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Exploring physical self-concept perceptions in athletes with intellectual disabilities: the participation of Unified Sports experiences

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Objectives: Self-description research on athletes with intellectual disabilities (ID) is under investigated. The specific aims in this paper are (a) to identify the differences in physical self-concept and body image by Unified Sports experiences, and (b) to investigate predictors of physical self-concept.
Methods: Participants included 89 Special Olympics athletes who had Unified Sports experiences (USE, n = 43) and those without USE (n = 46). Demographic, anthropometric, self-description data were collected during the questionnaire interview and physical examination. Analyses included descriptive and regression modeling to determine differences in the psychological attributes by USE and best subsets of predictors of each physical self-concept construct.
Results: The findings suggest that the participation of USE facilitated greater sport competence and there is no single predictor across the six physical self-concept constructs.
Conclusion: The findings provide evidence that sports participation may have positive impacts on physical self-concept toward athletes with ID.

Keywords self-description, physical self-concept, body image, Special Olympics, Unified Sports, intellectual disabilities

Introduction

Physical self-concept was theorized as a hierarchical model and conceptualized by several researchers to examine the influence of internalization in physical activity and sports psychology fields (Fox and Corbin 1989; Marsh 1994). Physical self-concept has been well established in providing the findings and educational implications for those without disabilities (e.g. Babic *et al*. 2014; Beasley and Garn 2013) but not for people with disabilities, particularly for those with intellectual disabilities (ID). Few studies have investigated this research area due to a lack of reliable and valid assessment tools (Maïano *et al*. 2011).

From the psychosocial perspective, the physical self refers to a composite self-description of a perceived feeling or experience based on one's bodily movement, such as health, fitness levels, sport competence, physical appearance, and global self-esteem (Fox and Corbin 1989). Put another way, self-esteem is believed to be elevated when overall physical self-concept perception arises (Lau *et al*. 2008). Body image, another related psychological attributes, is part of self-description in relation to the degree of body dissatisfaction (Perrotta 2011; Reel *et al*. 2013).

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The involvement of cognitive development and individual characteristics may mingle with the complex psychological formation, yielding specific self-description in physical self-concepts. The hierarchical physical self-concept model comprises global self-worth (commonly called self-esteem) at the top, followed by physical self-worth at the second level, and four domain-specific physical self-concepts, including physical condition, sport competence, physical appearance, and physical strength (Fox and Corbin 1989).

Compared to the general population, people with ID were perceived with lower self-esteem (MacMahon and Jahoda 2008) and adolescents with ID who were placed in inclusive sports settings seemed to have greater perceived sport competence and general self-worth than those who were in segregated school contexts (Briere and Siegle 2008; Ninot *et al*. 2005). Sports participation should help people with disabilities, including ID, to ameliorate a degree of physical inactivity, achieve self-confidence, and have a positive physical self-concept (Duvdevany 2002; Varsamis and Papadopoulos, 2013). One of the popular community-based physical activity opportunities, Special Olympics Unified Sports, including people with and without ID on the same team training or competing together, has been suggested to facilitate personal development

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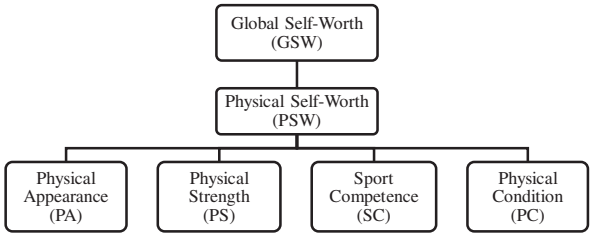

Figure 1. Physical Self-Concept Conceptual Model: global self-worth (GSW), physical self-worth (PSW), physical appearance (PA), physical strength (PS), sport competence (SC), and physical condition (PC) (Fox and Corbin 1989).

such as improved self-esteem (McConkey *et al*. 2013; Wilski *et al*. 2012). These studies highlight the importance of Unified Sports experiences (USE) among such the population.

