EXAMINATION OF ASSOCIATIONS OF PHYSICAL SELF-CONCEPT OF ATHLETES WITH INTELLECTUAL DISABILITIES

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DEDICATION

My deepest gratitude goes to those whose influence may not be so evident but who nevertheless provided the educational and emotional foundation without which this dissertation would have never been possible.

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ABSTRACT

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While the field of study in self-descriptions in a physical domain for the general population has been extensively investigated, such research in athletes with intellectual disabilities (ID) is relatively unexplored. The purpose of this study was threefold: (a) to investigate the differences in demographic factors and sports participation; (b) to report the associations among these variables; and (c) to identify the predictors of physical self-concept for athletes with mild to moderate ID.

A secondary analysis was used to analyze physical self-concept, body image, and sport participation in 89 athletes with ID from the Special Olympics. Physical Self-Concept Model (Fox & Corbin, 1989) is a hierarchical framework with six constructs, including global self-worth, physical self-worth, physical appearance, physical strength, sport competence, and physical condition. Body image perception was measured using Figure Rating Scale (Stunkard, Sorensen, & Schulsinger, 1983). Anthropometric measures included height, weight, and waist circumferences. The quantitative analysis was performed through descriptive (ANOVA, Chi-Squared and Spearman correlation), and inferential statistics (step-wise multiple regression), using SPSS version 22.0.

The results confirm several differences in age, gender, weight status, comorbidities of ID, and Unified Sports participation for physical self-concept and/or body image. Other important findings suggest that the constructs of physical appearance and physical condition relate mainly to anthropometrics (except for height). The results of the regression analysis suggest that there was no single predictor across the six physical self-concept constructs in this hierarchical framework. Identified predictors for global self-worth included lower cardiovascular diseases (CVD), Special Olympics participation, and age. Waist circumference and age were predictors for physical appearance. Physical strength and physical condition each had one predictor, gender and waist circumference, respectively. Raw discrepancy of actual-ideal body image ratings and Special Olympics participation were predictors for sport competence. No identified predictor was confirmed for physical self-worth.

This study may serve as a basis of understanding of physical self-concept for athletes with ID and it also allows for a more in-depth explanation of the associations and predictions for such psychological attributes. Recommendations and potential implications are provided in ameliorating psychological well-being in athletes with ID.

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CHAPTER I

INTRODUCTION

Background

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 (e.g., Fox, 1997; Fox & Corbin, 1989; Marsh, 1994; Marsh & Sonstroem, 1995). 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 & 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, Morin, Begarie, & Ninot, 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 & Corbin, 1989; Marsh, 1996, see Figure 1). Exercise psychologists are interested in how key factors (e.g., age, gender, weight status, and sports participation) relate to the conceptualization of psychological attributes of the physical self.

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 appearancephysical appearance, and physical strength (Fox & Corbin, 1989; Maïano et al., 2011). In addition to this hierarchical model, self-esteem is theorized to be elevated when overall physical self-concept perception arises (Lau, Cheung, & Ransdell, 2008; Marsh & Sonstroem, 1995). Thus, physical self-concept as a psychometric evaluation can be useful to explain how bodily movement or activity experiences impact self-esteem (global self-worth), overall physical-self-worth at the second level, and other specific domains of physical self-concept at the third level. Compared to the general population, people with ID were perceived with lower self-esteem (MacMahon & Jahoda, 2008). However, little is known about whether physical self-concept affects a higher level of self-esteem in individuals with ID. Due to the limitation of empirical findings for people with ID, the results (e.g., Babic et al., 2014; Lau et al., 2008; Moreno-Murcia, Hellín, González-Cutre, & Martínez-Galindo, 2011) 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. For example, 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. (2001) 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 (Lau et al., 2008).

Few efforts were made by researchers who insisted that age, gender, and weight status may affect subdomains of the multidimensional model in people with ID (Bégarie, Maïano, & Ninot, 2011; Salaun, Reynes, & Berthouze-Aranda, 2014). Take the factor of age and weight status for example, Bégarie's et al. (2011) study indicated that 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. In addition, females with ID were also perceived to have lower global self-esteem at a higher level and several lower scores in the subdomains (e.g., physical appearance, physical condition, sport skills, and strength) of the physical self-concept model, compared with males with ID (Bégarie et al., 2011). As sports psychologists theorized, the formation of physical self-concept and its optimal psychological development (global self-esteem) should be based on bodily movement and physical activity experiences in genders (Fox, 1997; Fox & Corbin, 1989; Marsh, 1994; Marsh & Sonstroem, 1995) and in body weight status (Bégarie et al., 2011; Pliner, Chaiken, & Flett, 1990). This infers that physical activity participation could influence one's physical self-concept.

Sports participation, a form of physical activity participation, helps people with disabilities to ameliorate a degree of physical inactivity, achieve self-confidence, and have a positive physical self-concept (Varsamis & Papadopoulos, 2013). Studies showed

that sports participation may positively relate to physical self-concept in people with ID (Briere & Siegle, 2008; Duvdevany, 2002).

To date, the most accessible sports participation opportunity for people with ID is Special Olympics, a global nonprofit organization. The vision of Special Olympics is to provide year-round Olympic-type sports opportunities for children and adults with ID (Special Olympics, 2014). In addition to the contribution of providing sports participation opportunities, Special Olympics provides a socially inclusive environment and wider society of social acceptance through their Unified Sports programs (McConkey, Dowling, Hassan, & Menke, 2013). “Inclusion for All” was the main theme of the 2015 Special Olympics World Games in Los Angeles and was promoted with the Unified Sport of Bocce. This approach promoted inclusion not only in competitions, but in family bonding and friendships through inclusive sports participation (Pan & Davis, 2015).

One of the advantages of sports participation is that it may improve psychological well-being (Ayaso-Maneiro, Domínguez-Prado, & García-Soidan, 2014; Chan & Chow, 2010;). For example, to engage in Special Olympics Unified Sports programs (involving athletes with and without ID) may have a long-term effect of better psychosocial status (Briere & Siegle, 2008). It may not indicate an increased psychological well-being, but a more realistic perception with regard to social comparison. Ninot, Bilard, and Delignieres (2005) reported those who participated in integrated sports (swimming in school-based Integrated Scholastic Sport and Unified Sports) appeared to have lower perceived sport competence but improved swimming performance than those who had a sedentary

lifestyle without regular swimming practice. The Ninot et al. study involved the comparison of those who participated in segregated sports (i.e., traditional Special Olympics swimming training) and those who had multiple integrated sports experiences with regard to perceived sport competence. The results of perceived sport competence did not reveal a statistical difference between the integrated sports group and the traditional Special Olympics sports group; however, the perceived sport competence in the integrated sports group was lower than that in the traditional Special Olympics sports group.

It is inconclusive whether body image perceptions or physical activity participation contributes to physical self-concept in individuals with ID (Ayaso-Maneiro et al., 2014; Salaun et al., 2014). However, the literature generally supported a weight problem (e.g., obesity) contributed to poor physical self-concept for individuals with ID (Hsieh, Rimmer, & Heller, 2014; Melville et al., 2008; Slevin, Truesdale-Kennedy, McConkey, Livingstone, & Fleming, 2014; Stewart et al., 2009). Among the physical indices, obesity is a serious morbidity, in both people with and without ID, that may lead to various health consequences (Centers for Disease Control and Prevention [CDC], 2015).

The prevalence of obesity in adolescents with ID is approximately 33% to 36% higher than adolescents without ID (Slevin et al., 2014; Stewart et al., 2009) and 34% to 38% higher for adults with this disability (Hsieh et al., 2014; Melville et al., 2008). Weight status, such as overweight and/or obesity, for people with and without ID can contribute not only to poor physical conditions (e.g., hypertension) but psychological

discomfort (e.g., low self-esteem, Rimmer, Yamaki, Lowry, Wang, & Vogel, 2010). Grondhuis and Aman (2014) noted abnormally elevated weight status as a stigma that brought psychological complications, such as body dissatisfaction, starting in youth. Weight statuses (e.g., obesity) can also impact body image perceptions.

Body image refers to the evaluation of physical appearance (i.e., the degree of body dissatisfaction) and can be used as a self-evaluation or an evaluation of others' body shape (e.g., physical appearance; Perrotta, 2011; Reel, Bucciere, & SooHoo, 2013). Body image itself is part of self-description linked to self-esteem (Fanchang et al., 2013). The possible body image perceptions may be either positive or negative feelings (e.g., body dissatisfaction) as assessed with silhouette matching. A silhouette matching task is a common technique to measure one's perception of body image. The silhouette matching task represented individuals with a set of silhouette pictures of 9 men and 9 women, from very skinny to very fat. Respondents could choose one of the silhouette pictures to reflect which one looks like them (actual body image) or which one they would like to be (ideal body image). The silhouette matching task could reflect body dissatisfaction, as shaped by body weight (Pelegrini & Petroski, 2010). The matching task can also be applied to athletes, including those (e.g., Reel et al., 2013) with and without ID (e.g., Hallinan, Pierce, Evans, & DeGrenier, 1991).

With that being said, investigating differences in body image between genders, and to relate such body image perceptions to anthropometric indicators (e.g., BMI) or activity experiences using a silhouette matching task for athletes with ID appears to be

feasible. Reel et al. (2013) suggested that athletes with ID who had a higher body mass index (BMI) reported lower body satisfaction (unidirectional explanation), which simply means that they were not satisfied with their physical appearance. Thus, the population with ID who were obese may perceive their own body appearance as bigger and have greater body dissatisfaction. Body dissatisfaction may start by awareness of elevated weight status (i.e., obesity) in youth with developmental disabilities, including ID (Grondhuis & Aman, 2014). More individuals with ID who were compared to those without ID, identified their ideal body shape as congruent with their actual body shape (Yoshioka & Takeda, 2012). This behooves researchers to examine its relevance to their higher BMI and lower body satisfaction in relation to the discrepancy between these two body image perceptions. Thus, poor physical appearance (linked to obesity) can trigger psychological complications (actual vs ideal) and may lead to lower global self-worth of the physical self-concept model, consequently (Esnaola, Rodríguez, & Goñi, 2010; Fanchang et al., 2013; Gortmaker, Must, Perrin, Sobol, & Dietz, 1993).

As mentioned earlier, these findings (see Reel et al., 2013) could provide an understanding of a simple unidirectional body image effect (the result of lower body satisfaction due to higher BMI). Stated another way, the population with ID who are obese may perceive their own body appearance as bigger and have greater body dissatisfaction; however, this simple explanation may fail to illuminate other unique self-described psychological issues in other settings (Marsh & Roche, 1996). Because of the desire to achieve a higher dimension of self-fulfillment such as self-esteem, a better

conceptualized model is needed to explain whether, and to what extent, psychometric distance between selves (i.e., actual and ideal selves) may contribute to psychological well-being (Stanley & Burrow, 2015). Accordingly, one particular body image model, emerged from Self-Discrepancy Theory (Higgins, 1987), is called the actual-ideal body image discrepancy model. This model comprises Actual (A), Ideal (I) body image ratings, the raw values of actual minus ideal body image ratings [A-I], and the absolute values of these raw ratings [|A-I|] (Marsh & Roche, 1996).

The actual-ideal body image discrepancy could be described as a psychological conflict regarding personal characteristics of body shape or physical appearance versus those one would like to possess or should ideally possess (Heron & Smyth, 2013). The literature supports the fact that the discrepancy model may have more explanatory power to predict self-esteem than applying a traditional and unidirectional actual-importance model (Marsh & Sonstroem, 1995; Marsh & Roche, 1996). Some scholars may question the empirical evidence for the appropriateness of the actual-ideal body image discrepancy model in self-concept research (Boldero, Moretti, Bell, & Francis, 2005). Other exercise psychology researchers, however, reported that the unique composite score (e.g., the absolute values of actual ratings minus ideal ratings) was in support of psychological representation more than just actual or ideal self-described perceptions (Marsh, Hau, Sung, & Yu, 2007). The present investigator contends that the actual-ideal body image discrepancy model should be applied to explain physical self-concept for individuals with

ID. This will further help researchers to understand whether factors like age, gender, and weight status affect psychological attributes.

More evidence is needed when applying the discrepancy model to determining physical self-concept for individuals with ID. Factors such as age and gender influences on physical self-concept, and their links to self-esteem in the general population (those without ID), has received more research emphasis than people with ID. The body image perceptions associated with body weight status, applied to the actual-ideal discrepancy model, may project a better explanation of physical self-concept. The present investigation has highlighted a more interesting possibility; that is, whether the factors of age, gender, weight status, body image perceptions, and sports participation, contribute to the hierarchical physical self-concept model.

Significance of the Study

The current literature appears to favor studies that were conducted with people without disabilities when investigating body image (e.g., Esnaola et al, 2010; Gatti, Ionio, Traficante, & Confalonieri, 2014; Golan, Hagay, & Tamir, 2014; Marsh & Roche, 1995; Tiggemann, 2004). 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; Scarpa, 2011). Minimal investigations of physical self-concept obesity (e.g., Bégarie et al., 2011), and body image (e.g., Reel et al., 2013; Özer, 2005) for persons with ID have addressed. One study conducted by Salaun et al. (2014) explored physical self-percept, body image, and sports participation that included age, gender, and weight

status differences in non-athletes with ID, thus increasing the lack of literature support needed for this study population (i.e., athletes with ID).

Purpose

Gaining insight into the relationships between physical self-concept, body image, sports participation, and demographic factors of athletes with ID may provide a better understanding of factors affecting physical self-concept. Therefore, the purpose of this study was threefold: (a) to investigate the differences in demographic factors and sports participation; (b) to report the associations among these variables; and (c) to identify the predictors of physical self-concept for athletes with mild to moderate ID.

Research Questions

To accomplish the purpose, three objectives and the corresponding research questions are identified, as follows:

Objective 1: To investigate psychological attributes (physical self-concept perceptions and actual-ideal body image discrepancies) on age, gender, weight status, the severity of ID, and sports participation among athletes with mild to moderate ID.

Research question 1: Does physical self-concept and body image differ in age (12-20 years vs 20-35 years) for athletes with ID?

Research question 2: Does physical self-concept and body image differ in gender (male and female) in athletes with ID?

Research question 3: Does physical self-concept and body image differ in weight status (not overweight vs overweight/obese) for athletes with ID?

Research question 4: Does physical self-concept and body image differ in comorbidities of ID (ID only vs Down syndrome vs Autism Spectrum Disorder) for athletes with ID?

Research question 5: Does physical self-concept and body image differ with severity of ID (mild vs moderate) for athletes with ID?

Research question 6: Does physical self-concept and body image differ in sports participation (Unified Sports experience vs non-Unified Sports experience) in athletes with ID?

Objective 2: To investigate the correlations between physical self-concept, body image perceptions, and body weight in athletes with ID.

Research question 7: Are there significant associations between age, physical self-concept, body image perceptions, sports participation, and other variables (e.g., weight status, severity of ID) for athletes with ID?

