there are people who will help, while those who were physically active were often annoyed by people wanting to help too much; noticed lack of opportunities to do sports, and needed friends to encourage them.

The correlations between demographic data and the scores received from the PP-SCI also showed some differences between the two examined groups. Table V illustrates only correlations which were statistically significant. Significant positive Pearson correlations coefficients were observed among sedentary individuals with quadriplegia, between age and the global score in PP-SCI ($r = .39, p = .019$) as well as scores in sphere of personality ($r = .39, p = .018$); family ($r = .40, p = .016$) and social contacts ($r = .36, p = .034$). Negative correlations between time since injury and the global score ($r = -.38, p = .024$)

TABLE V
Statistically Significant Correlations Between Demographic Variables and SCI Scale Scores in Physically Active and Sedentary Individuals With Quadriplegia

Variables	Physically active		Sedentary	
	r	r ²	r	r ²
Time since injury – Global score	-.38*	.14	-	-
Time since injury – Family sphere	-.34*	.11	-	-
Time since injury – Occupational sphere	-.44**	.19	-	-
Age – Global score	-	-	.39*	.15
Age – Personality sphere	-	-	.39*	.15
Age – Family sphere	-	-	.40*	.16
Age – Social contacts sphere	-	-	.36*	.13
Age – Occupational sphere	-.39*	.15	-	-

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

and scores in family ($r = -.34$, $p = .48$) and occupational sphere ($r = -.44$, $p = .008$) were noted among physically active individuals with quadriplegia. Age also correlated negatively with sphere of occupation ($r = -.39$, $p = .041$) in the physically active group. The effect size (r^2) indicated a medium strength of significant correlation in both the physically active and sedentary groups. In addition, marital status showed statistically significant Spearman correlation coefficients with global score ($r_s = -.36$, $p = .031$) and scores in sphere of personality ($r_s = -.40$, $p = .017$) and social contacts ($r_s = -.40$, $p = .018$) in the physically active group. The rest of the demographic variables did not show statistically significant correlations with PP-SCI scores in both groups.

Discussion

The results of the present study indicated that males with quadriplegia who are physically active sportsmen presented a significantly lower level of psychosocial problems, than those who stay far away from physical activity (the sedentary group). These findings are in accordance with results of previous studies (Jacobs et al., 1990; Muraki et al., 2000; Tasiemski et al., 2000; Tasiemski et al., 2004). In both groups the highest scores were observed in the occupational sphere, while the lowest scores were reported for the sphere of social contacts. Interestingly, eight out of twenty of the most frequently indicated psychosocial problems with high and very high intensity scores were related to the occupational sphere in both groups. Krause (1992) has reported that persons with paraplegia are more likely to return to work than those with quadriplegia. The results of the present study suggest that although physically active individuals with quadriplegia face significantly less

problems in the sphere of occupation than sedentary individuals with quadriplegia, occupation still remains a visible problem for physically active males with quadriplegia. It might be explained by limited employment opportunities for individuals with quadriplegia, who usually need further re-education or training, and very rarely return to their pre-injury job or profession. According to data published by the Central Statistical Office in Poland (GUS, 2009) the employment rate of people with severe physical disability equals 2.7%. Even worse, there is also a very low number of employers who are willing to hire such people (Bartkowski, Gąciarz, Giermanowska, Kudlik, & Sobiesiak, 2009). The negative correlations between time since injury and the global score, as well as that between age and sphere of occupation in the physically active group seems to support the belief that individuals with quadriplegia need more time for the process of returning to work.

The analysis of specific psychosocial problems encountered by physically active and sedentary males showed some similarities – eleven items from 20 with high and very high intensity PP-SCI Scale were common for two groups. This outcome is important for those who provide psychosocial rehabilitation services. They should remember that only 50% of physically active people with quadriplegia face the same psychosocial problems as sedentary individuals. Thus, there is a great need for individualisation in therapy, with regard to level of activity.

Interestingly, the important correlations between demographic variables and PP-SCI scores for physically active individuals with quadriplegia were not statistically significant for sedentary individuals with quadriplegia and significant relationships in sedentary group were irrelevant for the physically active group. The level of intensity of psychosocial problems (in global score and in the sphere of family and occupation) decreases with time since injury (years spent on a wheelchair) among males with quadriplegia who were physically active. These findings suggest that physically active individuals with quadriplegia may adapt better to their disability in the sphere of family and occupation than sedentary males with quadriplegia. Among individuals with quadriplegia who were not physically active, a statistically significant positive correlation was observed between their age and the total score in the PP-SCI, as well as in the sphere of personality, family and social contacts. This suggests that the intensity of psychosocial problems experienced by sedentary individuals with quadriplegia increases when they are getting older.