The current literature appears to favor studies that were conducted with people without disabilities when investigating physical self-concept (e.g. Babic *et al*. 2014; Moreno-Murcia *et al*. 2011). Additional literature regarding physical self-percept or body image has been reported for individuals with physical disabilities, i.e. amputation (e.g. Holzer *et al*. 2014). Similarly, little is known about whether physical self-concept affects a higher level of self-esteem in individuals with ID, including those had regular sports participation. Due to the limitation of empirical findings for people with ID, the results (e.g. Babic *et al*. 2014; Lau *et al*. 2008) yielded for the general population may be useful and helpful to allow researchers to begin hypothesizing the development of physical self-concept for those with ID. According to a meta-analysis for children and adolescents without disabilities, the findings showed that gender had a significant contribution to physical self-concept (Babic *et al*. 2014). Moreno-Murcia *et al.* (2011) further discussed a domain-specific physical self-concept, such as sport competence, likely related more to physical activity in boys than girls. Physical self-concept could be a trigger for facilitating self-esteem among the general population (Lau *et al*. 2008).

Few efforts were made by researchers who insisted that gender, age, and weight status may affect sub-domains of the multidimensional model in people with ID (Bégarie *et al*. 2011; Salaun *et al*. 2014). Bégarie *et al*.'s (2011) study indicated that females with ID were also perceived to have lower global self-esteem at a higher level and several lower scores in the sub-domains (e.g. physical appearance, physical condition, sport skills, and strength) of the physical self-concept model, compared with males with ID. In addition, adolescents with ID, who were obese (i.e. abnormal weight status), appeared to have lower global self-esteem, physical appearance, and perceived physical value than those of normal weight status (Bégarie *et al*. 2011).

Minimal investigations of physical self-concept, body image (e.g. Reel *et al*. 2013), and obesity (e.g. Bégarie *et al*. 2011) for persons with ID have been addressed, thus increasing the lack of literature support needed for the study population (i.e. athletes with ID who have or have no USE) in this issue. Therefore, the purpose of this study was twofold: (a) to investigate the differences in physical self-concept and body image between sports participants with and without Unified Sports experiences (USE); (b) to identify the predictors of physical self-concept for athletes with mild to moderate ID among self-description values, demographic, anthropometric, and sports experience variables.

Method

A cross-sectional research design was used to explore multidimensional perceptions of physical self-concept for athletes with ID. The method, including procedures and instruments, had been approved by a university's Institutional Review Board.

Descriptions of study participants

Demographics

The study population involved in this research study were athletes (n = 89) with ID, aged 12–35 years, who participated during the 2015 Special Olympics Texas Games or Area Games. The primary eligibility requirement for participation in the present study was that study participants were diagnosed as having an ID, as reported by parents or caregivers. Parents of athletes were asked to complete demographic information such as ID morbidities, the severity of disability (mild or moderate), USE (yes or no). Children's ID comorbidities included ID only (n = 45), autism spectrum disorders (ASD, n = 26), and Down syndrome (DS, n = 18).

In addition, the severity of ID was limited to mild and moderate disability (70–35 IQ), as reported on part of demographic information. In short, those with severe to profound ID (IQ < 34) were not eligible to participate because of the limited intellectual functioning preventing from fully understanding and responding to the questionnaires, which may limit the validity of instrumentation employed in the present study. Further, those with neurological disabilities (e.g. cerebral palsy) causing atypical ambulation of movement and the genetic disorder (Parder–Willi syndrome) resulting in excessive eating habits, abnormal appetite, and obesity were excluded as well. Pilot testing was performed by asking parents of individuals with ID to verify if each individual item of the survey was understandable. If there was any uncertainty of any survey questions (e.g. ID comorbidities and severity of ID) during the recruitment process, the parents or caregivers would be contacted again to ensure the validity of the demographic data obtained for the present study.

Anthropometrics

Height, weight, and waist circumferences of athletes with ID were measured. Body Mass Index (BMI) was calculated based on the formula, kg/m^2. WHtR (waist to height ratio) is defined as the ratio of the circumference of the

waist to that of the height, as computed from anthropometric information. The value of WHtR over 0.5 was regarded a risk indicator for cardiovascular diseases (CVD) in adolescents or adults (Ashwell and Hsieh 2005). A category of CVD risk was created with two levels, labeled as "Yes" (meaning with CVD Risk) and "No" (without CVD risk).

