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ORIGINAL RESEARCH ARTICLE

Investigation of the Impact of Sports, Exercise, and Recreation Participation on Psychosocial Outcomes in a Population of Veterans with Disabilities

A Cross-sectional Study

ABSTRACT

Laferrier JZ, Teodorski E, Cooper RA: Investigation of the impact of sports, exercise, and recreation participation on psychosocial outcomes in a population of veterans with disabilities: a cross-sectional study. *Am J Phys Med Rehabil* 2015;94:1026–1034.

Objective: The aim of this study was to investigate possible effects that participation in sports, exercise, and recreation may have on self-esteem and quality-of-life in service members/veterans with disabilities.

Design: Two hundred twenty service members/veterans with disabilities who were participants in one of three annual adaptive sporting events took part in this cross-sectional study. Variables of interest were years of sport, exercise, and recreation participation since the onset of disability as well as the type of activity they engaged in. Main outcome measures were self-esteem and quality-of-life.

Results: A positive relationship was found between participant quality-of-life and the number of years spent participating in sports, exercise, and recreation since the onset of their disability. A significant difference was found between pre-event and postevent self-esteem scores. A significant difference was also found in self-esteem scores between the levels of years of participation in sports, exercise, and recreation when averaged across activity type. Finally, there were significant differences found on self-esteem scores between the levels of type of activity averaged across years of participation.

Conclusions: Our results indicate that participation in sports, exercise, and recreation has a positive influence on self-esteem and quality-of-life in individuals with disabilities.

Key Words: Psychosocial Well-being, Adaptive Sports, Recreation, Sports Participation, Rehabilitation, Disability, Self-esteem, Depression, Posttraumatic Growth, Quality of Life, Service Members, Veterans

Sports, exercise, and recreation (SER) are important activities for health, fitness, and social change as well as for the rehabilitation of individuals without disabilities. For the past two decades, studies regarding the effects of SER have been focused on able-bodied individuals. The beneficial effects of SER on physical health and psychosocial well-being in this population have been researched extensively and established in the literature.¹⁻¹⁰

Evidence to support the benefits of SER as rehabilitation is needed more at this time in history than perhaps ever before. The number of United States veterans living with some type of disability has reached 5.5 million, more than doubling the number of veterans with disabilities in 2001.¹¹ The main reasons for this increase are an aging veteran population and an influx of injured service members from the most current conflicts, Operation Enduring Freedom in Afghanistan and Operation Iraqi Freedom in Iraq. Service members are now surviving injuries that would have proven fatal in past conflicts owing to advances in protective equipment and battlefield care.^{12,13} In addition to an increased number of veterans with physical disabilities, the number of service members with mental health diagnoses is also increasing. A 2007 study conducted by Seal et al.¹⁴ reported that more than 30,000 of approximately 100,000 Operation Enduring Freedom/Operation Iraqi Freedom veterans studied received a mental health or psychosocial diagnosis and that 56% of these veterans have received more than one diagnosis. With such a drastic increase in the number of veterans who are living with these issues, it is important to identify interventions to assist in their recovery process.

Just as participation in SER may have physical and psychosocial benefits for those without disabilities, it stands to reason that participation in such activities may benefit individuals with disabilities as well. Shortly after World War II, Sir Ludwig Guttmann and his colleagues at Stoke Mandeville Hospital in England used exercise and recreational outlets for the large number of veterans recently injured in the war. Out of this need came wheelchair sports as a rehabilitation tool. Since then, hundreds of nonprofit and community-based programs have emerged to offer adaptive sport and recreation. However, because of a lack of scientific support, these programs are often the first to be abandoned when funding becomes an issue.

The detrimental effects of disability on psychosocial well-being have been documented in the literature.¹⁵⁻²³ *Psychosocial well-being* has been defined by constructs such as mood, trait anxiety, self-esteem, as well as perceived competence and quality-of-life

(QoL). These constructs have been validated in studies involving individuals with a variety of disabilities.²³⁻²⁵ Because psychosocial well-being is a complex multifocal construct, the authors decided to investigate the concepts of self-esteem and QoL in this study because of their relationship to successful rehabilitation outcomes and close relationship to acceptance of disability. Decreased self-esteem and reduction in overall QoL are significant issues and have been associated with unemployment, decreased community re-integration, poor physical health, and overall decreased function.¹⁹⁻²⁵