The results of this study first of all demonstrate the importance of the new way of viewing disability suggested by the ICF, which emphasises the functional limitations experienced by those with quadriplegia as the result of limitation or lack of motor functions, rather than simply focussing on med-

ical problems. Based on the research we have conducted, we now have more knowledge about the kind and intensity of the specific psychosocial problems faced by this group of individuals with disability. The findings we have presented also support the conclusions of Muraki et al. (2000) that sports activity can improve the psychological status of persons with spinal cord injuries. Sport participation helps people with disabilities to be more independent and to function better as a part of society. It should be underlined that sport activity in special populations, especially team games such as wheelchair rugby, includes fitness training as well as training for the activities of daily living, locomotion training and psychological training. Thus, the multifaceted interaction of sports training may cause both improvements in physical performance and improvements in the quality of life of individuals with quadriplegia (Morgulec & Skrzypczyk, 2003). Therefore, it may be concluded that sports activity plays an important role in lowering the number and intensity level of psychosocial problems experienced by males with quadriplegia in sphere of personality, family, social contacts and occupation.

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REFERENCES

- Bartkowski, J., Gąciarz, B., Giermanowska, E., Kudlik, A., & Sobiesiak, P. (2009). *Pracodawcy o zatrudnianiu osób niepełnosprawnych*. [Employers on employing people with disabilities]. ISP, Warsaw, pp. 17-20.
- Block, B. L. (1999). *Osobowościowe uwarunkowania nasilenia problemów psychospołecznych u osób z uszkodzeniem rdzenia kręgowego* [Psychosocial problem of people with spinal cord injuries and personality correlates of their intensification]. Towarzystwo Naukowe KUL, Lublin.
- Dewis, M.E. (1989). Spinal cord injured adolescents and young adults: the meaning of body changes. *Journal of Advanced Nursing*, 14, 389-396.
- Figoni, S.F. (2009). Spinal cord disabilities – paraplegia and tetraplegia. In: *ACSM's exercise management for persons with chronic diseases and disabilities* (p.298). Champaign, IL: Human Kinetics.
- Gentile, J.K., Ten Hoedt, A.E., & Bosch, A.M. (2010). Psychosocial aspects of PKU: hidden disability – a review. *Molecular Genetics and Metabolism*, 99, 64-67.
- Gulbrandsen, P., Hjortdahl, P., & Fugelli, P. (1998). Work disability and health-affecting psychosocial problems among patients in general practice. *Scandinavian Journal of Social Medicine*, 26, 96-100.