Based on the results of BMI, the weight statuses were categorized by the following descriptive BMI cut-off points (participants over 18 years old; World Health Organization [WHO] 1995) and BMI percentiles (participants under 18 years old; Barlow 2007); underweight (BMI < 18.5 or BMI < 5th percentile), normal (BMI between 18.5 and 24.9 or between 5th and 85th percentile), overweight (BMI between 25.0 and 29.9 or between 85th and 95th percentile), obese (BMI ≧ 30.0 or BMI ≧ 95th percentile). For those under 18 years old, the weight status of BMI is categorized according to the age and gender-specific references in the clinical growth charts (Center for Disease Control and Prevention [CDC] 2009). In the present study, weight status was categorized into two levels, "not overweight/obese" (the sum of normal weight and underweight) and "overweight/obese" (the sum of overweight and obese). People with obese or overweight status were more likely to suffer heart disease and other health conditions (National Heart, Lung, and Blood Institute 2000). In the present study, the variable of CVD risk, based on values of WHtR, was created to examine what proportion of CVD risk the sample of athletes with ID could possibly have.

Measurement of physical self-concept

Physical self-concept, as a whole, was theorized to represent a perceived global self-worth which is influenced by physical activities and health related behaviors, based on Fox and Corbin's (1989) model (the Physical Self-Perception Profile, PSPP). Maïano, and his colleagues (2009, 2011) modified the Physical Self-Perception Profile (PSPP) to be applied to the ID population, aged 12–20 years old, entitled the Intellectual Disability Version of the Very Short Form of the Physical Self-Inventory (PSI-VS-ID). A six-point pictorial ''facial'' rating with a text scale (from "No, I Totally disagree" to "Yes, I Totally agree") also included an additional option for "I don't understand this question" and is utilized in PSI-VS-ID. This validated instrument has12 items, measuring a total of six psychometric constructs (each has two items), represented as a pyramid, with an apex of the global self-worth [GSW], followed by the physical self-worth [PSW], and lastly four sub-domains (physical condition [PC], sport competence [SC], physical appearance [PA], and physical strength [PS]) as a foundation base (Maïano *et al*. 2009, 2011). The acceptable goodness of fit indices (CFI and TLI > .95; RMSEA add SRMR < .07) and appropriate internal consistency coefficients (ranging from .67 to .82) within six-correlated constructs were reported (Maïano *et al*. 2011).

The primary investigator examined the internal consistency (ranging from .65 to .81) of the data in relation to physical self-concept constructs, applying PSI-VS-ID, to determine the appropriateness of the data for this study.

Body image

Body image variables used in the present study were based on the Figure Rating Scale (FRS), developed by Stunkard *et al*. (1983). Body image is defined as a self-perception of physical appearance or body size. The FRS is a nine-figure silhouette instrument ranging from very thin to very fat (1 being the thinnest, 9 being the fattest). The FRS includes two sets of nine images, one for boys and one for girls. This self-matching technique is primarily used to examine actual and ideal body image perceptions. The nine-figure silhouettes were used to measure perceived actual and ideal body image by asking two questions: (a) which figure looks like you? (actual body image) and (b) which figure would you like to be? (ideal body image). The variable of body dissatisfaction in the present investigation was computed by "actual minus ideal body image ratings". The body dissatisfaction could be positive or negative if actual self-ratings are larger or smaller than ideal self-ratings. This method has been used in assessing body dissatisfaction (e.g. Lai *et al*. 2013) and also used in samples with ID (e.g. Reel *et al*. 2013). The reliability of the FRS was calculated, using the one-week test-retest method, revealing that the actual, ideal, and body dissatisfaction for males and females with ID ranged from .70 to .86 and from .76 to .86, respectively. Thus, the FRS appeared to be acceptable for the present study.

Procedure

Recruitment of participants was conducted through the support of Special Olympics Texas and the group homes, offering Special Olympics sports programs on a regular basis. During the anthropometric measure and the questionnaire interview, to prevent systemic inaccuracy in data collection due to possible distractions (e.g. noise) in the measuring environments, parents and child with ID were instructed to physically turn away from these external distractions. Measurement of anthropometrics and physical self-descriptions were performed by two specially trained research assistants (Kinesiology-Adapted Physical Education majors), experienced in coaching people with ID. A 2-h training session was offered for the research assistants to learn how to conduct the tests according to the anthropometry and questionnaire protocols.