Self-esteem

According to Branden,²³ self-esteem is the sum of self-confidence (a feeling of personal capacity) and self-respect (a feeling of personal worth). It exists as a consequence of the implicit judgment that every person has the ability to face life's challenges as well as to understand and solve problems and has the right to achieve happiness or to respect and defend his/her own interests and needs. There is a true sense of accomplishment and personal well-being that comes from being able to navigate challenges or attain personal goals. Inability to set and meet goals can lead to lower levels of community integration and decreased overall function because individuals with reduced self-esteem may withdraw from situations they feel incapable of managing. Conversely, success leads to increased confidence and greater willingness to set new goals.^{25,26} Moreover, a skewed perception of personal capabilities brought on by low self-esteem may be more limiting than the disability. This is particularly important in veterans and service members. Many persons who have served in the military put a high value on physical prowess and their ability to handle difficult and stressful situations. For this reason, veterans with traumatic and acquired disabilities are at increased risk for decreased self-esteem because of alterations in self-perception related to traumatic and acquired disability. It has been suggested that SER may provide an effective mode through which self-esteem can be enhanced on the basis of its ability to provide the individual with a meaningful mastery experience as well as positive interactions with others and an improved perception of physical self.^{27,28}

Quality-of-Life

Scores of QoL reflect the adjustment of people with disabilities and show their overall satisfaction with life.²⁹ According to a study by Rimmer et al.,³⁰ many people with physical disabilities, in addition to having poor general health and limited community

participation, also report poor QoL. Kannisto et al.³¹ reported that individuals with a spinal cord injury reported QoL scores that were 10% below those recorded for able-bodied adults. *Quality-of-life* has been defined by the World Health Organization as the individual's perception of their position in life, in the context of culture and value systems in which they live and relation to their goals, expectations, standards, and concern.^{31,32} This definition provides an important concept related to our population. The military is truly its own culture and therefore may have distinctly different responses to SER.

In 2009, Sporer et al.³³ found that 98% of veterans who participated in the National Disabled Veterans Winter Sports Clinic and the National Veterans Wheelchair Games (NVWG) reported improvements in their QoL. Improved relationships with friends and the ability to be competitive were two areas where study participants said that the National Disabled Veterans Winter Sports Clinic and NVWG had influenced their lives. The participants at these events also scored high (34.3 ± 5.5 of a possibly 40) on a measure of self-esteem. McVeigh et al.³⁴ found that individuals with a spinal cord injury who participated in sports were 7 times more likely to report higher QoL scores than those who did not participate in sports. A recent study on athletes with cerebral palsy found that the majority of the athletes either agreed or strongly agreed that adaptive sport positively influenced their overall health (85%), QoL (81%), quality of family life (53%), and quality of social life (56%).³⁵

Although studies have been conducted in this field, there is still a significant gap between research on the effects of SER in able-bodied populations and those with disabilities. Many of the studies related to individuals with disabilities have small sample sizes, methodological problems, or both. For example, of the studies referenced above, a number used previously untested data collection tools, had varying levels of sampling bias, and had study samples of less than 100 participants. The current study attempted to correct a number of these issues by using a tested and reliable data collection tool with standardized and valid outcome measures and increasing the sample size to more than 200 participants.

The aims of the current pilot study were three-fold: (1) to investigate whether higher self-esteem and/or QoL scores among service members and veterans with disabilities were found after three annually held national adaptive sporting events, (2) to see whether this association was affected by the number of years the service member/veteran had participated in SER since the onset of their disability, and (3) to see whether this association was affected by the type of

SER activities the service member/veteran took part in. We hypothesized (1) that SER participation would be associated with better self-esteem and QoL outcomes among service members/veterans with disabilities, (2) that service members/veterans with more years of participation in SER would be associated with better self-esteem and QoL outcome scores, and (3) that service members/veterans who took part in team activities (such as wheelchair basketball) would be associated with better self-esteem and QoL outcomes than those who took part in only individual-type activities (such as swimming).

METHODS

Study Design

A cross-sectional cohort pilot study was conducted to determine the association between the independent variables (SER participation, number of years a service member/veteran has participated in SER since the onset of their disability [less than 1 yr, 1–5 yrs, 5–10 yrs, and more than 10 yrs], and type of activity participated in [team, combination, and individual events]) and the variables of interest (self-esteem and QoL).