Objective 3: To determine whether demographic variables, weight related indicators, actual-ideal body image discrepancies, and Unified Sports participation contribute to physical self-concept perceptions for athletes with ID.

Research question 8: Do demographic variables, body image perceptions, and Unified Sports participation predict each physical self-concept construct?

The answer to such questions will not only determine group differences in demographic variables but may also reveal essential psychological implications (e.g., elevated physical self-concept perceptions due to sports participation). This may be

beneficial to enhance the advantages of sports participation and to improve psychological well-being for athletes with ID.

Limitations/Delimitation

Limitations

1. This is a cross-sectional study, using an existing database. All the relationships explored between variables were associational in nature. Therefore, no cause-and-effect relationships may be inferred (Portney & Watkins, 2009).

2. The proxy report of sports participation for athletes with ID, as reported in the database, may limit the reliability and validity of the study (Shephard, 2003). As noted in the database, the respectful caution with regard to reliability and validity was due to several possible distractions in the measuring environments (competitions, sports practices, special events); however, parents and their child with ID were instructed to physically turn away from these external distractions during the interview and measurement process. Nevertheless, how possible distractions affect parent and child's accurate disclosure of information, which reflected their physical self-concept and body image during psychometric measures, was not examined.

3. Information on medications used by the athletes was not collected in the database. The effect of medication use (the mental state) may mediate weight status, physical self-concept, and body image perceptions in the target population during the testing procedure.

4. The number of independent variables (e.g., age, gender, and weight status) used are limited to four predictors when entering into multiple regression models in order to achieve the statistical power of .8.

Delimitations

1. Inclusion criteria for participation in this study dictated that participants must have mild to moderate ID and be 12 to 35 years old. Those with severe or profound levels of ID and those with Prader-Willi syndrome were excluded because of difficulties with comprehension of the questionnaires, abnormality of food desire, and difficulty with focus and motivation with regard to participation. People with physical disabilities were also excluded because their types of physical activity and perceptions of psychological attributes may differ from ambulatory individuals with ID. Thus, the inclusion/exclusion criteria limit the generalization of the findings to ambulatory athletes with mild to moderate ID.

2. Participants in the database were primarily recruited from the state of Texas. The findings may not be generalized to other states or nations.

3. The sports participation questionnaire (e.g., sports types, Unified Sports participation) was previously administered to obtain clinical patterns of physical activity behaviors. In this study, the operational definition of sports participation for statistical analysis is limited to the dichotomy of without Unified Sports experience versus with Unified Sports experience. This may not be able to generate more comprehensive outcomes attributable to influences of inclusive sports environments such as the factors of friendships and

selection of individuals without ID as partners (Hassan, Dowling, McConkey, & Menke, 2012) and the efficacy of Unified Sports models (Special Olympics, 2003).

Definitions

Intellectual Disabilities (ID): ID is a cognitive impairment which influences conceptual (e.g., reading and writing), social (e.g., communication skills), and practical domains (e.g., personal care), occurring during a developmental stage (i.e., onset before the age of 18) and is diagnosed based on the adverse impact of the lack of age-appropriate adaptive skills (American Association on Intellectual and Developmental Disabilities [AAIDD], 2009).

Physical self-concept: Physical self-concept is defined as one of the self-concept components (the others are academic self, the family self, the emotional self, the social self, and the physical self) under the apex of global self-esteem (global self-worth; Shavelson, Hubner, & Stanton, 1976). Physical self-concept, the specific subdomain of self-concepts, was later theorized with the interpretation of how one self-describes his/her physical domains (Fox & Corbin, 1989), which were more strongly related to self-esteem (Fox, 1997). The multidimensional psychological constructs may inherently influence physical activity patterns and physically related experience capability (Marsh, 1996). In the present study, the psychological well-being of physical self-concepts consists of global self-worth, physical self-worth, physical condition, sport competence, physical appearance, and physical strength, which were assessed in people with ID using PSI-VS-ID developed by Maïano et al. (2011).

Body image: Body image is defined as a self-perception of physical appearance or body size, often more impactful in women (Cromley et al., 2012; Tiggemann & Lynch, 2001; Tiggemann, 2004) but more likely to decrease with age than men (Tiggemann, 2004). The internalized affect is usually influenced by mass media and significant others, leading to body dissatisfaction (Dittmar, 2005). Particularly in adolescence, poor body image perception, such as body dissatisfaction, may cause lower self-esteem and unhealthy behaviors (J.-D. Lin et al., 2010; Marsh & Roche, 1996). The proposed study used a nine-figure silhouette instrument, called the Figure Rating Scale ([FRS], Stunkard, Sorensen, & Schulsinger, 1983), to assess body image perceptions and further apply the actual-ideal body image discrepancy model (see the definition below) to gain more insight into its relation to the multidimensional physical self-concept perceptions.

Actual-ideal body Image discrepancy model: The actual-ideal body image discrepancy model is based on a silhouette matching task to examine the discrepancy of one's actual and ideal body image or size (Marsh & Roche, 1996). In this study, the measured ratings in the actual-ideal body image discrepancy model for statistics includes actual, ideal, the raw value of actual minus ideal ratings, and the absolute value of raw discrepancies.

Body Mass Index (BMI): BMI is calculated by height and weight with the formula (kg/m^2), representing an indirect measure of body fatness.

Sports participation: In this study, information of sports participation, reported in the database, was based on a method of a proxy report, including what Special Olympics traditional sports programs participants were currently involved in, how long they have

participated, and what Unified Sports programs they were currently involved in. However, the frequency and intensity of sports participation were not included in the present investigation.

CHAPTER Ⅱ

REVIEW OF THE LITERATURE

This review is divided into three main sections. Overall, because the literature on topics of the physical self-concept and body image in people with ID is rare, related studies in the general population are described to obtain the contextual thinking into the possible psychological well-being in the population with ID.

Therefore, in Section 1, a conceptual model is presented to elaborate the multidimensional hierarchy of physical self-concept, current measures, factors affecting physical self-concept, and domain-specific influences, and lastly, a brief of systematic review using key terms on current literature in people with ID. Section 2 is presented with an introduction of obesity and body image with regard to some factors affecting both areas. In addition, the background of the actual-ideal body image discrepancy model is also proposed as an analysis tool in this study. Section 3 provides a summary of physical self-concept and body image in people with ID.

Understanding of Physical Self-Concept

Contextual Model of Physical Self-Concept

Self-concept is a multidimensional construct comprising of many characteristics and competencies in which one perceives him or herself leading a status of self-evaluation (Marsh, 1994). A classic work first developed by Shavelson et at. (1976) proposed that the conceptualization of self-concept is represented as a pyramid, with an

apex of global self-esteem and other following downward subdomains such as the academic self, the family self, the emotional self, the social self, and the physical self. This paper will focus on the physical self. The early work of the physical self was later redefined by several researchers (e.g., Fox & Corbin, 1989; Marsh, 1994; Page, Ashford, Fox & Biddle, 1993). Fox and Corbin (1989) further developed the multidimensional and hierarchical model of the physical self-concept, meaning that it was considered the domain-specific self-concept. In addition, physical self-concept is more applicable to sport and physical activity fields, especially for sport psychology (Marsh, 1994, 1996). Implied in the definition is an individual's descriptive and evaluative self-perception of his or her physical appearance, physical activity experiences, and physical capabilities (Marsh, 1994, 1996). Physical self-concept as an outcome could lead to psychological well-being and to elevated self-esteem (Fox, 1997; Paradise & Kernis, 2002) and physical fitness (Marsh & Redmayne, 1994). Thus, physical self-concept is important for individuals evaluating their related physical experiences and physical appearance, which facilitates later routine development of being physically active and healthy lifestyle habits (Moreno-Murcia et al., 2011). This infers that physical self-concept may be an important determinant for self-determination motivations through exercising (Fox, 1997).

In this physical self-concept model, the upper level is called global self-worth (GSW), referring to the positive or negative feelings about themselves as a whole, also often called global self-esteem (e.g., Brown, Dutton, & Cook, 2001). Physical self-worth (PSW), follows GSW, and is a generic psychological construct regarding a general

feeling of happiness, satisfaction, and pride in the physical self. Lastly, the lower level as a base is subdivided into four constructs, including physical appearance (PA: an ability of maintaining self's physical features aesthetically pleasing across time), physical strength (PS: a physical exertion of force or muscular capability), sport competence (SC: cumulative athletic ability in sports), and physical condition (PC: bodily fitness functions, stamina). With the practice of the multifaceted model, an individual could develop GSW and PSW based on the interpretations of personal experiences across these subdomains. This multidimensional and hierarchical conceptual model is represented in Figure 1.

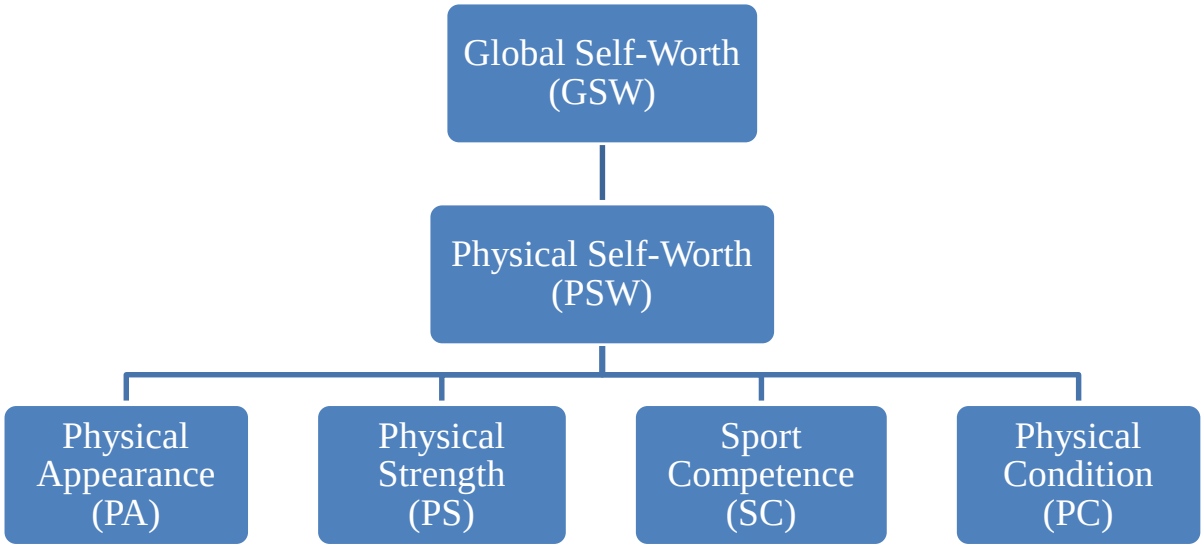

Figure 1: Physical Self-Concept Conceptual Model: global self-worth (GSW), physical self-worth (PSW), physical appearance (PA), physical strength (PS), sport competence (SC), and physical condition (PC; Fox & Corbin, 1989).

Measurement of Physical Self-Concept

In order to measure the impact of physical self-concept on one's psychological attributes, two well-known instruments were developed: Physical Self-Description Questionnaire (PSDQ) by Marsh and Redmayne (1994) and Physical Self-Perception Profile (PSPP) by Fox and Corbin (1989). These two widely used instruments were based on the conceptual model of the self-concept in the physical domain; however, the numbers of the measured subdomains below between PSDQ and PSPP differed. For example, the PSDQ has 11 subscales and the PSPP has six. In addition, the item testing formats were different (the PSDQ adopts Likert-type scales while the PSPP takes structured alternative format). Both instruments were based on a Fox and Corbin (1989) multidimensional and hierarchical conceptual model. The PSPP was based on the previous model by Fox and Corbin (1989), and included 30 items (6 for each subscale). The content and the factor validity of PSPP were verified for American college students and also further cross-validated and conducted in English-speaking adolescents and adults (e.g., Hagger, Biddle, & Wang, 2005; Page et al., 1993) and non-English samples (e.g., Netherlands: Van de Vliet et al., 2002; Portugal: Fonseca & Fox, 2002) from other countries. Following PSPP, a short form (18 items) of physical self-concept inventory (PSI-VS) was validated on French samples (Maïano et al., 2008). Thus, the constructs of PSPP and PSI-VS have been shown to be corresponding to the conceptualization of self-perception in a physical domain as a fairly invariant cross-cultural measurement.

Most importantly, PSI-VS was further successfully expanded and applicable to adolescents and young adults with ID across gender, weight status and ID levels, namely PSI-VS-ID (English version) with 12 items, 2 for each subscale (Maïano et al., 2011). It is a prominent contribution to sports psychology for the appropriateness of the theoretical framework applicable to individuals with ID in their sports or physical activity self-perceptions. Therefore, in this study, we adopted the PSI-VS-ID questionnaire to measure physical self-concept for athletes with ID.

Factors Affecting Physical Self-Concept

This section will discuss factors such as age, gender, weight status, and sport participation, affecting physical self-concept according to the present literature.

Age and gender. In early works global self-concept between genders, females were reported having lower scores, usually occurring before adolescence (Marsh, 1998). The decline may be due to the increased emphasis on social comparison and greater self-awareness. As age increases, the decline tended to be more stable and many-faceted influences during their later adolescence because of the capability of abstraction about the difference of self and others. This made them acknowledge the sense of reality such as failure. (Marsh, 2002). Girls had lower physical self-concept and global self-worth than boys in various settings (e.g., school PE; Caglar, 2009) partially because of physical self-concept pressures and disturbances from the common devalued physical appearance by society (U.S. Department of Education, 2003). The negative physical self-concept, specifically, could be attributable to the fact that girls thought that boys may like thin

girls, and girls may have a preference of muscular boys. These culturally valued attributes indicated girls had difficulty being considered overweight or obese while boys considered weight gain to represent a more muscular physique (Demarest & Allen, 2000; Smolak, 2006).

Weight status. It was reported that the weight status has been seen to be relevant to physical self-concept factors (Fairclough, Boddy, Ridgers, & Stratton, 2012; Morano Colella, Robazza, Bortoli, & Capranica, 2011). For instance, overweight and obese children had lower self-perception than their peers with a healthy weight (O'Dea, 2006). Fairclough et al. (2012) stated, normal weight status was highly pertinent to perceived physical conditions (Boys: Odds ratio [OR] = 5.05, $p = .008$; Girls: OR = 2.50, $p = .08$) and body attractiveness (Boys: OR = 4.44, $p = .007$; Girls: OR = 2.56, $p = .02$), using the Children and Youth version of the Physical Self-Perception Profile (CY-PSPP; Whitehead, 1995). As for body attractiveness, as observed in other studies, overweight or obese children were prone to compare themselves to typical body shape ideals. This was seen as body dissatisfaction and poor body attractiveness perception, particularly in girls (Fairclough et al., 2012).