In order to avoid embarrassment regarding the questionnaire and/or anthropometric measurements, it was allowed, if participants asked, to have parents/teachers stay with the participants to create more stress free and nonthreatening environments (e.g. a secluded room). Staff/teachers of the same gender could stay with the participant, especially during the measurement of waist circumference. Completion of the questionnaires and anthropometric measurements

Table 1. Demographics of athletes with ID by Unified Sports experiences

	With USE (*N* = 43)	Without USE (*N* = 46)	All (*N* = 89)	F/χ^2
Gender, % (n)				3.30
Male	76.7% (33)	58.7% (27)	67.4% (60)	
Female	23.3% (10)	41.3% (19)	32.6% (29)	
Age, % (n)	23.44 ± 6.85	23.66 ± 6.88	23.55 ± 6.83	.02
12 – 20 years	39.5% (17)	37.0% (17)	38.2% (34)	
20 – 35 years	60.5% (26)	63.0% (29)	61.8% (55)	
Comorbidities, % (n)				4.10
ID only	39.5% (16)	58.7% (27)	50.6% (45)	
Autism	34.9% (15)	23.9% (11)	29.2% (26)	
Down syndrome	25.6% (11)	17.4% (8)	20.2% (18)	
Severity of ID, % (n)				.62
Mild	39.5% (17)	47.8% (22)	43.8% (39)	
Moderate	60.5% (26)	52.2% (24)	56.2% (50)	
Height (mean ± S.D)	167.40 ± 13.18	165.08 ± 11.66	166.20 ± 12.40	.02
Weight (mean ± S.D)	75.87 ± 23.67	70.97 ± 22.75	73.34 ± 23.20	.78
BMI (mean ± S.D)	26.77 ± 7.00	25.87 ± 7.13	26.31 ± 7.04	.36
Weight status, % (n)				2.86
Underweight	11.6% (5)	13.0% (6)	12.4% (11)	
Normal weight	27.9% (12)	39.1% (18)	33.7% (30)	
Overweight	27.9% (15)	19.6% (9)	27.0% (24)	
Obese	25.6% (11)	28.3% (13)	27.0% (24)	
WC (mean ± S.D)	96.94 ± 17.43	95.54 ± 17.52	96.22 ± 17.39	.14
WHtR (mean ± S.D)	.58 ± .10	.58 ± .09	.58 ± .10	.00
CVD risk, % (n)				.00
Yes	76.7% (33)	76.1% (35)	76.4% (68)	
No	23.3% (10)	23.9% (11)	23.6% (21)	

Notes: ID: Intellectual disabilities; USE: Unified Sport experiences; S.D: Standard deviation; BMI: Body mass index; WC: Waist circumferences; WHtR: Waist to height ratio; CVD: Cardiovascular diseases. None of the demographic variables by USE were significantly different. (*N* = 89).

may take around 30 min. If there are any data missing (e.g. incomplete questionnaire), the responders had been contacted to clarify the questionnaire items. Confidentiality was protected by assigning each participant a code, in place of their name, to ensure anonymity of data for further use.

Data analysis

Before the essential analysis, there were several steps to ensure the quality of data. A completely numerical coding scheme was first developed. Double entry of data was performed to eliminate data entry inaccuracies. Descriptive statistics such as means, standard deviation (SD), and confidence intervals of the means difference (CI 95%) were computed for continuous variables; for categorical variables (e.g. gender, comorbidity, and weight status), frequencies and percentages by USE were recorded.

In order to determine the minimal sample size, a power analysis, was used to estimate the appropriate sample size (Cohen 1992). With α set at .05, medium effect size at .15, and power set at .80, the appropriate sample size is 85 for four independent variables in a linear multiple regression, calculated by *G*Power* version 3.1 (Faul *et al*. 2009). The results showed that a sample size of 89 appears to be sufficient to achieve the power of .80 for linear multiple regression models, along with the four predictors.