Structure/Content

In preparation for the proposed study, investigators at the Human Engineering Research Laboratories developed a data collection tool to investigate the effect of sports participation on the four outcome variables of interest. The Sports Participation Outcomes Tool was conceptualized using feedback received from various experts in adaptive SER recruited nationally to include the following: medical providers, coaches, and athletes. The initial version tool was fielded in 2007 as well as re-examined on the basis of findings, and necessary changes were made. The questionnaire is composed of 5 sections with questions related to (1) demographics, (2) medical information, (3) assistive technology use, (4) sports participation and standardized measures of self-esteem, as well as (5) QoL. The tool showed strong face validity and high test/retest reliability with an interclass correlation coefficient of 0.83. The same questionnaire was used with all participants at all events.

Demographic Variables

Demographic data collected included age, sex, and ethnic origin. General military information requested included veteran status and rank (either currently or at the time of discharge if the participant was separated from the service). The demographic

section also included information concerning marital and employment status as well as education level.

Medical Information and Assistive Technology

The second section asked the participants to report information regarding their disability and current health status. Data were collected on disability type, level, and duration. This section also investigated possible concomitant injuries and/or disease processes. The third section presented questions related to both the primary and secondary use of assistive technology devices.

Standardized Questionnaires

In the final section of the questionnaire, the participants were asked to complete two valid and reliable measures that have been widely used in research, the World Health Organization Quality of Life-BREF and the Rosenberg Self-Esteem scale. Quality-of-life was assessed by using portions of the World Health Organization Quality of Life-BREF. The World Health Organization Quality of Life-BREF is a 26-item self-report questionnaire. In this questionnaire, 24 items constitute four subdomains (physical health, psychological health, social relationships, and environment), whereas the other two items measure overall QoL and general health.³⁶ The Rosenberg Self-Esteem scale is a measure consisting of ten statements that ask the level of agreement (4-point Likert scale). A total score is calculated, with a higher score indicating better self-esteem.³⁷

Participants and Data Collection

Participants were recruited in 2009 and 2010 from registered athletes at the NVWG, the United States Olympic Committee Warrior Games, and the National Veterans Summer Sports Clinic. All participants were either active duty service members or veterans of all branches of the United States Armed Forces who currently have some type of disability. Potential participants approached the designated research area at the events, indicated an interest in participating in the study, were provided an opportunity to read an informational sheet with the essential elements of informed consent, and provided verbal consent. Individuals were excluded only if they were unable to complete the questionnaires or presented with a severe traumatic brain injury (TBI). Although a severe TBI was an exclusion criterion, there was no differentiation made between a mild TBI and moderate one. The participants received assistance from the research staff to complete the questionnaires. No exclusion criteria were based on race, ethnicity, sex, or

HIV status. This study was approved through the VA Pittsburgh Healthcare System Institutional Review Board (no. 02954).

Statistical Methods

Descriptive analysis examined participant demographics and medical history. Findings are presented separately by event for demographic and medical data. Owing to missing total score data, QoL was measured using self-reported overall QoL only from the World Health Organization Quality of Life-BREF and was analyzed with bivariate correlation analysis using the Spearman rho correlation coefficient to investigate the association between the number of years the individual participated in SER since the onset of their disability as well as the type of activity the service member/veteran participated in and their self reported QoL. All other data were on a continuous scale, and self-esteem outcomes were analyzed using Rosenberg Self-Esteem scale total scores.

To analyze the possible effects of the years of participation in SER at the annual adaptive SER events (specific aim 1), total self-esteem scores were collapsed across the event and an average score was produced and compared with able-bodied norms. To analyze the possible effects of the years of participation in SER since the onset of disability (specific aim 2) and the type of activity that the participant engaged in on self-esteem scores (specific aim 3), a 3×4 between subjects analysis of variance was conducted. The variable of years of participation in SER since the onset of disability was separated into four groups: less than 1 yr, 1–5 yrs, 5–10 yrs, and more than 10 yrs. The variable of the type of activity the service member/veteran engaged in was separated into individual sports/events, team sports/events, and a combination of individual and team sports/events. For example, if participants only participated in swimming, they would be placed in the individual group; similarly, if they only played wheelchair basketball, they would be placed in the team group, and if the individuals participated in both, they would be in the combination group. Post hoc testing was conducted using the Scheffe adjustment. The Scheffe adjustment was selected owing to the fact that it is flexible as well as conservative and can be used with unequal groups and, like analysis of variance, is robust with respect to nonnormality and heterogeneity of variance. The assumption of homogeneity of variance was violated (Brown-Forsythe $F_{11,199} = 2.588$, $P = 0.041$). The assumption of normality was met for all but three groups.