Another study examining the physical self-concept and motor performance among normal weight, overweight, and obese children, using the Italian version of PSDQ had similar findings with regard to overweight or obese children who felt dissatisfied with their body and had poor coordination, sport competence, and physical activity (Morano et al., 2011). The researchers also concluded that obesity appeared to negatively impact

both motor performance and physical self-concept perception. In addition, physical self-concept, as a mediator, had an influence on the relationship between BMI and body dissatisfaction (Morano et al., 2011). Based on the previous studies discussed here, the present investigator contends with certainty that the degree of psychological well-being could be a result of many factors such as age, gender, body weight, and even a functionality of motor performance in the general population.

Sport participation. The rise of health awareness in people with ID could be improved if given access to higher quality of physical activity participation (Wilski, Nadolska, Dowling, McConkey, & Hassan, 2012). Special Olympics International has provided year-round Olympic-type sports training and competitions, and is regarded as the largest sports organization serving children and adults with ID in the world.

According to a 2014 Reach Report, the Special Olympics International organization claimed to reach over 4.5 million athletes with approximately 95,000 competitions in over 170 countries, promoting social inclusion in Unified Sports and related health screening programs in community-based settings (Pan & Davis, 2015; Special Olympics, 2014). An increasing number of recent publications and empirical studies have assessed a positive contribution that sport participation, such as Special Olympics, can make to health promotion among people with ID (e.g., Barnes, Howie, McDermott, & Mann, 2013; Briere & Siegle, 2008; Cuesta-Vargas, Paz-Lourido, & Rodriguez, 2011; Özer et al., 2012; Pan & Davis, 2015; Wilski et al., 2012).

For example, personal development in Unified Sports is of central interest in the context of health promotion among people with ID (McConkey et al., 2013; Wilski et al., 2012). As observed by Wilski et al. (2012), through the participation of people with and without ID, there were three advantages: physical (sports skills and fitness levels, teamwork); mental (self-confidence, self-esteem, and the ability to communicate with others.); and social (friendship: their relationships with other individuals, mutual trust, greater participation in public events) areas in this field. As many others including Baran et al. (2013) and McConkey et al. (2013) have pointed out, Unified Sports programs facilitated sports skills and positive perceptions of athletes with and without ID. For example, Baran et al. (2013) addressed that Special Olympics athletes improved their physical fitness capabilities (e.g., standing broad jump, sit-ups) and soccer skills (e.g., run and kick, slalom, total Soccer Score, etc). Another study by Marks, Sisirak, Heller, and Wagner (2010) evaluated the benefits of Special Olympics programs (sports training, health and fitness training, nutrition education) that ran in 6 to 12 week cycles across five different states (i.e., Colorado, Illinois, Massachusetts, South Carolina, and Texas) complemented Wilski et al. (2012) findings. Marks et al. (2010) indicated that after the programs, decrease in average body weight from 178.2 to 176.3 lbs ($p < .01$), along with positive psychological benefits (Marks et al., 2010). These benefits such as improved self-confidence, more positive attitudes toward exercise, and decreased barriers to exercising were self-reported. However, the practical decrease in abdominal fat (39.5 in to 39.1 in), aerobic fitness (six-minute walk, 610.7 to 675.8 yards) and muscular strength

and endurance (one-minute timed push-up, 13.5 to 16.1) were found, but did not reach a statistical difference (Marks et al., 2010).

A qualitative research study exploring psychological well-being in Special Olympics programs showed that sports participation improved physical self-concept (Briere & Siegle, 2008), with more positive feelings about the program and themselves in integrated programs (people with and without ID) than their counterparts participating in segregated ones (only people with ID; Duvdevany, 2002). The majority of research in physical self-concept has reinforced a message that people with ID have an optimistic outlook in their physical activity participation (e.g., Briere & Siegle, 2008; Duvdevany, 2002; Salaun et al., 2014). Salaun et al. (2014) further explored the path between self-perception variables (physical self-concept, positive illusory bias, and body dissatisfaction) and morphological variables (BMI, waist circumference, and body fat percent) and their changes among adolescents with ID after a 9-month adapted physical activity (APA) program. The outcomes concluded that the overestimation of their real physical-sport competence may coexist in such a population (Salaun et al., 2014)). This caused the inclination of higher scores in global self-esteem and physical condition of physical self-percept model (Salaun et al., 2014). The findings may explain Varsamis and Agaliotis' (2011) study that the reason why individuals with ID presented more positive profiles in the areas of physical self-concept, goal orientation, and self-regulation of their motor functions, than their counterparts with other disabilities (e.g., multiple disabilities and physical disabilities).

To conclude, physical self-concept perception imposes its multidimensional associations on specific domain areas. For example, factors of age, gender, weight status, and sport participation seemed important to mediate domain-specific physical self-concept. The next section of this chapter will explore the current literature of physical self-concept and how it may be affected by these factors and show the associations between them in people with ID.

Physical Self-Concept in People with Intellectual Disabilities

Although several studies have been made on physical self-concept perceptions and related healthy behaviors in the general population, there seems to be no sufficient conclusion to explain this field to people who have ID. The lack of evidence in physical self-concept in people with ID may be due, to a large extent, to the stereotype of labeling incapability of speaking for themselves (Kittelsaa, 2014), and to fewer reliable assessment tools to obtain their actual physical self-perceptions (Maïano et al., 2011).

An intellectual disability refers to the overall functional performance associated with the discrepancy between chronologic and mental age for individuals with ID. The American Association on Intellectual and Developmental Disabilities (AAIDD) defines ID as a limitation in intellectual functioning (e.g., learning and problem-solving,) and in adaptive behaviors (e.g., personal care, self-esteem, interpersonal skills; AAIDD, 2009; Fegan, 2009). The degree of the disparity between the chronologic and mental age may determine the intelligence or to how well they comprehend and express their physical self-concept and its downward subdomains (Nader-Grosbois, 2014). Nader-Grosbois

(2014) addressed that older adolescents with ID displayed a poorer perception of their physical appearance, when compared to their younger peers with ID. These above findings imply that even the greater discrepancy between the chronologic and mental age may cause a limitation of higher cognitive performance in adolescents with ID. Thus, achieving self-perceived competence is possible if using specific educational guidance (Nader-Grosbois, 2014). At a younger age (7-13 years) children with mild ID, the development of self-concept perception may be similar to their peers without disabilities (Donohue, Wise, Romski, Henrich, & Sevcik, 2010). For people with and without ID, the greater comprehensions the more likely it may be to perceive their subjective attractiveness. Given the exploratory nature of the present study, this suggests a possibility of people with ID comprehending physical self-concept. A study by Jones (2012) showed that the awareness of self-identity (see disability as a positive societal view) and social acceptance in people with ID required a comprehension of self-description to some extent. This further contributed to later perceptions of global self-concept, which may lead to a long-term effect on their positive self-esteem in their future adulthoods (Jones, 2012). Taken together, the feasibility of obtaining the understanding of physical self-concept in people with ID is possible depending on how well a practical guidance (e.g., a reliable and valid assessment tool and education guidance) facilitates the quality of the self-interpretation. The six pictorial rating scale of PSI-VS-ID, developed by Maïano, Bégarie, et al. (2009) and Maïano, Morin, et al. (2011), is the only published assessment tool through a robust cross-validation process to measure physical self-

concept for adolescents and young adults with ID. In the present study, the investigator adopted this tool to obtain the physical self-concept in the target population. In the current literature, two studies were published using PSI-VS-ID to understand the psychological attributes regarding physical self-concept for people with ID. First, a study by Bégarie et al. (2011) was conducted to investigate the effects of age, gender, weight, and their interactions on global self-worth (apex) and physical self-concept, used in PSI-VS-ID (Maïano et al., 2011) among 353 adolescents with ID aged 12 to 18 years. The results revealed that a gender difference existed in global self-esteem and the four subdomains of physical self-concept perceptions (except the overall physical self-worth scores). Put differently, except for the overall physical self-worth scores, girls had lower composite scores (i.e., the lower global self-worth, physical condition, physical appearance, sports skills, and sport competence) than those in boys. Regarding the effect of different weight statuses in this study, obese adolescents with ID perceived lower global self-worth, physical self-worth, and physical appearance, compared to those with ID being overweight or normal weight. Of these findings, obese girls with ID perceived lower physical appearance, compared to other peers with ID (Bégarie et al., 2011).

Second, Salaun et al. (2014) attempted to explore the respective changes of psychological physical self-concepts, positive illusory bias (overestimation of the physical–sport competence), body image, obesity awareness, and anthropometric variables (BMI, body fat percent, waist circumference, and waist to hip ratio [WHtR]) among 23 participants with ID aged 6 to 18 years before and after a 9-month exercise

program. The exercise program primarily concentrated on a progressive aerobic exercise format (total 60 minutes up to 105 minutes), twice per week. It must be further noted that this study is also the only current article investigating the changes of both physical self-concept and body image in adolescents with ID using the PSI-VS-ID before and after the exercise program (Salaun et al., 2014).

In order to correspond to the research interest of the present study, I will focus on the findings related to physical self-concept perceptions. The body image related discussions will be addressed in the later main section (Section 2). According to Salaun et al. (2014), the significant conclusion of this study was that the physical self-concept perceptions, in general, were not elevated or improved through the program. The effects of participating in a 9-month exercise program on the global self-esteem and its subdomains of physical self-concept perceptions were unclear. However, a cross-sectional investigation conducted before the exercise program, noted that there were several important results which may have implications for the present study, as follows. First, positive illusory bias was the only variable and determinant explaining the global self-esteem score (β= -.5), but this variable was not the focus of the present research and was not validated in Maïano's et al. (2011) study (the variable of positive illusion was created using two items from different psychological constructs). Second, both BMI (β = -.45) and positive illusory bias (β = -.34) predicted the physical appearance score, meaning that poorer BMI and positive illusory bias yielded greater physical appearance perception. Third, similarly, the physical condition score was predicted by low waist

circumference (β = -.47), positive illusory bias (β = -.62), underestimation of personal body weight status (β = .46), and a male variable (β = -.30). Fourth, regarding the relationship between the physical self-concept perceptions and anthropometric variables, only physical appearance and physical condition scores were found significantly different with weight (r = -.36 and -.41), BMI (r = -.55, and -.54), waist circumference (r = -.43, and -.55), and WHtR (r = -.42, and -.48). In brief, from Salaun et al. (2014), the physical appearance and physical condition were seen to be relevant to anthropometrics variable, instead of the link to the higher level of physical self-concept perceptions such as global self-worth and physical self-worth.

Before the creation of PSI-VS-ID, which was specifically developed for physical self-concept measurement for people with ID, Duvdevany (2002) utilized the Tennessee Self-Concept Scale, Second Edition, to explore the self-concept perceptions (including physical self-concept) and adaptive behaviors among 33 individuals with mild to moderate ID, aged 14 to 60 years, between their participation in integrated (environments such as community centers, involving people with and without disabilities) and segregated (i.e., sheltered employment and special education schools) recreation activities. This instrument, including 82 questions for 5 subscales (physical self-concept, moral self-concept, personal self-concept, family self-concept, and social self-concept), was designed for the general population. The results of this study, applied to people with ID, showed that those who participated in the integrated programs scored lower ($p < .01$) in their physical self-concept subscale than those who participated in segregated ones.

The greater satisfaction of overall self-concept ($p < .05$) was found in those who attended the integrated programs (Duvdevany, 2002). The results reported here supported the findings of other research studies; the exposure of being in inclusive settings may make people with ID perceive their limitations due to a collective sense of negative self-identity (as being disabled), and that negatively affected their self-perceptions as a result (Huck, Kemp, & Carter, 2010; Kittelsaa, 2014).

Ninot's et al. (2005) findings were similar to Duvdevany's (2002), meaning that the inclusive participation in sports may lower physical self-perceptions. Ninot and his colleagues further compared the differences in perceived sport competence and general self-worth between four female groups ($n = 32$) with mild to moderate ID (traditional Special Olympics swimming program, swimming in integrated Scholastic Sports, swimming in adapted physical education classes, the sedentary group). After 32 months of training and competitions (e.g., Special Olympics swimming games and scholastic swimming meets), those who participated in integrated scholastic sports reported to have lower perceived sport competence than the sedentary group ($p < .05$). An improved actual swimming sport competence was seen in the three groups (except for the sedentary group) after 32 months. However, no significant difference in general self-worth between the four groups was discovered. The common reason why lower self-perceptions (perceived sport competence and overall physical self-concept) in people with ID occurred in integrated sports may be due to the realizations of actual sport competence in relation to social comparison (Duvdevany, 2002; Ninot et al., 2005).

To conclude, given the exploratory nature of these related studies, the important implications regarding physical self-concept in people with ID are summarized as follows:

1. The factors of gender and age may have influences on physical self-concept perceptions, as identical to those for the general population (Bégarie et al., 2011).
2. Weight status may contribute to global self-esteem and physical self-concept perceptions, especially in physical appearance and physical condition (Bégarie et al., 2011).
3. Participation in inclusive settings may cause lower physical self-concept than participation in segregated physical activities (Ninot et al., 2005; Duvdevany, 2002); however, in either setting, both participants still described themselves in a positive way (Duvdevany, 2002). The lower self-concept in integrated sports may be attributable to the realistic perception of sport competence when participants with ID compared themselves to their counterparts without disabilities (Ninot et al., 2005; Duvdevany, 2002).
4. The perceptions of physical appearance and physical condition were negatively related to body composition indicators such as weight, WHtR, waist circumference, and BMI; however, these two subdomains were only predicted by the latter two variables (Salaun et al., 2014).
5. The improvement of morphological variables was attributable to the APA program, which caused changes in physical self-concept perceptions (Salaun et

al., 2014). However, the global self-esteem index was predicted by lower waist circumference before the APA program, but not after.

6. Physical self-concept perceptions are complex and their subdomains may reflect on different impacts of outcome variables and lead to different results (Salaun et al., 2014).

Obesity and Body Weight in People with Intellectual Disabilities

Prevalence of Obesity

Obesity is an epidemic and growing public health issue in both the general and ID populations. The prevalence of individuals with ID was estimated to be at approximately 3% (7.5 million) of U.S. citizens and the prevalence of obesity in adolescents with ID is approximately 36% higher than the general population in boys and girls (Stewart et al., 2009). According to the CDC, obesity is caused in part by a sedentary lifestyle (CDC, 2015). Additionally, there is a positive correlation between obesity/overweight and Body Mass Index (BMI; CDC, 2009; Frey & Chow, 2006).

In an investigation by the CDC, the prevalence of obesity between 1976-1980, 2007-2008 and 2011-2012 in adolescents aged 12-19 rapidly increased from 5.0%, 18.1% to 34.5%, respectively (CDC, 2014; Ogden, Carroll, Kit, & Flegal, 2014). Approximately 18% of 6 to 11 year olds, 21% of 12 to 19 year olds, and 35% of adults aged 20 years or older had obesity problems between 2011 and 2012 (Ogden et al., 2014). When compared to the obesity prevalence of Special Olympics athletes between 2009-2010, roughly 21% (world regions) of 8 to 11 year olds, 28% (world regions) of 12 to 19 year olds, and 52%

(U.S samples only) of adults aged 20 to 39 years were obese (Foley, Lloyd, & Temple 2013; Foley, Lloyd, Vogl, & Temple, 2014). From this revealing data, obesity in people with ID starts at younger ages and is exacerbated into their adulthood.