Information regarding Special Olympics participation (years involved in Special Olympics) of athletes with ID by USE was tabulated. Two-sample t-tests, one-way analysis of variance (ANOVA) as well as effect size statistics (*d*) were used to examine the group mean differences between USE (with vs without USE) for continuous (height, weight, BMI, WC, WHtR) for athletes with ID. Chi-squared test (χ^2) was used to examine the relationships between categorical variables (i.e. age groups, genders, comorbidities, severity of ID, and weight statuses) and USE.

In order to determine the independent contribution of various demographic information (age, gender), anthropometric (height, weight, BMI, WC, WHtR), three body image perceptions, and the USE variable on each physical self-concept outcome, the separate stepwise multiple regression analysis were conducted, yielding unstandardized (B), standardized (Beta [β]) coefficients, and adjusted R^2. The accepted level of significance for all analyses was set at $p < .05$. Data analysis was accomplished using SPSS 22.0 (SPSS Inc. 2013).

Results

Demographics of the study population

The demographic data of participants with ID (i.e. athletes with ID), including gender, age, comorbidities, severity of ID, anthropometrics and body composition related indicators were shown in Table 1. Note that, after a cross-comparison of comorbidity and CVD risk, 94.4% (*n* = 17) of samples with DS and 80.0% (*n* = 36) of samples with ID only (without DS) were considered having a CVD risk.

Differences in physical self-concept and body image on unified sports experiences

Table 2 illustrates the comparisons of USE (with vs without USE) on physical self-concept and body image components. Initially, the results of internal consistency of the physical self-concept model showed that the current data

Table 2. Comparison of physical self-concept and body image by Unified Sports experiences

	Unified Sports Experiences						Cronbach's Alpha
Variables	With USE (*n* = 43)	Without USE (*n* = 46)	t(87)	*p*	95% CI	*d*	*n* = 20
PSC							.86
GSW	4.8 ± 0.8	5.0 ± 0.7	–1.23	.22	[–.7, .2]	.26	.76
PSW	4.8 ± 1.0	4.6 ± 0.9	.73	.47	[–.2, .6]	.19	.65
PS	4.2 ± 0.8	4.2 ± 1.3	.16	.87	[–.4, .4]	.03	.67
PA	4.6 ± 1.0	4.6 ± 1.1	–.08	.94	[–.4, .4]	.02	.81
PC	3.9 ± 1.2	3.9 ± 1.3	–.15	.88	[–.5, .4]	.03	.71
SC	4.8 ± 0.8	4.4 ± 1.2	1.99	.049	[.0, .8]	.42	.77
Body image							n/a
Actual (A)	4.1 ± 2.0	5.0 ± 2.1	–1.87	.065	[–.8, .0]	.40	
Ideal (I)	3.2 ± 1.5	3.2 ± 1.8	–.02	.96	[–.4, .4]	.01	
Body dissatisfaction	0.9 ± 1.7	1.7 ± 2.3	–1.90	.058	[–.8, .0]	.40	

Notes: Effect sizes were calculated to measure the magnitude of effects of ID levels. According to the guidelines of Cohen (1988) for independent *t*-tests, effect size of .20 = small effect, .50 = moderate effect, and .80 = large effect.

Table 3. Summary of stepwise regression model for physical self-concept

Predictors	B	Std. Error	*Beta*	Multiple R^2	t	*p*	CI 95%
Physical self-concept							
Global self-worth							
Adjusted R^2 = .14, F (3, 85) = 5.91, *p* = .001							
Years involved in SO	.34	.10	.38	.05	3.5	.001	[.15, .54]
Age	–.03	.01	–.27	.13	–2.3	.022	[–.05, –.004]
WC	–.01	.004	–.21	.17	–2.0	.044	[–.02, –.000]
Physical self-worth							
No predictor was generated.							
Physical strength							
Adjusted R^2 = .05, F (1, 87) = 5.85, *p* = .024							
Gender	–.55	.24	–.24	.06	–2.30	.024	[–1.02, –.07]
Physical appearance							
Adjusted R^2 = .12, F (2, 86) = 7.16, *p* = .001							
WC	–.02	.07	–.26	.10	–2.44	.017	[–.03, –.003]
Age	–.03	.02	–.21	.14	–2.03	.045	[–.06, –.001]
Physical condition							
Adjusted R^2 = .09, F(1, 87) = 9.92, *p* = .002							
WC	–.02	.01	–.32	.10	–3.15	.002	[–.04, –.01]
Sports competence							
Adjusted R^2 = .07, F(2, 86) = 4.39, *p* = .015							
Body dissatisfaction	–.12	.05	–.25	.05	–2.38	.019	[–.23, –.02]
Years involved in SO	.27	.13	.21	.09	2.02	.046	[.01, .53]