- GUS (2009). Labor Force Survey in Poland 2nd Quarter 2009. Statistical information and elaboration. Warsaw: Central Statistical Office.
- Heflich-Piątkowska, H., & Walicka, J. (1975). *Problemy psychologiczne i psychopatologiczne w ciężkich uszkodzeniach narządu ruchu* [Psychological and psychopathological problems in severe locomotor impairments]. PZWL, Warsaw, pp. 89-147.
- Hicks, A. L., Martin, K. A., Ditor, D.S., Latimer, A.E., Craven, C., Bugaresti, J. et al. (2003). Long-term exercise training in persons with spinal cord injury: effects on strength, arm ergometry performance and psychological well-being. *Spinal Cord*, 41, 34-43.
- Jacobs, D. P., Roswal, G. M., Horuat, M.A., & Gorman, D. R. (1990). *A comparison between the psychological problems of wheelchair athletes, wheelchair nonathletes, and able-bodied athletes*. In: Doll-Tepper G et al (Eds). *Adapted Physical Activity*. Springer Verlag: Berlin, pp. 75-79.
- Kiwerski, J. (1997). *Patofizjologia uszkodzeń kręgosłupa i rdzenia kręgowego*. [Pathophysiology of spinal vertebra and cord injuries] In: Kiwerski J, Kowalski M, Krasuski M (eds.). *Schorzenia i urazy kręgosłupa*. PZWL, Warsaw, pp 130-134.
- Krause, J. S. (1992). Employment after spinal cord injury. *Archives of Physical Medicine and Rehabilitation*, 73, 163-169.
- Lezak, M.D. (1987). Relationships between personality disorders, social disturbances, and physical disability following traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 2, 57-69.
- Livingstone, M.H., Rosenbaum, P.L., Russell, D.J., & Palisano, R.J. (2007). Quality of life among adolescents with cerebral palsy: what does the literature tell us? *Developmental Medicine & Child Neurology*, 49, 225-231.
- Loup, O., von Weissenfluh, C., Gahl, B., Schwerzmann, M., Carrel, T., & Kadner, A. (2009). Quality of life of grown-up congenital heart disease patients after congenital cardiac surgery. *European Journal of Cardio-Thoracic Surgery*, 36, 105-111.
- Morgulec, N., & Skrzypczyk, R. (2003). Development of wheelchair rugby and its influence on the functional abilities of quadriplegics. *Physical Education and Sport*, 62, 545-553.
- Muraki, S., Tsunawake, N., Hiramatsu, S., & Yamasaki, M. (2000). The effect of frequency and mode of sports activity on the psychological status in tetraplegics and paraplegics. *Spinal Cord*, 38, 309-314.
- Noreau, L., & Fougereyrollas, P. (2000). Long-term consequences of spinal cord injury on social participation: the occurrence of handicap situations. *Disability and Rehabilitation*, 22, 170-180.
- North, N. T. (1999). The psychological effects of spinal cord injury: a review. *Spinal Cord*, 37, 671-679.
- Proctor, E.K., Hasche, L., Morrow-Howell, N., Shumway, M., & Snell, G. (2008). Perception about competing psychosocial problems and treatment priorities among older adults with depression. *Psychiatric Services*, 59, 670-675.
- Santo S., & Manuel, A. (2010). P01-244 - Psychiatric emergency department of an adult general hospital – a look into the adolescents. *European Psychiatry*, 25(Suppl. 1), 455.
- Shephard, R. J. (1990). *Fitness in Special Populations*. Champaign, Human Kinetics.
- Sherrill, C. (1998). *Adapted physical activity, recreation and sport: crossdisciplinary and lifespan*. WCB/McGraw-Hill, Dubuque, IA, p. 586.
- Stedward, R. (1998). Musculoskeletal and neurological disabilities: implications for fitness appraisal, programming and counselling. *Canadian Journal of Applied Physiology*, 23, 131-165.

- Stover, S. L., & Fine, P. R. (1987). The epidemiology and economics of spinal cord injury. *Paraplegia*, 25, 225-228.
- Tasiemski, T., Bergström, E., Savic, E., & Gardner, B.P. (2000). Sports, recreation and employment following spinal cord injury - a pilot study. *Spinal Cord*, 38, 173-184.
- Tasiemski, T., Kennedy, P., Gardner, B., & Blaikley, R. A. (2004). Athletic identity and sports participation in people with a spinal cord injury. *Adapted Physical Activity Quarterly*, 21, 364-378.
- Tasiemski, T., Kennedy, P., Gardner, B. P., & Taylor, N. (2005). The association of sports and physical recreation with life satisfaction in a community sample of people with spinal cord injuries. *Neurorehabilitation*, 20, 253-265.
- Weiss, M., & Beck, J. (1973). Sport as a part of therapy and rehabilitation of paraplegics. *Paraplegia*, 11, 166-172.
- Witkowski, T. (1993). *Rozumie problemy osób niepełnosprawnych* [To understand the handicap problems]. MDBO, Warsaw.
- World Health Organization. (2001). *International classification of functioning, disability and health (ICF)*. Geneva. Retrieved June 13, 2010 from: <http://www.who.int/classifications/icf/en/>.
- Wright, G. N., & Remmers, H. H. (1960). *Manual for the Handicap Problems Inventory*. Lafayette, Perdue University.
- Wyndaele, M., & Wyndaele J.J. (2006). Incidence, prevalence and epidemiology of spinal cord injury: what learns a worldwide literature survey? *Spinal Cord*, 44, 523-529.
- Yeo, J. D., Walsh, J., Rutkowski, S., Soden, R., Craven, M., & Middleton, J. (1998). Mortality following spinal cord injury. *Spinal Cord*, 36, 329-336.

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