Assessing and Classifying Body Weight Status

There are several laboratory and field methods of anthropometry measures for body composition. The laboratory methods, including dual-energy X-ray absorptiometry (DXA) and BOD POD, refer to a highly accurate body composition measure to yield body fat and lean body mass (ACSM, 2010). The field methods, including BMI, bioelectrical impedance analysis (BIA), skinfold thickness, and waist circumference are more practical and relatively low-cost, and are used more commonly in community-based settings (ACSM, 2010). With the appropriateness of validation (e.g., coefficient of determination) and reliability (e.g., intraclass coefficient of correlation), to measure body composition in people with ID, BMI (kg/m^2) and waist circumference measure have been regarded as a practical and feasible approach to measure adiposity (Casey, 2013; Temple, Walkley, & Greenway, 2010; Verstraelen et al., 2009). BMI provides a more accurate method to determine body composition versus body weight alone (Grondhuis & Aman, 2014), indicating that the correlation between BMI and body fat has a fairly positive relationship. However, BMI could also be affected by age, gender, and ethnicity (Deurenberg-Yap, Schmidt, van Staveren, & Deurenberg, 2000; Meeuwsen, Horgan, & Elia, 2010) and may be overestimated on professional athletes or muscular persons (Hark & Morrison, 2009).

In general, the classification of BMI categories is endorsed for four weight statuses, including underweight, normal weight, overweight, and obese (World Health Organization [WHO], 1995). Cut-off points of absolute BMI can be used for classification of weight status for adults, aged above 18 years old, with a ratio of BMI less than 18.5 being underweight, 18.5 to 25 being normal weight, 25.5 to 30.0 being overweight, and the ratio of BMI over 30 being obese (National Heart, Lung, and Blood Institute, 2000; WHO, 1995). On the other side, the distribution of BMI with age- and gender-specific references is recommended for those under the age of 18 years old, with a BMI less than the 5th percentile being underweight, a BMI between the 5^{th} and 85^{th} percentile being normal weight, a BMI between the 85^{th} and 95^{th} percentile being overweight, and a BMI over the 95^{th} percentile being obese (Barlow, 2007; Lobstein, Baur L. & Uauy, 2004). The measurement of BMI is well-established and is used in people with disabilities, including ID (e.g., Melville et al., 2008; Mikulovic et al., 2014; Rimmer et al., 2010) and is considered an inexpensive and reliable approach to measuring the distribution of adiposity (Casey, 2013; Temple et al., 2010) while BMI cut-off points are more consistent for adults (Grondhuis & Aman, 2014).

Factors Affecting Obesity

The reasons for the high prevalence of obesity for people with ID have been described in the literature to capture its multidimensionality. Factors associated with obesity are complex and interrelated. In the current investigation, the contributing factors

to obesity focused on age/gender, comorbidities of ID/levels, and psychological factors as discussed below.

Age and gender. In an international sample examining body weight status of Special Olympics athletes (youth and children) across world regions, age and gender were predictors for body weight status in North America and Africa/Middle East-North Africa (Lloyd, Temple, & Foley, 2012). With age increases, the occurrence of obesity arises in studies with individuals with ID (e.g., Hsieh et al., 2014; Lin, Yen, Li, & Wu, 2005; Lloyd et al., 2012; Temple, Foley, & Lloyd, 2014). Age, in general, is an important factor predicting obesity for people with ID, including youth, adolescents (Lloyd et al., 2012), and adults (Lin et al., 2005; Temple et al., 2014). In comparison with studies with a larger sample size in different ages, age as a predictor seemed not be fully conclusive (Foley et al., 2014). For example, groups at a younger age of 8-11 years with ID, age played a predictor role for obesity both in boys and girls but not those in the 12 to 19 years age group. However, boys aged 8 to 11 years were more likely to be obese than girls with matched age (Foley et al., 2014). The findings were consistent with Bégarie, Maïano, Leconte, and Ninot (2013), contrary to other studies stating that obesity in girls and women with ID were higher (Lloyd et al., 2012; Temple et al., 2014). Study samples with mixed ages revealed that females may be exposed to a greater obesity threat than males (Bhaumik, Watson, Thorp, Tyrer, & McGrother, 2008; Hsieh et al., 2014; Melville et al., 2008). Thus, the involvement of age in obesity should be emphasized because the occurrence of obesity increases with age (Temple et al., 2014). As for gender, studies

need to be conducted regarding the interaction of gender and other factors (e.g., age). Thus, the present study will attempt to report gender differences in physical self-concept and body image.

Comorbidities and severity of ID. According to Hsieh et al. (2014), adults with Down syndrome (DS) were more likely to be obese than other comorbidities such as autism and cerebral palsy. Additional evidence in support of higher obesity in DS was provided by Rimmer and Yamaki (2006), suggesting that people with DS appeared to be more overweight (87.9%, BMI ≧ 25), obese (70.9%, BMI ≧ 30), and extremely obese (19.9%, BMI ≧ 40) than those with ID and without DS (84.8%, 60.6%, and 12.1%, respectively). In an investigation of obesity and its related secondary conditions in adolescents with ID aged 12 to 18 years, samples with DS were obese three times (3.00 in odds ratio) more than their peers without disabilities, followed by other comorbidities such as autism (2.19), spinal bifida (1.61), ID only (0.96), and cerebral palsy (0.30; Rimmer et al., 2010).

Regarding the severity of ID, adults with severe or profound ID levels seemed to have lower obesity rates (26.1%) than those with mild (43.9%), moderate (40.7%), and borderline (34.4%) ID levels (Hsieh et al., 2014). Other studies investigating obesity in school-aged students with ID yielded similar results, indicating that people with severe or profound ID may be less obese or overweight (e.g., Melville et al., 2008; Pan, Davis, Nichols, Hwang, & Hsieh, 2016). For example, obesity rates in people with severe (15.1% in males and 20% in females) or profound (7.5% in males and 8.5% in females)

ID levels were estimated to be significantly lower than those in mild (42.5% in males and 47.9% in females) or moderate (34.9% in males and 23.6% in females) ID levels (Melville et al., 2008).

Consequences of Obesity

Individuals with ID of all ages have been reported to be more obese (Melville et al., 2008; Rimmer et al., 2010; Slevin et al., 2014; Stedman & Leland, 2010), live with adverse health consequences (e.g., low self-esteem, hypertension, depression, hyperlipemia; Lin, Lin, & Lin, 2010; Rimmer et al., 2010), and have poorer living habits (e.g., physical inactivity, dietary intake, medication use; Bhaumik et al., 2008; Maïano, 2011) than their non-disabled counterparts. Researchers studying obesity-related consequences in people with ID have often suggested that childhood obesity is related to a variety of chronic diseases such as diabetes, hypertension, cardiovascular diseases, and many others (Grondhuis & Aman, 2014; Rimmer, Rowland, & Yamaki, 2007; Rimmer et al., 2010). The obesity-related secondary conditions in adolescents with ID will persist throughout their adult lives (Rimmer et al., 2010).

The comprehension capability of people with ID may not be a critical factor leading to obesity (Emerson, 2005). Conversely, it may compensate for being less obese due to complex secondary health conditions in people with ID (Hsieh et al., 2014; Pan et al., 2016). However, the characteristics of ID consist of lower cognitive capability in various degrees and significant limitations on adaptive functional skills such as gross/fine motor and interpersonal skills later in life (Fegan, 2009). Those characteristics not only

give rise to an inactive lifestyle and health related problems (Rimmer, 1999; Sherrill, Rimmer, & Pitetti, 2003), but also a limitation of participation in community activities (Reinehr, Dobe, Winkel, Schaefer, & Hoffmann, 2010).

Regarding the secondary health conditions in obese children and adolescents with ID, Lin and colleagues (2005) reported that the top five health concerns were neurological disorders (including epilepsy; 11%), other (11%), cardiovascular problems (7%), skin diseases (6%), gastrointestinal illness (5%), and respiratory illness (5%). Furthermore, 26% of the study sample had a regular medication history. With the increase of age, the weight status of obesity/overweight conditions has been apparent in the population with ID. de Kuijper et al. (2013) stressed that 46% of individuals with ID who took antipsychotics on a regular basis were overweight or obese. It draws attention to the fact that early intervention and strategies for the problem of obesity in children and adolescents with ID are needed to ensure their quality of life. The psychological attributes could be expanded upon and are regarded as a unique path to understanding and mitigating an obesity threat in public health.

Understanding of Body Image Perception

Background of Body Image

Body image has been thought of as a multidimensional and complex psychological aspect of self-worth and mental health, in which people explain the interpretation of their bodies (Hart, 2000; Muth & Cash, 1997; Plesa-Skwerer, Sullivan, Joffre, Tager-Flusberg, 2004; Pruzinsky & Cash, 2002). The construct of body image

perception includes perceptual, cognitive, affective, and behavioral aspects of body experiences (Cash & Pruzinsky, 2002), particularly in regard to size, shape, and aesthetic quality, or beauty (Cash, Ancis, & Strachan, 1997). The conceptualization of body image has become increasingly important over the past few decades, identified by increased research in self-esteem (Huang, Norman, Zabinski, Calfas, & Patrick, 2007; Swami, Taylor, & Carvalh, 2011), depressed mood (Cromley et al., 2012; Huang et al., 2007), social anxiety (Cromley et al., 2012; Esnaola et al., 2010), eating disorder symptoms (Cromley et al., 2012; Huang et al., 2007; Tiggemann, 2004), and physical self-concept (Ayaso-Maneiro et al., 2014; Jones, 2012; Marsh et al., 2007; Salaun et al., 2014). However, most of the previous investigations have been conducted using females. The explanation may be that the self-evaluation of body related perception was significantly impacted by one's expectations, mediated by culturally and socially valued attributes for women (Bair, Steele, & Mills, 2014; Esnaola et al., 2010; Swami et al., 2011). Girls and women in North America were reported to face anxiety about their appearance (Cash & Pruzinsky, 2002), leading to poor psychological well-being (Smolak, 2006), especially when building a relationship with others (Cash, Maikkula & Yamamiya, 2004). Body dissatisfaction perception (anxiety about their appearance) appeared to be stable over time for emerging adults (18 – 25 years), especially for women (Cromley et al., 2012; Tiggemann & Lynch, 2001; Tiggemann, 2004) and then may decrease with age (Tiggemann, 2004). Recently, research has begun to focus on body image perceptions in

both genders (more descriptions will be discussed later in Factors Affecting Body Image).

Accordingly, negative body image and body dissatisfaction are directly reflective of body perception, based on body shape, body size, physical activity experiences, general wellness and social pressure (Bair et al., 2014; Duncan, Woodfield, O'Neill, & Al-Nakeeb, 2002; Krane, Stiles-Shipley, Waldron, & Michalenok, 2001). Often, these two terms (negative body image and body dissatisfaction) are similar concepts, but the operational definitions can be differentiated depending on different assessment tools and research contexts (e.g., Pila, Sabiston, Brunet, Castonguay, & O'Loughlin, 2015). Such body image research has been widely studied in educational environments, or other physical activity settings, to better investigate an individual's body self-evaluation in relation to the physical activity behaviors and participation (Slater & Tiggemann, 2011).

Measurement of Body Image

The use of silhouette rating scales has been widely used for assessing body image perception and body dissatisfaction in the sport psychology field due to its low cost, face validity, quick administration, and verbal fluency (Hart, 2000; Smolak, 2006; Truby & Paxton, 2002). The Figure Rating Scale (FRS), developed by Stunkard et al. (1983), has been one of the most utilized assessment tools (Truby & Paxton, 2002), and FRS can be used to compare other variables such as internal (self-determination) and external factors (healthy behavior patterns and physical activity levels). The use of different ranges in a series of frontal images of men and women primarily represented a projection of

conceptualization of body size mediated by perceived sociocultural exposure (Dittmar, 2005; Esnaola et al., 2010). The "normative body ideal" (what other people think is attractive) was closely related to mass media and may be reinforced by peers and family (Clark & Tiggemann, 2006; Grabe, Ward, & Hyde, 2008). Additionally, these factors were also considered the major cause of body dissatisfaction (Dittmar, 2005).

The use of body image perception involved in psychological aspects reflected how individuals perceive their body and their preferred body shape. The discrepancy between perceived actual and ideal body shape (i.e., body dissatisfaction) resulted in poor health behaviors (e.g., physical inactivity and excessive sugar intake) and self-esteem (Esnaola et al., 2010; Fanchang et al., 2013; Gortmaker et al., 1993; Huang et al., 2007; March & Roche, 1996; Swami et al., 2011). The discrepancy between body ideal and how an individual perceives his or her actual body shape is a representation by which people internalize and conceptualize their physical appearance (Marsh & Sonstroem, 1995). Thus, computation of the ratings between the actual-ideal discrepancies can measure body dissatisfaction (Heron & Smyth, 2013; Reel et al., 2013). One of the major problems with regard to figural rating (i.e., line-drawn images or silhouettes) was the lack of ecological validity, meaning that the measure may not reflect participants' sociocultural demographics such as ethnicity, religion, socioeconomics, and even the degree of exposure to mass media (Esnaola et al., 2010; Gardner & Brown, 2010). That is, line-drawn images or silhouettes, as an input, may not induce more realistic representations, as an output, as one's interpretation of body image. However, the

silhouette rating scales, such as FRS, were well established and have been utilized in diverse populations such as adolescents (e.g., Lai et al., 2013), adults (e.g., Pila et al., 2015), and people with disabilities, including ID (e.g., Reel et al., 2013). The test-retest reliability in a conventional way of presenting frontal images from very thin to very fat (left to right) for measures of actual (.89 to .92) and ideal (.71 to .82) body shapes (two correlations significant at $p < .001$) in 92 men and 89 women was reasonable and acceptable (Thompson & Altabe, 1991). A study examining a random presentation of figures in the traditional protocol from Stunkard et al. (1983) silhouettes discovered that body dissatisfaction scores were not impacted and remained a proper measure of psychometric properties for perceived actual and ideal body shapes and for body image assessment (Duncan, Dodd, & Al-Nakeeb, 2005).

Actual-Ideal Body Image Discrepancy Model

The actual-ideal body image discrepancy model is part of the Self-Discrepancy theory (SDT; Higgins, 1987), which refers to the understanding of one's conflicting belief about one's discomfort in relation to one's self in body image perception. In general, the SDT includes basic components, that is, actual self, ideal self, and ought self (Higgins, 1987). The actual self reflects one's personal psychological attributes; the ideal self refers to one's representation of the attributes that he or she wishes to possess; the ought self, based on different societal values, are the attributes that oneself or others believe one ought to have. The latter two are considered as self-guide concepts, meaning that one does not own such attributes, but they would like to strive for or possess these

attributes. Thus, the discrepancy between these self-ratings may provide an idea in which a crisis of self-identity is likely to lead to a negative emotion, such as dissatisfaction (Higgins, 1987) and even low self-esteem (Marsh & Roche, 1996).