Notes: *N* = 89. SO: Special Olympics; WC = Waist circumferences; Beta: standardized coefficients. Variables entered into Regression analysis for each physical self-concept component included gender (male coded as "0", female coded as "1"), age, severity ID (mild = 0, moderate = 1), WC, years involved in Special Olympics (0–5 years = 0, 6–10 years = 1, 10 years or more = 3), USE (non-USE = 0, USE = 1), body image perceptions (actual rating, ideal rating, and body dissatisfaction).

had overall acceptable Cronbach's α values (.86) as well as the subscales ranging from .65 to .81. The test–retest reliability of FRS revealed that the actual, ideal, and body dissatisfaction, for males and females ranged from .85 to .86 and from .82 to .91, respectively.

The results showed that the only significant difference among the nine variables was observed in SC, t (87) = 1.99, p = .049, CI 95% = .00, .8, d = .42. The SC scores for those with USE (M = 4.8, SD = −.8) were higher than for those without USE (M = 4.4, SD = 1.2). The d value for SC was considered small to moderate practical significance. In addition to the above-mentioned significant differences, the values of actual body image ratings (p = .07) and body dissatisfaction (p = .06) were lower in those with USE when compared to those without USE. Except for d values for actual body image ratings (.40), and body dissatisfaction (.40), the rest of d values among other variables suggested trivial to small (.26 in GSW) practical significance.

Predictors of physical self-concept perceptions

Collinearity was examined using the variance inflation factor (VIF) and tolerance figures. The parameter of VIF ranged from 1.00 to 1.32 and the tolerance figures were from .76 to 1.00. Both parameters indicated a lack of multicollinearity, according to the VIF (above 10) and tolerance (below .1) cut-offs (Cohen *et al*. 2003). Separate stepwise multiple regressions for each component of physical self-concept were performed, as summarized in Table 3.

For GSW, the stepwise regression model with three predictors (years involved in Special Olympics, age, and WC) produced adjusted $R^2 = .14$, $F(3, 85) = 5.91$, $p = .001$, explaining about 14% of the variance in the outcome variable. Years involved in Special Olympics was the most weighted predictor, $\beta = .38$, followed by age, $\beta = -.27$, and WC, $\beta = -.21$. For PSW, there was no predictor for the regression model among the variables (all $p > .05$). For PS, gender was the only predictor, $\beta = -.24$, explaining approximately 5% of variance in the outcome variable, adjusted $R^2 = .05$, $F(1, 87) = 5.29$, $p = .024$. For PA, the regression model produced adjusted $R^2 = .12$, $F(2, 86) = 7.16$, $p = .001$. The two predictors of WC, $\beta = -.26$, and age, $\beta = -.21$, collectively explained about 12% of variance in PA. For PC, WC was the only predictor, $\beta = -.32$, explaining approximately 9% of variance in the outcome variable, adjusted $R^2 = .09$, $F(1, 87) = 9.92$, $p = .002$. Lastly, for SC, the regression model produced adjusted $R^2 = .07$, $F(2, 86) = 4.39$, $p = .015$. Body dissatisfaction, $\beta = -.25$, and years involved in Special Olympics, $\beta = .21$, carried out about 7% of variance in SC.

Discussions

This research was intended to examine group differences of physical self-concept and body image between those with and without USE, and the predictions of physical self-concept with the possible factors among demographics, anthropometrics, and body image in athletes with ID. The current study contributes to the understanding of multifaceted associations among variables between those who participated in Unified Sports and those without such experiences.