All other assumptions were met. Owing to the violations of the assumptions of normality and

homogeneity of variance, parametric and nonparametric statistical analyses were run on all available data. Both parametric and nonparametric tests produced similar significant results, suggesting that the 3×4 analysis of variance was robust against the violations; as such, parametric results will be reported. To find the pattern of differences on self-esteem scores among the levels of the independent variables, post hoc pairwise comparisons were conducted using the Scheffe adjustment.

RESULTS

Participant Demographics

Demographic information of the study sample separated by each event is presented in Table 1.

Medical History

Four primary disabilities (TBI, spinal cord injury, posttraumatic stress disorder, and upper or lower limb amputations) were represented in the three groups of athletes (see Table 2). Additional diagnoses including, but not limited to, arthritis, digestive problems, heart trouble, and diabetes were also indicated by a majority of participants across all three groups. Comorbid conditions were reported by 64% of the participants at the Warrior Games, 79% of the participants at the NVWG, and 65% of the participants at the National Veterans Summer Sports Clinic. It is important to remember

that each participant may have more than one disabling condition.

Quality-of-Life

A positive relationship was found between the individuals' self-reported overall QoL and the number of years they have spent participating in SER since the onset of their disability ($r_s = 0.40$, $P < 0.001$). It should be noted that, owing to the wide variety of disabilities represented in this study, scores were not analyzed with regard to disability level. However, scores were examined on the basis of the number of concurrent conditions the participant had (one diagnosis, two diagnoses, or 3 diagnoses or more) and no significant difference was found ($P = 0.074$). There was no significant relationship found between the type of activity the individual participated in and QoL.

Self-esteem

The mean self-esteem score of all 220 participants was 24/30 and a standard deviation of 3.52. There was a significant difference found on the self-esteem scores among the levels of years of participation in SER since the onset of disability averaged across the type of activity engaged in ($F_{3,211} = 7.20$, $P < 0.001$, partial $\eta^2 = 0.098$). There were also significant differences found on the self-esteem scores among the levels of type of activity engaged

TABLE 1 Participant demographics

Total No. Participants (220)		WG (n = 98), % (n)	NVWG (n = 70), % (n)	NVSSC (n = 52), % (n)
Mean age, yrs		31 ± 7.3	52.3 ± 9.7	40.4 ± 12.3
Sex	Female	10 (10)	17 (12)	15 (8)
	Male	90 (88)	83 (58)	85 (44)
Ethnicity	White	60.0 (59)	69.0 (48)	50.0 (26)
	Hispanic or Latino	16.0 (16)	6.0 (4)	21.0 (11)
	Black/African American	10.0 (10)	17.0 (12)	12.0 (6)
	Two or more races	n/a	7.0 (5)	8.0 (4)
Educational level	High school diploma or GED	48.0 (47)	40.0 (28)	44.0 (23)
	Higher education (Associate-Doctorate)	45.0 (44)	59.0 (41)	46.0 (24)
Marital status	Married	47.0 (46)	37.0 (26)	31.0 (16)
	Single	34.0 (33)	6.0 (4)	25.0 (13)
	Divorced/Separated	12.0 (12)	39.0 (27)	40.0 (21)
	Widowed	n/a	3.0 (2)	4.0 (2)
Occupational status	Employed	77.0 (75)	13.0 (9)	0 (0)
	Unemployed (disability, by choice, unable to find a job)	3.0 (3)	39.0 (27)	42.0 (22)
	Retired	5.0 (5)	36.0 (25)	19.0 (10)
	Student	10.0 (10)	n/a	19.0 (10)
	Others	n/a	1.0 (1)	15.0 (8)

Where percentages do not equal 100 participants did not respond.

GED, general education development; n/a, not applicable; NVSSC, National Veterans Summer Sports Clinic; WG, Warrior Games.

TABLE 2 Primary disabilities reported by the participants

Disability	WG (n = 98), % (n)	NVWG (n = 70), % (n)	NVSSC (n = 52), % (n)
TBI (mild or moderate)	46.0 (45)	16.0 (11)	75.0 (39)
Spinal cord injury	12.0 (12)	70.0 (49)	27.0 (14)
Posttraumatic stress disorder	23.0 (23)	16.0 (11)	19.0 (10)
Amputation (upper or lower limb)	22.0 (22)	11.0 (8)	17.0 (9)
Others	2.0 (2)	10.0 (7)	8.0 (4)

NVSSC, National Veterans Summer Sports Clinic; WG, Warrior Games.

in averaged across the levels of years of participation in SER since the onset of disability ($F_{2,211} = 4.698, P = 0.010$, partial $\eta^2 = 0.045$).