With regard to body satisfaction/ dissatisfaction, it is a subjective self-perception associated with the degree of differences between how an individual thinks they look and how they would like to be seen by others (Reel et al., 2013). It is widely assessed by the discrepancy between the two values of perceived actual body image minus the ideal body image (Gardner & Brown, 2010; Reel et al., 2013), earlier referenced as the actual-ideal body image discrepancy model. In Reel et al. (2013), 51% female and 37% male Special Olympians preferred a thinner body shape; however, 20% of female and 29.6% of male Special Olympics athletes desired to have more muscle. In addition, higher body satisfaction seemed to a correlate with lower BMI; interestingly, unlike other studies in the general population, no significant gender difference was found (Reel et al., 2013). On the whole, there was evidence that individuals with ID had lower self-esteem (MacMahon & Jahoda, 2008) and those who were athletes may have a greater desire to be thin (Reel et al., 2013). More studies are needed to examine whether there is a gender difference with regard to sport participation, as was found in the general population.

Following this perspective of SDT, the actual-ideal body image discrepancy model is based on the combination of actual self-rating and ideal self-rating to represent or predict a body dissatisfaction affect. Within the SDT, there are four ratings which can

be manipulated, including actual (A), ideal (I), and the raw values of actual minus ideal ratings [A-I], and the absolute values of these ratings [A-I] (Marsh & Roche, 1996).

Marsh and Roche (1996) suggested that a silhouette matching task supported the actual-ideal body image discrepancy model; that is, the use of actual self-rating alone was less explanatory and less efficient to predict self-concept perceptions (e.g., self-esteem) than the discrepancy model itself. In other words, if the actual-ideal body image discrepancy is positive (actual self-rating > ideal self-rating), the larger the discrepancy between these two values, the more negative self-perceptions could be. Scalas and Marsh (2008) further addressed that physical self-concept mainly played a mediating role in effects of the actual- ideal body image discrepancy in self-esteem.

There is extensive literature on silhouette matching tasks of body image in relation to gender differences, eating disorders, physical activity patterns, physical self-concept, and various outcomes (e.g., Marsh & Roche, 1996; Marsh et al., 2007; Sorbara & Geliebter, 2002; Stanley & Burrow, 2015). For example, actual self-rating was seen to be relevant to objective anthropometrics measures (r = .62, BMIs, girths, skinfolds) and body fat self-concept (r = .66, one of the subdomains in PSDQ); however, body fat self-concept appeared to be more closely associated to the actual-ideal discrepancies (r = .76; Marsh & Roche, 1996). Herein, it can be concluded that the positive discrepancies (actual self-rating > ideal self-rating) implied the physique anxiety may be due to a person's perspective of thinness. Similar to the positive discrepancies, the negative discrepancies (actual self-rating < ideal self-rating) could be regarded as a detraction

from a desirable self-concept, but in the opposite direction. The raw discrepancies (actual minus ideal) with either positive, negative or its absolute values could contribute to the formation of self-concept in some way (Marsh, 1999). Marsh et al. (2007) further pointed out that both of the absolute discrepancies (the absolute value of actual minus ideal discrepancies) and the raw discrepancies predicted physical self-concept perceptions, particularly in global self-esteem in the general population. However, this study focused on adolescents without disabilities, but provided an assumption, in the present investigation, that it is possible to occur in those with ID. To conclude, the use of the actual-ideal body image discrepancy model may help researchers to investigate in-depth understanding of the standpoint and the effect of body image perceptions in predicting physical self-concept, which is also the main focus of the present investigation.

Factors Affecting Body Image

Body image might be thought of as "an evaluation of self-image of body size or shape". In other words, it could be a visual representation of how one's body looks from the outside (Perrotta, 2011). There is evidence that our perceptions of body image may be influenced by many areas such as demographics (e.g., age, gender, ethnicity), obesity, and weight status.

Age and gender. Age and gender were the most studied variables in body image research (Esnaola et al., 2010; Gatti et al., 2014). Body dissatisfaction in women was generally reported more than men at all ages (Tiggeman, 2004). The importance of physical appearance in women declined with age, especially in midlife adults (31-49

years or older), when compared to adolescents (12-18 years) and young adults (19-30 years; Tiggeman, 2004). This implied that the meaning of body dissatisfaction between ages seemed to differ. For example, during early adolescence, children experience physical development (e.g., body size and physical appearance) during puberty (Thornburg & Aras, 1986). Puberty is an important stage to develop self-image and has been considered impactful on self-esteem due to self-satisfaction (Slater & Tiggemann, 2011). The emerging secondary gender characteristics and growing body shapes between boys and girls differ (Franzoi & Shields, 1984). As discovered by Golan et al. (2014), body image perception in adolescence was more impacted by popularity, appearance, interpersonal communication, and significant others. The desire to be thin in physical appearance was found more in girls than in boys (Banitt et al., 2008; Golan et al., 2014), implying that weight status may mediate body image.

Weight status and obesity. Banitt et al. (2008) suggested that the body image discrepancy (actual vs ideal) was positively correlated to weight status both in genders, and the body image discrepancy may increase with an increasing prevalence of obesity. Several studies revealed that psychological complications of body image discrepancy were due, to a large extent, to a larger body size (obesity), resulting in negative self-esteem (Esnaola et al., 2010; Fanchang et al., 2013; Gortmaker et al., 1993).

Factors affecting body image all determine the degree of self-esteem. Thus, self-esteem is an outcome and could be an emotional need as affected by body dissatisfaction and other aspects (e.g., restrained eating; Fanchang et al., 2013). Stated another way,

positive self-esteem may be reached through greater body satisfaction, meaning “I like my body; therefore, I like myself” (Gatti et al., 2014), representing a linkage between a salient component of body size and self-esteem in body image perceptions.

Perceived body satisfaction/dissatisfaction as well as obesity contribute to global self-esteem itself, indicating that the increased weight status provided a link to lower self-esteem, as mediated by perceived body dissatisfaction (Pila et al., 2015). The fact that obesity has been linked to psychological consequences (e.g., depression and low self-esteem) is well documented, in addition to physical diseases such as coronary heart disease, stroke, and hypertension among people with ID (Fleming et al., 2008; P. -Y. Lin et al., 2010; Rimmer et al., 2010).

The formation of the aesthetic faculties of people with ID may be impacted by their perceived body dissatisfaction. The findings of Reel et al. (2013) suggested that over half of female athletes with ID desired to be thinner (37% in men), with higher BMI associated with lower body dissatisfaction. According to Robinson and Butler (2011), body image perception (42%), followed by biological factors such as hypertension (12%), general health condition (11%), and other demographics (e.g., age, gender, race, education), was the most significant contributor to obesity, especially in obese women. The influence of poor body image may worsen weight management control, consequently contributing to obesity. As a result, overweight or obese people may have lower ratings of self-esteem when compared to their normal weight peers (Grondhuis & Aman, 2014).

Body Image in People with Intellectual Disabilities

Due to the limitation of cognitive development, the assessment of body image as well as physical self-concept of individuals with ID is still a controversial issue because the self-presentation of this population may not be valid to be accurately evaluated (Ayaso-Maneiro et al., 2014). However, researchers found that the general population tended to overestimate or underestimate their actual body weight (Bhuiyan, Gustat, Srinivasan, & Berenson, 2003; Lynch et al., 2009; Standley, Sullivan, & Wardle, 2009) due to the impact of positive illusory bias (Salaun et al., 2014; Owens, Goldfine, Evangelista, Hoza, & Kaiser, 2007). This psychological response of self-protection (i.e., positive illusory bias) exists in not only attention-deficit/ hyperactivity disorders (ADHD), learning disabilities, and the general population, but also in people with ID. One possible explanation for this profile is that it likely served primarily to protect their self-esteem (Salaun et al., 2014).

There have been studies in the literature dealing with body image concerns in the general population (e.g., Heron & Smyth, 2013; Lai et al., 2013; Marsh & Roche, 1995; Tiggemann, 2004). Body image is a self-perception of physical appearance or body size. Positive body image may lead to body satisfaction (Reel et al., 2013), similar to the general population (Gatti et al., 2014). Besides, several studies involved people with physical disabilities or amputations (e.g., Gürsel & Koruç, 2011; Holzer et al. 2014; Junker & Carlberg, 2011; Schmidt, Blum, Valkanover, & Conzelmann, 2015; van Amsterdam, Knoppers, & Jongmans, 2015). Essentially, the possible explanatory

perspectives in body image research, such as the discrepancy between actual and ideal body shape (i.e., body dissatisfaction), specifically for people with ID, as transition of a psychological process, is still largely unknown and uninvestigated (Bucciere, Reel, & SooHoo, 2011).

As discussed in a previous section regarding physical self-concept, the study by Salaun et al. (2014) was the only attempt at investigating the effects of an APA program on both body image and physical self-concept for people (the study population focused on adolescents, aged 6 – 18 years) with ID. When further explaining the correlations between body image, physical self-concept, and morphological variables, Salaun et al. (2014) pointed out that body image dissatisfaction had very little to do with the morphological variables (anthropometric measurements, body composition assessment), but more to do with physical self-concept perceptions (physical appearance and physical conditions) for adolescents with ID. However, body image dissatisfaction was explained by weight and appeared to be explained by waist circumference (before and after the program) when controlling for positive illusion (an overestimation of sport-physical competence; Salaun et al., 2014). In Salaun's study, as the body image formation could be primarily affected by either physical appearance (subjective: Everybody finds me good-looking.) or physical conditions (objective: I can run 10 times around the basketball court without stopping), physical self-concept may also be affected by anthropometric criteria (objective) and self-competence criteria (subjective) or by how others see their competence (Huck et al., 2010).

An attempt by Reel et al. (2013) to investigate body image among 103 Special Olympics athletes, aged 18 to 61 years old, concluded that athletes' body satisfaction seemed to correlate with lower BMI ($r = -.46$). However, Reel et al. (2013) did not confirm the gender difference in body image perception using the FRS ratings (actual body, ideal body, body satisfaction, figure most attractive for dating others). The average BMI for men (28.24 ± 7.38) and women (33.02 ± 9.28) met CDC classifications for obesity ($BMI > 30$) and overweight ($25 \leqq BMI \leqq 29.9$) status (CDC, 2009). Other results from the open-ended questions revealed that 51% of female athletes and 37% of male athletes reported to have the desire to be thin while only 20% of female athletes and 29.6% of male athletes wanted to be larger (Reel et al., 2013). Secondly, Bucciere et al. (2011) provided similar findings as Reel et al. (2013); the majority of participants (approximately 80%) with ID desired to change their current body figures, and half of those preferred a thinner body size, especially in females with ID. Both findings of the two studies highlighted the need to raise awareness of healthy body weights for people with ID whose normative physical appearance was similar to the general population (Yoshioka & Takeda, 2012), influenced by current sociocultural settings (e.g., peer, family, and mass media). A more rigorous test in these areas (e.g., health weight status and sports involvement) for people with ID could be performed. For example, an appropriate correlational report or regression model testing is needed to search for better implications.

Moreover, Ayaso-Maneiro et al. (2014) noted that after the impact of a 30-week adapted physical activity program, body image dissatisfaction of participants with mild to moderate ID, aged 24 to 60 years, significantly decreased between the beginning and the end of the program. This was explained by the individual differences before and after the program. That is, the heavier the participants were before the intervention, the smaller the decrease in body dissatisfaction the participants reported after the program, and vice versa.

Lastly, Yoshioka and Takeda (2012) compared body image and body shape between high-school aged students with and without ID, demonstrating that most of the obese participants with ID selected body image 4 among the seven possible choices (1 being thinnest, 7 being fattest; Yoshioka & Takeda, 2012). Whereas those without ID and who were not obese selected body image 3, no significant difference between groups was found (Yoshioka & Takeda, 2012). This inferred that adolescents with ID, who were obese, preferred a larger body shape, compared to their current body shape. In addition, the number of obese participants (29.7%) with ID outnumbered those of their peers (8.6%) without ID (Yoshioka & Takeda, 2012). Further examination of the effects of age, gender, or other demographic characteristics (e.g., severity of disabilities) with the actual-ideal discrepancy model is needed to obtain a deeper perspective.

To conclude, given the exploratory nature of these recent studies, the important implications regarding body image fields in people with ID are summarized as follows:

1. Gender differences between body image perceptions (actual body, ideal body, body satisfaction) were not confirmed (Reel et al., 2013). However, in clinical practice, more females with ID desired to be thinner than males with ID did (Bucciere et al., 2011; Reel et al., 2013).
2. There is no identified literature regarding age differences in body image involving people with ID (Ayaso-Maneiro et al., 2014; Bucciere et al., 2011; Reel et al., 2013; Salaun et al., 2014; Yoshioka & Takeda, 2012).
3. Body image dissatisfaction may be improved after participation in physical activity by adolescents (Ayaso-Maneiro et al., 2014) and adults (Salaun et al., 2014) with ID. The significant decrease of body image dissatisfaction may be due to individual body composition indicators (e.g., waist circumferences and weight; Ayaso-Maneiro et al., 2014; Salaun et al., 2014).
4. The formation of body image may be affected by physical self-concept perceptions, including physical conditions and physical appearance (Salaun et al., 2014).
5. Adolescents with ID who were obese tended to prefer a larger body shape as their actual body shape, however, the differences were not confirmed between adolescents with ID who were and were not obese. It is noteworthy that

adolescents with and without ID appeared to have a similar ideal body shape (Yoshioka & Takeda, 2012).

Summary of Physical Self-Concept and Body Image in People with Intellectual Disabilities

The significance of psychological attributes associated with physical self-concept and body image in people with ID is made explicit (Ayaso-Maneiro et al., 2014; Bégarie et al., 2011; Briere & Siegle, 2008; Duvdevany, 2002; Reel et al., 2013; Salaun et al., 2014; Yoshioka & Takeda, 2012). Possible factors such as age, gender, weight status, and obesity affecting the psychological attributes were discussed to highlight the need to explore the effects of physical activity participation on people with ID (sports participation in Special Olympics for example in this study).

Global physical self-concept could be strongly correlated with body fat, physical appearance, strength, and body rating (actual vs. ideal) factors in the general population (Marsh & Roche, 1996). Sports participation was beneficial to the development of psychological attributes for people with and without ID (Eime, Young, Harvey, Charity, & Payne, 2013; Hutzler, Oz, & Barak 2013). Again, Salaun et al.'s (2014) study was the only attempt to examine both physical self-concept and body image for people with ID. It was concluded that self-perceptions (global self-esteem index, physical appearance, physical conditions, and body image dissatisfaction) and anthropometric measurements/body composition indicators (BMI, weight, waist circumferences) were not closely linked before and after the APA program. The conclusion drawn above should

be considered in relation to the specific context and the variations among study participants. In the current investigation, the differences between ages (12-20 years vs 20-35 years), genders (males vs female), weight statuses (non-overweight/obese vs overweight/obese), comorbidities (ID only vs Down syndrome vs autism spectrum disorder), levels (mild vs moderate), and sports participation (non-Unified Sport vs Unified Sport) were conducted, and will then examine whether, in addition to the variables mentioned above, body image perceptions could predict physical self-concepts as well.