In the present study, the effect of sports participation may not be seen as an importance factor in accounting for the formation of physical self-concept. However, the study participants with USE perceived greater SC than those without USE, the variables of actual body image ratings ($p = .065$) and body dissatisfaction ($p = .058$) had a tendency toward greater values in those without USE. Given the effect of an inclusive setting, Huck *et al*. (2010) pointed out that people with ID may modify their self-concepts when placed in an inclusive environment and may have overall positive feelings about themselves (Briere and Siegle 2008; Duvdevany 2002). Our results are consonant with the previous studies. Conversely, the results of the present study appeared to be inconsistent with Ninot *et al*. (2005). Such disagreement may be due to the different sports involvement in terms of an inclusive setting. Ninot et al.'s. study indicated that the environmental conditions of the integrated training competitions (i.e. interschool competitions with those without disabilities) were not limited to an only USE-like setting (a team comprising those with and without ID and competing another similar team composition), but expand to integrated scholastic sporting events where those with ID needed to compete with their peers without disabilities. Thus, the decreased perceived sport competence in the integrated group was only observed when compared to the sedentary group. This may explain why perceived lower sport competence in the integrated scholastic group was found in Ninot *et al*.'s (2005) but not in the present study. It may be inferred that such discrepancy of modality of inclusive physical activity environments seemed to influence perceived sport competence. How realistic perceptions may be manipulated when competing against their counterparts, despite improved athletic performance found in all groups (except for the sedentary group) after 32 months of training and competitions.

Special Olympics Unified Sports is specifically designed to train people with and without ID (similar age and ability) together to play on the same team (Special Olympics 2003). Sports formatting and the degree to which people with ID are involved may interact with individual's physical self-concept and body image to some extent. In the current investigation, based on USE information collected, the dichotomy method (yes or no) could not differentiate whether a sport experience of an individual participant had involved traditional Special Olympics sports, Unified Sports programs only, or a combination of both traditional and Unified Sports programs at the time of the present investigation. If different modalities of sports participation made a difference in physical self-concept (e.g. the results in Ninot et al.'s study), it would imply that there may be some potential impacts on the samples with ID in this study.

Personal development in Unified Sports has been of central interest in the context of health promotion among people with ID (McConkey *et al*. 2013; Wilski *et al*. 2012). The level of health awareness in people with ID could be improved if they were given access to a higher quality of physical activity participation (Wilski *et al*. 2012). Also, the involvement of Unified Sports is significant access to expand their life experiences (Harada and Siperstein 2009). An increasing number of recent publications and empirical studies have assessed the health promotion that sports participation can facilitate physiological and psychological health among people with ID, including physical (sports skills and fitness levels, see Baran *et al*. 2013), mental (self-confidence and self-esteem, see Roswal and Damentko 2006), and social (friendship: their relationships with other individuals, mutual trust, see Özer *et al*. 2012) areas in this field.

Our study supports the previous studies investigating psychological well-being (e.g. Özer *et al*. 2012), showing psychological benefits, such as more positive attitudes toward exercise and self-descriptions in a physical domain. Some other studies (see Baran *et al*. 2013) suggested that Unified Sports programs facilitated sports skills and positive self-descriptions of athletes with and without ID. The connection between the benefits of physical fitness and

psychological well-being improvement was made explicit through sports participation such as Special Olympics. Although the current study did not explore actual sport competence and fitness levels, the researcher simply focused on intrinsic perceptions of self-descriptions in terms of physical self-concept and its demographic information for regression analysis. The preliminary findings in the present study suggested that the increased self-referenced parameter supported the advocacy of Unified Sports and showed direct evidence of the benefits of inclusion. These advantages may have helped fulfill the mission of Special Olympics. More specifically, these outcomes were encouraging since the advocacy of Unified Sports has been raised in the two last decades following the implementation and promotion of Inclusion (Pan and Davis 2015; Special Olympics 2003). Note that Stanish *et al*. (2016) further reported that adolescents with ID were unwilling to engage in individual physical activities. This provided support for the notion that the peer effect of physical self-concept may be a more important factor in accounting for superior self-descriptions of Special Olympics athletes who participated in Unified Sports.

Conversely, the actual body image rating and body dissatisfaction in those with USE practically seemed to be indicative of the tendency toward lower than those with USE. Such findings were not significantly different, being with $p = .065$ and $p = .058$, respectively, but their magnitudes (.40 each) of the USE effect demonstrated a small to moderate practical significance. These outcomes implied that there was some benefit to involvement in inclusive physical activity settings, resulting in participants with ID perceiving smaller body shapes and less body dissatisfaction.