To find the pattern of differences on self-esteem scores among the levels of years of participation in SER since the onset of disability, post hoc pairwise comparisons were conducted using the Scheffe adjustment. Individuals with more than 10 yrs of participation in SER since the onset of disability (mean [M] = 26.85, SE = 1.083) had significantly higher self-esteem scores than those with 1–5 yrs (M = 22.92, SE = 0.626; $P = 0.001$) and those with less than 1 yr (M = 21.55, SE = 0.644; $P < 0.001$). Also, those with 5–10 yrs of participation in SER since the onset of disability had significantly higher self-esteem scores than those with less than 1 yr (M = 21.55, SE = 0.644, $P = 0.020$). There were no significant differences found between 5–10 yrs of participation and 1–5 yrs of participation or between 5–10 yrs of participation and more than 10 yrs of participation (Fig. 1).

Individuals who participated in primarily individual sporting and recreation events (M = 22.273, SE = 1.083) had significantly lower self-esteem scores than those who participated in either team events (M = 25.30, SE = 0.999; $P = 0.037$) or a combination of team and individual events (M = 25.127, SE = 0.682; $P < 0.036$). There were no significant differences found between the team and combination groups (Fig. 2).

The pattern of differences on the self-esteem scores among years of participation in SER since the

onset of disability was not significantly different between the levels of the type of activity the participant engaged in ($F_{6,211} = 1.152, P = 0.333$, partial $\eta^2 = 0.034$).

DISCUSSION

Fueled by clinical observation and testimonials provided by patients, athletes, and medical providers, SER has been used to augment rehabilitation programs for decades. Although there have been many stories of positive life-changing experiences related to involvement in adaptive SER, there is a paucity of strong scientific evidence to support these claims. Proponents of sports and recreation as rehabilitation cite increases in self-esteem and overall QOL as possible positive outcomes related to participation in SER for both the able-bodied and disabled populations. This study has attempted to bridge some of the gaps between belief and evidence with regard to possible psychosocial benefits, resulting from participation in adaptive SER.

Owing to the lack of pre-event scores, it was impossible to compare the possible effect of the actual event on the self-esteem of the individual service/veteran. However, the average self-esteem score for all participants was considered high even when compared with able-bodied athletes. Although causality cannot be inferred from this pilot study, SER has long been suggested as an effective mode through which self-esteem can be enhanced on the basis of

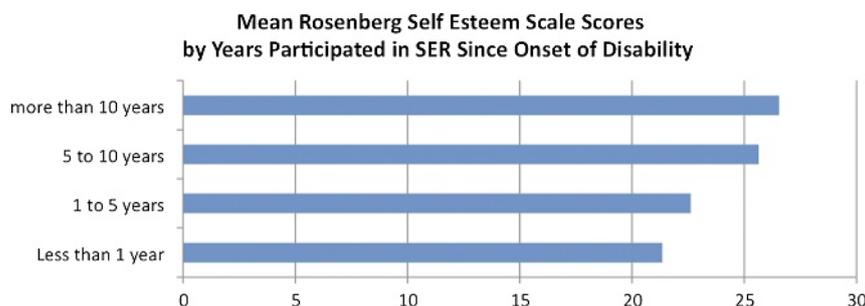


FIGURE 1 Mean self-esteem scores among the number of years of participation in SER since the onset of the individual's disability.

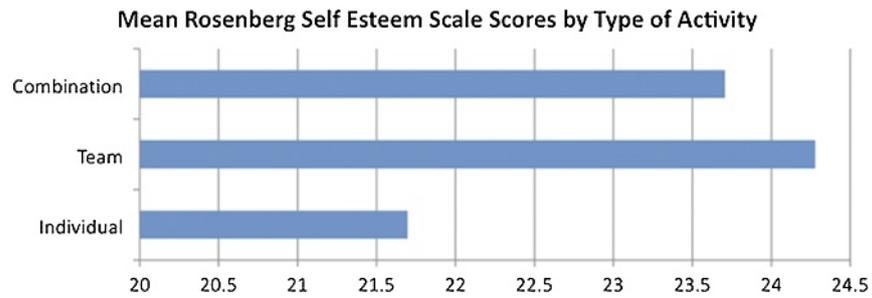


FIGURE 2 Means self-esteem scores among the type of activity the individual participated in.