Therefore, to ensure that sports participation best meets the psychological needs of athletes with ID, examination of the path between physical self-concept, body image, and other factors must be carried out to ascertain the psychological well-being among the population with ID. The findings may further help practitioners and researchers to understand the possible explanations, being obese or overweight or with or without Unified Sports participation for example, based on the findings emerged from psychosocial attributes.

CHAPTER III

METHOD

This present investigation is a correlational research study, with a secondary data analysis, in which data were obtained from the 2015 Special Olympics Texas State Games with a total of 89 participants. The method, including procedures and instruments, was approved by Texas Woman's University Institutional Review Board.

Research Design

Data from an existing database was used in a cross-sectional research design to explore multidimensional perceptions of physical self-concept, body image, and measures of body composition for participants with ID. A cross-sectional research design can be used to investigate associations between independent and outcome variables of interest at one specific point in time (Portney & Watkins, 2009). A statistical method of regression in a cross-sectional study helps researchers to predict a behavior and draw attention to further clinical initiatives and interventions. Correlational evidence is the first step of forming an evidence-based practice in the social and behavioral sciences, especially in the special education field (Thompson, Diamond, McWilliam, Snyder, & Snyder, 2005).

Accordingly, the cross-sectional research design was employed to explore the multidimensional physical self-concept perceptions, body image perceptions, and objective measures of body composition among Special Olympics athletes (aged 12 to 35

years) with mild to moderate ID. Utilization of the cross-sectional research design is appropriate. This allows researchers to explore whether inexplicit psychological needs in a physical domain can exist in athletes with ID in order to observe the phenomenon of psychological attributes in relation to physical self-concept, body images, and sports participation among the groups of samples.

The main focus of this study included the following:

1. Demographic differences: To see differences in age, gender, weight status, comorbidities of ID, severity of ID, and Unified Sports participation with regard to physical self-concept and body image (Research questions 1-6).
2. Associations: To examine the patterns of associations between physical self-concept constructs and demographics, anthropometric measures, and body image perceptions (Research question 7).
3. Regressions: To explore whether demographic, anthropometric variables, body image perceptions, and/or Unified Sports participation, contribute to the multidimensional physical self-concept perceptions (Research question 8).

Participants and Settings

As reported by the coordinator of the competition and included in the database, all the participants were from the state of Texas and were diagnosed as having ID. The term "intellectual disabilities" is defined using the following characteristics (AAIDD, 2009): (a) significant intellectual functioning, such as an Intellectual Quotient (IQ) score < 70 or as high as 75, (b) limitations in adaptive behaviors, including conceptual (e.g., literacy), social

(e.g., problem-solving), and practical skills (e.g., daily living), and (c) manifesting before 18 years of age.

Sample Population

The data sets involved in this research study were athletes (n = 89) with ID who participated during the 2015 Special Olympics Texas Games. In order to determine the minimal sample size and avoid making a type II error (the failure to reject the null hypotheses), a procedure, known as power analysis, was used to estimate the appropriate sample size (Cohen, 1992). Within this, the power analysis involved three key determinants, including alpha level (α), the effect size, and the desired level of power. 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 (e.g., BMI, age, raw discrepancy values, and absolute discrepancy values) in a linear multiple regression, calculated by *G*Power* version 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009). Within the same context (i.e., α at .05, 0.15 for medium effect size, and power at .80), a deeper investigation using more variables and a larger sample size, may be required. Thus, in the present investigation, 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 and the statistical assumptions noted above.

Inclusion/Exclusion Criteria

In addition to the definition of ID, the inclusion criteria used in the database for this study were as follows: (a) primarily recruited from Special Olympics Texas, (b) severity of ID was limited to mild and moderate disability (70-35 IQ), as reported on demographic

information by their parents or caregivers, (c) participants may have had other accompanying disabilities such as Autism Spectrum Disorders (ASD) and/or chromosome genetic conditions (e.g., Down syndrome), and (d) the age range for participation was from 12 to 35 years old across adolescence (aged 12-20 years) and early adults (aged 21-35 years).

The exclusion criteria included: (a) severe to profound ID (IQ < 34) that may prevent teenagers and adults from understanding and responding to the questionnaires, (b) those with neurological disabilities (e.g., cerebral palsy) causing atypical ambulation of movement, and (c) the genetic disorder (Parder-Willi syndrome) resulting in excessive eating habits, abnormal appetite, and obesity.

Instruments

As reported in the database, the instruments used included the Intellectual Disability Version of the Very Short Form of the Physical Self-Inventory (PSI-VS-ID, see Appendix B) and the Figure Rating Scale (FRS, see Appendix C). In considering the appropriateness of the data obtained by these two instruments, the examination of the internal consistency of both PSI-VS-ID and FRS was performed. In addition to the original data from the database, new variables (e.g., BMI, WHtR, the dichotomy of Unified Sports participation, and raw/absolute values of actual minus ideal ratings) were created to fit the purpose of the present study.

Table 1

Instruments and Variables

	Instruments	Variables
Children	Demographics	Gender, age, severity of ID, comorbidities
	PSI-VS-ID	Physical self-concept (GSW, PSW, PC, SC, PA, PS)
	FRS	Body image perceptions (actual, ideal, raw/absolute values of actual minus ideal). Raw/absolute values of actual minus ideal ratings were later computed.
	Anthropometrics	Height, weight, and waist circumferences. BMI (computed by height and weight), WHtR (waist circumferences and height), and weight status (categorized based on BMI cut-off points or BMI percentiles) were further computed or determined.
Parents	Demographics	Age and gender
	Sports Participation (Proxy report)	Sports types, years involved in Special Olympics programs**,** Unified Sports participation.

Note. Intellectual Disability Version of the Very Short Form of the Physical Self-Inventory (PSI-VS-ID), FRS (Figure Rating Scale), BMI (Body Mass Index), WHtR (waist to height ratio), GSW (Global self-worth), PSW (Physical self-worth), PC (Physical condition), SC (Sport competence), PA (Physical appearance), PS (Physical strength).

Physical Self-Concept

Physical self-concept represents global self-worth which influences physical activities and health related behaviors, based on Fox and Corbin's (1989) theoretical model (the Physical Self-Perception Profile, PSPP). Maïano and colleagues (2009)

modified the PSPP to be applied to the ID population, aged 12 to 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 instrument has12 items, measuring a total of 6 psychometric constructs, represented as a pyramid, with an apex of the global self-worth [PSW], followed by the physical self-worth [PSW], and lastly four subdomains (physical condition [PC], sport competence [SC], physical appearance [PA], and physical strength [PS]) as a foundation base (Maïano, Bégarie, et al., 2009; Maïano, Morin, et al., 2011, see Figure 1, p. 19). The current database included separate values of the 12 items for each data set. A mean score (an average of a construct with two items) for each construct was further computed by the primary investigator (PI) for statistical analysis in this study.

According to a cross-validation procedure using a series of confirmatory factor analyses by Maïano et al. (2011), the results supported: (a) appropriate factorial validity and reliability; (b) factorial invariance across gender and weight; (c) partial factorial invariance across age and ID levels; (d) latent mean differences across gender, weight status and, ID level groups. In general, the PSI-VS-ID questionnaire demonstrated its appropriateness and feasibility for measuring the psychometric properties in physical self-concept perceptions among adolescents and young adults with ID. Statistically,

Maïano et al. (2011) suggested that the 12-item PSI-VS-ID has shown acceptable goodness of fit indices (CFI and TLI > .95; RMSEA and SRMR < .07) and appropriate internal consistency coefficients (ranging from .67 to .82) within six-correlated constructs (Maïano et al., 2011). It should be noted that the PSW scales were much more closely connected to PA than to GSW, while any of the subscales were significantly and positively related to PSW, stronger than GSW (except for PA).

Before using the database, the PI examined the internal consistency of the data sets in relation to physical self-concept constructs, applying PSI-VS-ID, to determine the appropriateness of the database for this study. Thus, the attempt to evaluate the reliability of physical self-concept perceptions was made. The results (89 individuals with mild to moderate ID, aged 12 to 35 years) showed that the current data had overall acceptable Cronbach's α values (.86) as well as the subscales ranging from .65 to .81 (See Appendix D), according to George and Mallery's (2003) study for determining the quality of Cronbach's α values (p. 231). This questionnaire was recently utilized in Salaun et al. (2014), investigating the effects of an adapted physical activity program on self-perceptions (physical self-concept and body image) and morphological variables in obese adolescents with ID, previously discussed in Chapter 2. Accordingly, the data sets of physical self-concept using PSI-VS-ID were appropriate for the present study.

Body Image

As reported in the database, body image variables used in the present study were based on the 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 operational definitions of the body image variables applied the actual-ideal body image discrepancy model, suggesting that the combination of both ratings and raw/absolute values of actual and ideal discrepancy ratings better predicted physical self-concept than either actual or ideal ratings alone (Marsh & Roche, 1996). The discrepancy approach could explore which specific self-perceptions contribute or have reciprocal effects between perceptions. The relationships between actual self-rating, ideal self-rating, the discrepancy model, global self-esteem, and/or other specific domains of self-concept perceptions have driven self-concept researchers to obtain deeper understanding of physical activity behavior patterns (e.g., Marsh, 1994; Marsh & Roche, 1996; Marsh & Sonstroem, 1995; Morano et al., 2011; Pila et al., 2015).

As reported in the database, 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: A) and (b) which figure would you like to be? (ideal: I). For calculation of the discrepancy approach in the present investigation, there are four values computed, including actual self-rating, ideal self-rating, raw discrepancies (actual minus ideal), and absolute discrepancies (absolute value of raw discrepancies). Either raw discrepancies or absolute discrepancies could refer to body dissatisfaction depending on interest of

research and their operational definitions. The raw discrepancies could be positive or negative if actual self-ratings are larger or smaller than ideal self-ratings, while absolute discrepancies are only presented with positive values. This method has been used in assessing body estimation and body dissatisfaction (e.g., Lai et al., 2013; Mulasi-Pokhriyal & Smith, 2010; Rand & Resnick, 2000; Sorbara & Geliebter, 2002) and also used in samples with ID (e.g., Ayaso-Maneiro et al., 2014; Reel et al, 2013).

Thompson and Altabe (1991) reported 2-week test–retest reliability coefficients of .89 and .71 in 89 females, and of .92 and .82 in 92 males for actual image and ideal image, respectively. As appropriate in the actual and ideal self-ratings, the actual-ideal discrepancy was found acceptable for test–retest reliability, with .83 and .81 in females and males, respectively (Thompson & Altabe, 1991). However, the test-retest reliability for people with ID in the current literature was unclear.

In this study, the reliability of the FRS was calculated, using the one-week test-retest method. In a separate pilot test, the PI extracted 14 samples with ID (7 males and 7 females) to assess the internal consistency of the actual-ideal body image discrepancy model. The test-retest reliability revealed that the actual, ideal, raw discrepancy, and absolute values of raw discrepancy for males and females ranged from .70 to .86 and from .76 to .86, respectively (see Appendix E). When compared with Thompson and Altabe's (1991) study, the results from these two data sets appeared to be relevant and show its consistency and familiarity. The test-retest correlation coefficients achieved Cronbach's α .70, as recommended for multivariate statistics such as regression models

(Peterson, 1994). To present, there was no current literature examining FRS through a validation process for people with ID. However, along with the acceptable test-retest reliability of the study samples with ID, and with the previous application of FRS in other studies (i.e., Ayaso-Maneiro et al., 2014; Reel et al, 2013), it appeared to be acceptable for the appropriateness of the FRS for samples with ID in the proposed study.

Anthropometrics and Weight Status

According to the information in the database, all participants with ID had been previously assessed through anthropometrics, including height, weight, and waist circumferences (WC).

BMI (body mass index). Using the reported height and weight, the PI calculated BMI (kg/m^2). As noted in the database, height (using a standard stadiometer) and weight (using a portable Omron HBF-400 scale) of athletes with ID were measured. BMI was considered as a reliable measure of adiposity for individuals with ID (Casey, 2013; Temple et al., 2010; Verstraelen et al., 2009).

WHtR (waist to height ratio). WHtR is defined as the ratio of the circumference of the waist to that of the height. As noted in the database, the measure of waist circumference in centimeters was taken using a tape measure at the top of the iliac crest (narrowest part of waist). The value of WHtR over 0.5 was regarded a risk indicator for cardiovascular diseases (CVD) in adolescents or adults (Ashwell & Hsieh, 2005; Javier Félix-Redondo et al., 2013; Lam, Koh, Chen, Wong, & Fallows, 2015). In the proposed

study, a category of CVD risk was created with two levels, labeled as “Yes” (meaning with CVD Risk) and “No” (without CVD risk).

Weight status. Based on the results of BMI, the weight statuses were categorized by the following descriptive BMI cut-off points (participants over 18 years old; 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 $\geqq$ 30.0 or BMI $\geqq$ 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 (CDC, 2009). For descriptive analysis, the four levels (underweight, normal weight, overweight, and obese) of weight status were presented based on Unified Sports participation (with or without USP). In running ANOVA and regression analysis, one step of data reduction related to four levels of weight status was taken, with “not overweight” (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 (see the previous anthropometric variable in detail) to examine what proportion of CVD risk the sample of athletes with ID could possibly have.

Sports Participation

According to the information regarding sports participation in the database, the data included years involved in Special Olympics sports programs, and types of sports programs in which participants with ID were currently involved, to include special programs (Unified Sports). Years involved in Special Olympics sports programs were categorized into three levels (5 years or less, 5-10 years, and 10 years or more). Unified Sports participation (USP) was categorized by a dichotomy, labeled as "Yes" (meaning with USP experiences) and "No" (without USP experiences).

Demographic Data

Characteristics of athletes were reported as demographic data. The information from the demographics was used for descriptive purposes. Parents of athletes were asked to complete demographic information such as age, gender, socioeconomic status and child's characteristics (e.g., ID morbidities, the severity of disability). For children's ID comorbidities, the accompanying comorbidities included autism spectrum disorders (ASD), Down syndrome (DS), and ID only. To determinate the severity of disability, a parent-reported method was used in the original database, with three levels (mild, moderate, severe/profound); however, only those with mild or moderate ID met the eligibility criteria.

Procedures

Approval (Appendix A) by the Institutional Review Board of Texas Woman's University was obtained and the coordinator of Special Olympics Texas was contacted by

the PI for permission to conduct the proposed study. This permission to access the database allowed the PI to discover that there were two group homes offering regular Special Olympics sports practice. That is, the participation recruitment for the database was primarily based on the support of Special Olympics Texas (a total of three Special Olympics Area games and the Special Olympics Summer Games) and the group homes (offering Special Olympics sports programs on a regular basis).