Other factors affecting self-perceptions

The extent to which variables entered in the regression analysis predicted physical self-concept varies, and was limited to demographic and anthropometric variables and body image from the study participants. Through the six separate regression analyses for physical self-concept, values of adjusted R-squared were yielded to demonstrate how well predictors can explain individual physical self-concept constructs. The results of the regression analysis did yield significant predictors for several constructs, but it was noteworthy that the lower R-squared values (approximately between .05 and .14) revealed the fact that the variables entered into the regression models may not be sufficient to have greater explanatory power in the present study. In short, our sample with ID appeared to be fairly unpredictable. This may be due to the fact that the demographic data entered in the regression model was limited to the individual level (e.g. age and gender). Also, some psychological and behavioral phenomena may not be simply explained (Portney and Watkins 2009). Therefore, such findings also implied that there are likely other critical factors (e.g. demographic and parental factors) that may substantially manipulate the development of self-perceptions in adolescents with ID (Jones 2012).

One of the important findings by Salaun *et al*. (2014) was that an overestimation of physical-sport competence (i.e. positive illusory bias) predicted several physical self-concept perceptions and body dissatisfaction for adolescents with ID. An individual who had cognitive limitations may have similar psychologically overestimated response to their actual physical competence (Huck *et al*. 2010), although positive illusory bias was more common in students with attention deficit hyperactivity disorder or learning disabilities (Bishop and Block 2012). Thus, this perception which dictated the degree of such psychological attribute may greatly contribute to the physical self of individuals with ID. As Varsamis and Agaliotis (2011) and Salaun *et al*. (2014) suggested, people with ID tended to have positive psychological profiles that may spread to other domains. The overestimation of personal competence may start in early schooling experiences; students with ID who had "unrealistic", "excessive" successful experiences may overestimate their actual competence when compared to their counterparts.

In addition to these individual factors, societal factors in regard to a parental role may play an important part in the development of self-concept. Jones (2012) suggested that family support was one of the particularly salient factors influencing self-concept for adolescents with ID. In participation of physical activity, parental support involvement, to some degree, was associated with high levels of physical activity (Temple 2009). As for parental influences, people with ID depended more on their caregivers, including parents, to promote healthier lifestyles such as regular exercise and diet (Lin *et al*. 2010; Spanos *et al*. 2013a, 2013b), especially concerning participation in community-based activity programs (Temple 2009). Similarly, parental ideal body shape and stereotype stigma could influence body image perception and obesity awareness. Closely related to unhealthy weight in children with ID also included parental overweight (Mikulovic *et al*. 2011). These inferred that a parental role concerning a child's BMI was formative.

Limitations

Research focusing on subjective physical self-concept in people with ID is still scarce due to subjects' characteristics of limited cognitive abilities and comprehension capability (Barnes *et al*. 2013). The PSI-VS-ID was originally developed for French samples with ID and for English-speaking individuals with ID. It has not been validated for U.S samples with ID. Thus, it may not have been a reliable measure for people with ID living in the U.S. and should be considered a limitation in the present study.

The second limitation is rooted in the lower Cronbach's alpha, especially in the measure of the physical self-worth ($\alpha = .65$) at the second level of the hierarchical physical

self-concept model, which means that this item may not be measuring the corresponding and underlying construct. It left questions about predictions unanswered. In other studies such as Salaun *et al*. (2014), the researchers did not adopt this construct (i.e. physical self-worth) for analysis due to unstable coefficients (.29 and .60, before and after intervention, respectively). Our study is presenting preliminary results of a pilot observation among athletes with ID that will be further expanded and replicated and in particular, this line of investigation in a series of experimental studies in different features (e.g. kinetic chain exercises) of sports. Accordingly, the findings of this present study need to be treated circumspectly; as such, results may reflect, in part, to the way in which the data were collected.

Conclusions

This study explored a new research area with respect to how physical self-concept in this population interacts with sports participation. It is undeniable that participation in physical activity/exercise could offer a variety of benefits for human beings, including people with and without disabilities, so it stands to reason that physical activity/exercise would also benefit individuals with ID. This present study explored physical self-concept in athletes with ID in great depth and also looked at how several key differences in demographics as well as the discovery of possible predictors in specific physical self-concept constructs affected athletes with ID.

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