ability to provide the individual with a meaningful mastery experience, foster positive interactions with others, and provide an improved perception of physical self.³⁸ Self-esteem scores were significantly higher among service members/veterans with more years of participation in SER since the onset of their disability. Several theories could help to explain these findings. Self-esteem, a global measure of an individual's assessment of self-worth, is strongly affected by perceptions of competence. Self-esteem is related to the belief that one possesses the necessary skills to complete a task as well as the confidence that the task can actually be completed and the desired outcome obtained. Sports, exercise, and recreation have long been suggested as an effective mode through which self-esteem can be enhanced on the basis of the ability to provide the individual with a meaningful mastery experience. In addition, participation in sports can foster positive interactions with others and an improved perception of physical self.³⁹

Service members/veterans who are closer to their onset of injury/disability have less experience in participating in adaptive SER. The concept of "identity erosion *vs.* identity renewal," proposed by Graham et al.,³⁸ suggests that individuals with acquired disabilities have an initial sense of loss, or erosion, of identity, whether physical, emotional, or occupational. Over time, through participation in SER, individuals who participate in SER may be able to cultivate a new "athletic" identity that fosters competence and allows for a continuity of core aspects of self.⁴⁰ This takes time to develop and helps to explain the findings of higher self-esteem scores related to more years of participation in SER.

Significant differences in self-esteem were found when those who participated in individual events were compared with both team events and a combination of events. Athletes at each of these events may participate in individual events, team events, or a combination of both. Athletes who participated in individual events only consistently had lower self-esteem scores. Support from one's peer group has been reported as the

strongest source of social support, and self-esteem is also strongly associated with emotional responses.²⁸ Burke et al.⁴¹ found that participation in SER in a well-formed "true group" offers the greatest benefits. Zander⁴² suggested that well-formed groups are invested in the achievements of the collective, converse freely, assist and receive advice from one another, as well as identify the collective as "we" and nonmembers as "they." The mindset of the military is encapsulated perfectly in this description. Furthermore, observations have shown that team cohesion forms more quickly between service members and veterans than what is found with civilians. The environment created by being surrounded by a group of your peers or your "team" may provide an internal support system that helps to foster positive self-esteem. As a result, athletes at these events who participate in team events or a combination of events that includes team play would have significantly higher self-esteem scores than the individual group. The group dynamics fostered by the event itself as well as by the competitive teams to which an individual athlete belongs may have a positive influence on self-esteem. Members of a team may look at a task as less daunting and, therefore, easier to reach their desired goals. Of note, athletes who participated in individual sports did not meet the criteria for low self-esteem but scored lower than those who participated in team sports.

The literature has consistently reported a link between physical activity and higher QoL among various populations including individuals with chronic illnesses or various disabilities.⁴³⁻⁴⁷ The current study also found a strong positive association between the number of years a service member/veteran participated in SER since the onset of their disability and self-reported overall QoL. This relationship was independent of event participation or the type of activity that was engaged in by the individuals. Scores were not analyzed on the basis of severity of disability; however, the number of concurrent diagnoses of the participants was accounted for and no significant effects were found.

Limitations

Several limitations to this study must be noted. First, the cross-sectional design of this study means that positive longitudinal effects of the participation in these sporting events cannot be determined. Second, there was no control group against which results could be compared. Third, the sampling approach was not ideal. Sampling from athletes competing at these events is likely to provide a skewed view. Finally, the level and severity of disability were also not taken into account during the analysis owing to the wide variety of physical and cognitive disabilities present in the study population, leading to disagreement of level of severity between the two, and the fact that a number of the participants had more than one disabling condition.

CONCLUSIONS

Although it is true that SER has been used as formal rehabilitation for more than 60 years and informally for as long as there has been sport, there is still a paucity of evidence related to the physical and psychosocial benefits of SER in individuals with disabilities. This study attempts to support the widely held belief that “recreation as rehabilitation” holds psychosocial benefits for those with disabilities. Overall, the results from this study found a positive relationship between sports and recreation improved QOL and increases in self-esteem.

Even with its limitations, this study provides a solid step forward in investigating the potential multidimensional benefits of participation in SER in a population of individuals with disabilities, but there is still much work to be done. It should be noted that this was a pilot study to not only assess the efficacy of the tool but also the validity of the outcomes and variables in this population. Future research will address further potential benefits both physiologic and psychosocial health.

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