Several instructions and cautions regarding the use of the database were noted which may have impaired the validity or reliability in relation to appropriateness of data for the current research. However, several steps of protection strategies were taken. For example, to prevent systemic inaccuracy in data due to possible distractions in the measuring environments, parents and child with ID were instructed to physically turn away from these external distractions. However, the efficacy of this approach was not further examined. Moreover, in order to avoid embarrassment regarding the questionnaire and/or anthropometric measurements, it was allowed, if participants asked, to have parents/teachers/guardians/staff 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. Confidentiality was protected by assigning each participant a code, in place of his or her name, to ensure anonymity of data for further use.

The instruments applied for collection of data in the database were reported. PI conducted separate pilot testing (internal consistency) for physical self-concept and body

image perceptions, obtained from the PSI-VS-ID and FRS questionnaires, to examine the appropriateness of the data for the present study. The pilot testing results in relation to the internal consistency of the two instruments were earlier discussed (see Instruments section for details).

Data Analysis

Descriptive and Basic Statistical Analysis

The two major approaches for statistical analysis used in the current investigation were correlations and multiple regression models. 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 (e.g., BMI, WHtR, weight status) was performed to eliminate data entry inaccuracies. The researcher then inspected the data before it was added into the original database. Using the statistic software of SPSS 22.0 version (SPSS Inc., 2013), descriptive statistics such as means, standard deviation (SD) and confidence intervals of the means difference (CI 95%, a likelihood that a true value of a particular sample falls within these limits) were computed for continuous variables; for categorical variables (e.g., gender, types, and weight status) frequencies and percentages by USP were recorded. The data set was checked for outliers, missing data, and distribution. Information regarding Special Olympics participation (years involved in Special Olympics and sports types) of athletes with ID by USP was tabulated. Cronbach's α was performed to examine the internal consistency for PSI-VS-ID (Appendix D). Test-retest reliability was conducted for the FRS (Appendix E). Two-sample t-tests, one-way

analysis of variance (ANOVA) or one-way analysis of covariates (ANCOVA; to control significant covariates, if any) were used to examine the group mean differences between USP (with vs without USP) 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, weight statuses, and a CVD risk) and USP. Regarding each item (two items for each construct) of physical self-concept and body image perceptions (four values were computed based on the discrepancy model), means and standard deviations were presented for descriptive purposes.

Spearman correlation coefficient could be used to measure the relative strength of relationships between ordinal, interval or ratio scale variables (Portney & Watkins, 2009). Spearman correlations were computed to examine the correlations among age (continuous), severity of ID (ordinal), each domain (interval) of physical self-concept, anthropometrics measures (continuous), body image perceptions (ordinal, actual self-rating, ideal self-rating, raw discrepancies [A-I] and absolute discrepancies |A-I|) in the study population.

Multiple Regressions

Despite correlational statistics being able to depict the association of each pair-wise variable, in terms of a prediction for outcomes, the multiple regression method was used as a statistical approach for predicting an unknown variable(s) based on the known variables, called predictors. This technique is also widely used as a powerful tool in the

social sciences to explore insight into potential quantifiable patterns of behaviors and/or psychological attributes (Portney & Watkins, 2009).

Herein, the separate stepwise multiple regression models yielded unstandardized (B), standardized (Beta [β]) coefficients, and adjusted R^2, for each domain of physical self-concept to determine the contributions among variables (e.g., age, gender, four ratings based on the actual-ideal body image discrepancy and anthropometric variables) for athletes with ID. The procedures of regression analyses were utilized to determine the best subset of predictors of each physical self-concept perception for the samples of this group. In other words, whether there were predictive factors such as age, gender, weight status (not overweight vs overweight/obese), USP (with vs without USP), and body image perceptions (i.e., actual self-rating, ideal self-rating, raw discrepancies [A-I], and absolute discrepancies |A-I|) for any of the multidimensional physical self-concept constructs. The accepted level of significance for all analyses was set at $p < .05$. Data analysis was accomplished using SPSS 22.0 (SPSS Inc., 2013).

CHAPTER IV

RESULTS

This section begins with the characteristics of the study population, followed by results of all items from PSI-VS-ID and FRS, and the data corresponding to the research questions on physical self-concept in the present investigation. Accordingly, the main focus of this exploratory study was to:

1. Demographic differences: To see the differences of ages, genders, weight statuses, comorbidities of ID, the severity of ID levels, and Unified Sports experiences in physical self-conceptions (Research question 1- 6).
2. Associations: To examine the patterns of associations among physical self-concept constructs, and body image perceptions and demographic variables (Research question 7).
3. Regressions: To explore whether actual self-rating, ideal self-rating, two actual-ideal discrepancies (i.e., raw and absolute discrepancy values), Unified Sport experiences participation, and demographic variables, contribute to the multidimensional physical self-concept perceptions (Research question 8).

Study Population Characteristics

As noted in the database, the demographics of participants with ID (i.e., athletes with ID) were reported by their parents or guardians, and are shown in Table 2. All participants (n = 89) who were included in the database were from Special Olympics

Texas state games or adult living centers which provided regular Special Olympics sport practice and participated in Special Olympics sports games. All of the participants completed all phases of the research. Over two-third (n = 33) were males participating in Unified Sports Participation (USP). That is, only 23.3% (n = 10) of participants who participated in USP were females. Males and females who reported to have no USP experience were estimated at 58.7% (n = 27) and 41.3% (n = 19), respectively. Ages of all participants with ID ranged from 12 to 35 years (M = 23.55, S.D = 6.83). Of these, 38.2% were from 12 to 20 years; 61.8% ranged in age from 20 to 35 years. Regarding comorbidities of ID who had USP, those with ID only were estimated at 39.5%, followed by autism (34.9%) and Down syndrome (25.6%). Similar to the order of comorbidities in USP, the distributions of comorbidities of ID in the without USP group were 58.7, 23.9, and 17.4%. In the severity of ID, 43.8% of participants with ID had a mild disability (39.5% in USP vs 47.8% in without UPS), whereas 56.2% of them had moderate disabilities (60.5% vs 52.2%).

Regarding the results of anthropometrics and body composition indicators for participants with ID, the average of height and weight in USP were 167.40 cm (S.D = 13.18) and 75.87 kg (S.D = 23.67); whereas, the average of height and weight for those without USP were 165.08 cm (S.D = 11.66) and 70.97 kg (S.D = 22.75). Overall, the average of height and weight was 166.20 cm (S.D = 12.40) and 73.34 kg (S.D = 23.20).

Moreover, the BMI was computed based on height in meters and weight in kilograms, using the formula (kg/m^2), recommended by WHO (1995). Next, based on the

results of BMIs, four classifications (underweight, normal weight, overweight, and obese) of body compositions were computed according to cut-off points (see Method for details) of BMIs for adults (18 years and older), and gender specific BMI percentiles for those under 18 years (Barlow, 2007; Lobstein et al., 2004; WHO, 1995). Overall, only 33.7% (n = 30) of participants with ID in this study fell into the normal weight group; whereas, 12.4% (n = 11) were underweight and 27% each for overweight (n = 24) and obese (n = 24). For further statistical analysis, the data reduction for weight statuses was performed, with the overweight/obese (n = 48) and nonoverweight/obese group (n = 42).

WHtR (waist to height ratio) was computed as well. The average of waist circumferences (WC) was 96.22 cm (S.D = 17.39), which resulted in the overall WHtR being 0.58 (S.D = 0.10). The classifications of CVD risk (with CVD risk and without CVD risk) were determined by the cut-off point of 0.50 from WHtR (Ashwell & Hsieh, 2005; Javier Felix-Redondo et al., 2013; Lam et al., 2015). In the present study, 76.4% of participants with ID were more likely to have a CVD risk. 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.

Table 2

Demographics of Athletes With ID by Unified Sports Participation Experiences

	With USP (N = 43)	Without USP (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)	

Note. ID: Intellectual disabilities; USP: Unified Sport participation; 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 USP were significantly different. (N = 89).

Patterns of Sports Participation

Years involved in Special Olympics were estimated from the database and categorized into three levels: 5 years or less, 6 to 10 years, and 11 years or more. Athletes with ID in the present investigation participated in Special Olympics for an average of 9.42 years (S.D = 6.69). Specifically, 37.1% of participants were involved in Special Olympics for 6 to 10 years, followed by 11 years or more (32.6%) and 5 years or less (30.3%). There was a significant relationship between USP experiences and years involved in Special Olympics, χ^2 (2, N = 89) = 7.15, p = .03. Athletes with ID but without USP were more likely to have 6 to 10 year involvement of Special Olympics.

Table 3

Sport Participation of Athletes with ID

	With USP (N = 43)	Without USP (N = 46)	All (N = 89)	χ^2
Years involved in SO				7.15*
5 years or less	39.5% (17)	21.7% (10)	30.3% (27)	
6 to 10 years	23.3% (10)	50.0% (23)	37.1% (33)	
11 years or more	37.2% (16)	28.3% (13)	32.6% (29)	

Note. SO: Special Olympics. * p < .05. N = 89.

Regarding the sport types, there were 13 sports reported for active participation. The frequency and percentage of sport types for athletes with ID reported by their parents/guardians are presented in Table 4. Overall, the top five sports were track and field (71.9%), bowling (68.5%), basketball (56.2%), swimming (39.3%) and tennis (16.9%). According to Special Olympics Texas 2015 annual report, the most common

sports were track and field (19,759 athletes), bowling (16,812), basketball (11,318), bocce (2,531), and aquatics (swimming, 1,654). Moreover, when further analysis for the sport types by USP experiences were conducted, the top five sports were the same for the overall study population only the order changed. The order of the most common participated sports was: track and field (46.5%), basketball (30.2%), bowling (25.6%), tennis (18.6%), and swimming and softball (14% for each). For those who had not involved in USP, the top five sports were track and field (71.7%), bowling (69.6%), basketball (60.9%), swimming (34.8%), and bocce (17.4%). Note that athletics, bowling, and basketball sports were the top three most commonly participated sports for those with and without UPS experiences. There was no Unified Sports participation for cycling, equestrians, and golf recorded in the study population.

Table 4

Sport Types and Ranking by Unified Sports Participation

	Total (n = 89)		USP (n = 43)		Non-USP (n = 46)	
Sport	% (n)	Ranking	% (n)	Ranking	% (n)	Ranking
Track and field	71.9% (64)	1	46.5% (20)	1	71.7% (33)	1
Bowling	68.5% (61)	2	25.6% (11)	3	69.6% (32)	2
Basketball	56.2% (50)	3	30.2% (13)	2	60.9% (28)	3
Swimming	39.3% (35)	4	14% (6)	5	34.8% (16)	4
Tennis	15.7% (14)	5	18.6% (8)	4	10.9% (5)	8
Volleyball	14.6% (13)	6	2.3% (1)	7	13% (6)	7
Softball	14.6% (13)	6	14% (6)	5	15.2% (7)	6

(continued)

Bocce	14.6% (13)	6	11.6% (5)	6	17.4% (8)	5
Soccer	11.2% (10)	7	11.6% (5)	6	13% (6)	7
Cycling	6.7% (6)	8	0%		2.2% (1)	10
Flag football	6.7% (6)	8	2.3% (1)	7	4.3% (2)	9
Equestrians	5.6% (5)	9	0%		4.3% (2)	9
Golf	3.4% (3)	10	0%		4.3% (2)	9

Note. N = 89.

Findings of PSI-VS-ID

Responses to Questions

Table 5 presents the descriptive statistics for each construct with its two corresponding items of the physical self-concept model. The format of the Likert response scale of PSI-VS-ID, was completed at the time of competition and reported in the database, as a 6-level Likert item, ranging from 1 (No, I totally disagree) to 6 (Yes, I totally agree). None of the study samples checked the “I don’t understand the question” box.

In sum, based on the mean scores and standardized deviations of the six composite constructs, the results indicated that global self-worth (composite M = 4.9, SD = .7), as the top of the physical self-concept model, and was rated as the most highly perceived value. Following this, physical self-worth (composite M = 4.7, SD = 1.0) was rated second highest, as the second level of the model. At the bottom level, the composite mean scores of the four constructs (physical appearance, physical strength, sport competence, and physical condition) ranged from 3.9 to 4.6. It must be noted that

physical condition was rated lowest (composite M = 3.9, SD = 1.3) and the only psychological construct under 4.0 for the physical self-concept model. Thus, athletes with ID tended to perceive negative feelings regarding their physical condition. Conversely, they modestly perceived positive global self-worth, often called self-esteem. Simultaneously, the positive self-perception also occurred in the rest of the physical self-concept perceptions.

Table 5

Overall Results of Physical Self-Concept in Athletes with ID

Construct	Mean	S.D.
Global Self-Worth		
1. I like myself	5.1	.8
12. I want to stay as I am	4.7	1.0
Composite	4.9	.7
Physical Self-Worth		
2. I am happy about all the things I can to do with my body.	4.8	1.0
9. I am happy with myself and what I can do with my body.	4.7	1.2
Composite	4.7	1.0
Physical appearance		
4. My body is nice to look at.	4.6	1.2
8. Everybody finds me good-looking.	4.6	1.2
Composite	4.6	1.0

Physical Strength		
3. I am stronger than others.	4.3	1.2
5. I can carry heavy things.	4.1	1.4
Composite	4.2	1.1
Sport competence		
7. I am good in all sports.	4.5	1.2
11. I do things well in sports.	4.7	1.1
Composite	4.5	1.0
Physical Condition		
6. I can run a long time without getting tired	3.9	1.4
10. I can run 10 times around the basketball court without stopping	3.9	1.5
Composite	3.9	1.3

Note. N = 89

Table 6 presents the results of the body image discrepancy model were captured during enrollment to the games and results recorded in the database. This information included actual (A), ideal (I) ratings, raw (A-I), and absolute (|A-I|) discrepancies. The measure of body image using the gender specific 9-figure silhouettes ranged from 1 (very thin) to 9 (very fat), by asking two questions: “Which figure looks like you?” and “Which figure would you like to be?”. The former is to measure the actual body image and the latter is to measure for ideal body image. The raw discrepancies of actual and ideal ratings and absolute discrepancies were also computed. Overall, athletes with ID perceived a bigger actual body size (M = 4.6, SD = 2.1) when compared with the body

size they chose as their ideal body shape (M = 3.2, SD = 1.7). The results of mean raw discrepancies (M = 1.3, SD = 2.0) were positive reflecting the previous discovery that the actual ratings were higher than ideal ratings. The mean of absolute discrepancies was 1.8 (SD = 1.6). The four values computed based on the body image discrepancy model were further entered in the regression analysis for each physical self-concept component. It is important to note that 77.5% of samples with ID chose an ideal which was smaller than their actual rating choice, 72.4% were female. Conversely, it was estimated 17% females and 15% males chose larger ideal ratings than their actual body image ratings.

Table 6

Overall Results of Body Image Perceptions in Athletes with ID

Variables	Mean	S.D.
Actual Body Image (A)	4.6	2.1
Ideal Body Image (I)	3.2	1.7
Raw Discrepancy (A-I)	1.3	2.0
Absolute Discrepancy (|A-I|)	1.8	1.6

Note. Raw discrepancy means A minus I; |A-I| means absolute values of A minus I. N = 89

Demographic Differences

Research question 1: Does physical self-concept and body image differ in age (12-20 years vs 20-35 years) in athletes with ID?

Differences between age groups (12-20 years vs 20-35 years) were examined using an independent t-test for each physical self-concept component. Table 7 presents the results of descriptive statistics, including the mean score (M), standard deviation

(SD), t values, significant levels (*p*), and confidence interval (CI) 95%. In addition to the descriptive statistics, effect size (Cohen's *d*) values were also computed to determine the magnitude of differences between two measures, as often called practical significance (Cohen, 1988).

Results revealed that athletes with ID in 12 to 20 years age group (M = 4.94, SD = 1.05) had higher physical appearance (PA) scores than those in 20 to 35 years age group (M = 4.3, SD = 1.0), t (87) = 2.79, *p* = .01, CI 95% = .2, 1.0. Cohen's *d* effect size value (d = .60) suggested a high practical significance. For body image, the age group of 20 to 35 years reported higher scores in actual ratings (A; M = 4.9, SD = 2.0) than the age group of 12 to 20 years (M = 4.0, SD = 2.1), t (87) = -.21, p = .04, CI 95% = -.9, .0. Cohen's *d* effect size value (d = .47) suggested low to moderate practical significance. It is noteworthy that there was a tendency toward greater raw discrepancies of actual minus ideal ratings (A-I; M = 1.7, SD = 2.0 vs M = .8, SD = 2.1) in the 20 to 35 years age group compared with the 12 to 20 years age group, t (87) = -1.97, p = .052, CI 95% = -.9, .0. The effect size in Cohen's *d* was .43, indicating the similar strength (low to moderate) as that in the actual ratings between age groups. No statistical significance between age groups was found in other physical self-concept perceptions (global self-worth [GSW], physical self-worth [PSW], physical strength [PS], physical condition [PC], and sport competence [SC]) and body image ratings (ideal [I] and absolute discrepancies of actual minus ideal ratings [|A-I|]).

Table 7

Comparison of Physical Self-Concept and Body Image by Age Groups

Variables	Age group 12 – 20 years (n = 34)	20 – 35 years (n = 55)	t(87)	*P*	95% CI	*d*
PSC						
GSW	5.0 ± .8	4.9 ± .8	1.20	.24	[-.1, .7]	.26
PSW	4.7 ± 1.0	4.8 ± .9	1.21	.23	[-.2, .7]	.26
PS	4.4 ± 1.1	3.9 ± 1.1	1.27	.21	[-.2, .8]	.28
PA	4.6 ± 1.0	4.5 ± 1.2	2.79	.01	[.2, 1.0]	.60
PC	3.8 ± 1.3	4.0 ± 1.3	1.03	.31	[-.2, .7]	.26
SC	4.5 ± 1.0	4.7 ± 1.0	1.50	.14	[-.1, .8]	.35
Body image						
Actual (A)	4.0 ± 2.1	4.9 ± 2.0	-.21	.04	[-.9, -.0]	.47
Ideal (I)	3.2 ± 1.8	3.3 ± 1.6	-.26	.79	[-.5, .4]	.05
A-I	0.8 ± 2.1	1.7 ± 2.0	-1.97	.052	[-.9, .0]	.43
|A-I|	1.6 ± 1.5	2.0 ± 1.6	-1.10	.29	[-.7, .2]	.23

Note. The physical self-concept (PSC) conceptual model included global self-worth (GSW), physical self-worth (PSW), physical appearance (PA), physical strength (PS), sport competence (SC), and physical condition (PC). Effect sizes were also calculated to measure the magnitude of age effects. Body image perceptions included actual body image ratings (A), actual minus ideal ratings (A-I), absolute values of actual minus ideal ratings (|A-I|). According to the guidelines of Cohen (1988) for independent *t*-tests, effect size of .20= small effect, .50 = moderate effect, and .80 = large effect.

Research question 2: Does physical self-concept and body image differ in gender (male and female) in athletes with ID?

Results of an independent t-test (Table 8), indicated a statistical effect of physical strength (PS) between genders, t (87) = 2.30, p = .02, CI 95% = .1, 1.0. The findings suggested that PS scores on male athletes with ID (M = 4.4, SD = 1.1) appeared to be higher than those in female athletes with ID (M = 3.9, SD = 1.0). Cohen's effect size value (d = .51) suggested moderate practical significance. There was no statistical difference between genders for the rest of physical self-concept and body image components. However, it is worth noting that it seemed to have the inclination toward lower PA scores in females (M = 2.9, SD = 1.6 vs M = 3.4, SD = 1.7, t (87) = 1.48, p = .14) when compared to those in males. The effect size (d = .34), while not significant, in ideal body image ratings presented small to moderate practical significance.

Table 8

Comparison of Physical Self-Concept and Body Image by Gender

Variables	Genders		t(87)	*p*	95% CI	*d*
	Males (n = 60)	Females (n = 29)				
PSC						
GSW	4.9 ± 0.7	4.9 ± 0.8	-.14	.89	[-.5, .4]	.03
PSW	4.7 ± 1.0	4.8 ± 0.9	-.58	.56	[-.6, .3]	.13
PS	4.4 ± 1.1	3.9 ± 1.0	2.30	.02	[.1, .1.0]	.51
PA	4.6 ± 1.0	4.5 ± 1.2	.43	.67	[-.3, .5]	.10

PC	3.8 ± 1.3	4.0 ± 1.3	-.43	.67	[-.6, .3]	.10
SC	4.5 ± 1.0	4.7 ± 1.0	-.71	.48	[-.6, .3]	.17
Body image						
Actual (A)	4.7 ± 2.1	4.3 ± 2.0	.34	.70	[-.3, .6]	.16
Ideal (I)	3.4 ± 1.7	2.9 ± 1.6	1.54	.13	[-.1, .8]	.34
A-I	1.3 ± 2.1	1.5 ± 2.0	-.86	.39	[-.6, .3]	.11
|A-I|	1.8 ± 1.6	2.0 ± 1.5	-.56	.58	[-.6, .3]	.12

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

Research question 3: Does physical self-concept and body image differ in weight status (nonoverweight vs overweight/obese) in athletes with ID?

Results of sample comparisons of physical self-concept and body image between nonoverweight and overweight/obese groups were conducted, as presented in Table 9. The findings indicated that there were several statistical differences in physical appearance (PA), t (87) = 2.72, p = .01, CI 95% = .2, 1.0, physical condition (PC), t (87) = 2.74, p = .01, CI 95% = .1, .1.0. and three body image variables, actual rating (A), t (87) = -4.0, p < .001, CI 95% = -1.2, -.4, raw discrepancy of actual minus ideal ratings (A-I), t (87) = -3.74, p < .001, CI 95% = -1.2, -.4, and absolute discrepancy of actual minus ideal ratings (|A-I|), t (87) = 4.21, p < .001, CI 95% =-1.3, -.5. The effect size (d) values in PA and PC were .58 and .55, indicating moderate practical significance while large effects of practical significance were discovered in A (d = .80), A-I (d = .79), and |A-I| (d = .89). The findings of large practical significance were not surprising because

the nature of the association between body image and weight statuses may be positively correlated. That is, people with overweight/obese status perceived greater body image discrepancy (Banitt et al., 2008). In addition, the statistical significance in global self-worth (GSW) and physical self-worth (PSW) between genders was not confirmed (p = .13 and .17, respectively). However, the results may imply a tendency toward higher scores in the overweight/obese group when compared with the nonoverweight/obese group. The effect size values (d = .32 in GSW and .30 in PSW) suggested low to moderate practical significance.

Table 9

Comparison of Physical Self-Concept and Body Image by Weight Status

Variables	Weight status nonoverweight (n = 41)	overweight/obese (n = 48)	t (87)	*p*	95% CI	*d*
PSC						
GSW	5.0 ± .8	4.8 ± .7	1.53	.13	[-.1, .5]	.32
PSW	4.9 ± 1.0	4.6 ± 1.0	1.39	.17	[-.1, .7]	.30
PS	4.1 ± 1.1	4.3 ± 1.0	-.74	.46	[-.6, .3]	.16
PA	4.9 ± 1.0	4.3 ± 1.0	2.72	.01	[.2, 1.0]	.58
PC	4.2 ± 1.3	3.6 ± 1.1	2.74	.01	[.1, .1.0]	.55
SC	4.5 ± 1.2	4.6 ± .9	-.54	.59	[-.5, .3]	.11
Body image						
Actual (A)	3.7 ± 1.8	5.3 ± 2.2	-4.0	< .001	[-1.2, -.4]	.80
Ideal (I)	3.2 ± 1.8	3.3 ± 1.6	-.34	.74	[-.5, .35]	.07
A-I	0.5 ± 1.7	2.0 ± 2.0	-3.74	< .001	[-1.2, -.4]	.79
|A-I|	1.2 ± 1.4	2.4 ± 1.5	-4.21	< .001	[-1.3, -.5]	.89

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

Research Question 4: Does physical self-concept and body image differ in different comorbidities (ID only, DS, and ASD) in athletes with ID?

Results summarized in Table 10 indicated that there were two significant differences only in physical strength (PS) and sport competence (SC) constructs by comorbidities (ID only, DS, and ASD). Bonferroni post-hoc tests were further applied to identify the specific difference for the two constructs of PS and SC. Thus, results of one-way ANOVA analysis revealed that the significant main effects of comorbidities on PS, F (2, 86) = 4.47, p = .01, CI 95% = -.1.2, -.1, and on SC, F (2, 86) = 6.28, p = .003, CI 95% = -.1.3, -.2. The computed effect size (f) for PS and SC were .08. According to Cohen (1988), the two effect size values were considered barely small in their practical significance. Based on Bonferroni post-hoc tests, the mean PS scores in the sample with ASD (4.5 ± .9) was higher than those with ID only (3.9 ± .1.1). Mean SC in the sample with DS (5.2 ± .7) was higher than those with ASD (4.2 ± 1.1) and ID (4.5 ± 1.0), respectively.

There was a tendency toward greater raw discrepancies of actual minus ideal body ratings (ID only: 1.8 ± 2.0 vs DS: .4 ± 2.1) in the sample with ID only group in comparison with those with DS group, F (2, 86) = 3.04, p = .053. The effect size of Cohen'f value was .20, indicating a moderate to large practical significance as well.

Table 10

Comparison of Physical Self-Concept and Body Image by Comorbidities

Variables	Comorbidities			F(86)	p	95% CI	*f*	Post hoc
	ID only (n = 45)	DS (n = 18)	ASD (n = 26)					
PSC								
GSW	4.8 ± .7	5.0 ± .7	4.9 ± .7	.41	.67	[-.8, .3]	.01	
PSW	4.7 ± 1.0	4.7 ± 1.0	4.9 ± .9	.29	.75	[-.6, .5]	.02	
PS	3.9 ± 1.1	4.6 ± 1.0	4.5 ± .9	4.47	.01	[-1.2, -1.0]	.08	ASD > ID
PA	4.4 ± 1.0	4.7 ± 1.1	4.7 ± 1.0	.90	.41	[-.8, .3]	.03	
PC	3.7 ± 1.3	3.8 ± 1.5	4.2 ± 1.1	1.25	.29	[-.6, .5]	.05	
SC	4.5 ± .96	5.2 ± .7	4.2 ± 1.1	6.28	.003	[-1.3, -.2]	.08	DS > ID, DS > ASD
Body image								
Actual (A)	5.1 ± 1.9	4.1 ± 2.7	4.0 ± 1.9	2.78	.07	[-.1, 1.0]	.10	
Ideal (I)	3.3 ± 1.7	3.7 ± 2.0	2.9 ± 1.2	1.35	.27	[-.8, .3]	.08	
A-I	1.8 ± 2.0	.4 ± 2.1	1.2 ± 1.9	3.03	.053	[.1, 1.2]	.20	
|A-I|	2.1 ± 1.7	1.6 ± 1.4	1.6 ± 1.4	1.13	.33	[-.2, .9]	.11	

Note. DS: Down syndrome; ASD: Autism Spectrum Disorder. Effect sizes were calculated to measure the magnitude of effects of comorbidities. According to the guidelines of Cohen (1988) for one-way ANOVA, effect size (*f*) of .10= small effect, .25 = moderate effect, and .40 = large effect.

Research question 5: Does physical self-concept and body image differ in severity of ID (mild vs moderate) in athletes with ID?

Table 11 presents the results of group differences of the severity of ID (mild vs moderate) for physical self-concept and body image components. No significant differences between mild and moderate disability were discovered in any physical self-concept and body image component. Cohen's *d* values ranged between .03 and .24, suggesting trivial to low (.24 in physical appearance [PA] and .20 in sport competence [SC]) practical significance. Overall, the effect of severity of ID (mild and moderate) appeared to be of marginal or negligible importance in the study population.

Table 11

Comparison of Physical Self-Concept and Body Image by Severity of ID

Variables	Severity of ID		t(87)	*p*	95% CI	*d*
	Mild (n = 39)	Moderate (n = 50)				
PSC						
GSW	4.9 ± 0.7	4.9 ± 0.7	-.16	.87	[-.5, .4]	.03
PSW	4.7 ± 1.0	4.8 ± 0.9	-.28	.78	[-.5, .4]	.06
PS	4.1 ± 1.1	4.3 ± 1.1	-.56	.58	[-.5, .3]	.12
PA	4.7 ± 1.0	4.5 ± 1.1	1.11	.27	[-.2, .7]	.24
PC	3.9 ± 1.3	3.9 ± 1.3	.10	.92	[-.4, .4]	.02
SC	4.4 ± 1.0	4.7 ± 1.0	-.93	.37	[-.6, .2]	.20
Body image						
Actual(A)	4.6 ± 2.3	4.5 ± 1.9	.21	.83	[-.4, .5]	.05
Ideal (I)	3.1 ± 1.6	3.3 ± 1.8	-.67	.51	[-.6, .3]	.14
A-I	1.5 ± 1.9	1.2 ± 2.1	.77	.45	[-.3, .6]	.16
|A-I|	2.0 ± 1.4	1.7 ± 1.7	.70	.49	[-.3, .6]	.15

Note. Effect sizes were also 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.

Research question 6: Do physical self-concept and body image differ in Unified Sports participation (non-Unified Sports experience vs with Unified Sports experience) in athletes with ID?

Table 12 illustrates the effect of Unified Sport participation (with vs without USP) on physical self-concept and body image components. The results showed that there were significant differences in sport competence (SC), t (87) = 1.99, p = .049, CI 95% = .00, .8, d = .42, and absolute discrepancy of actual minus ideal ratings (|A-I|), t (87) = -2.24, p = .03, CI 95% = -.9, -.1, d = .48. The SC scores for those with USP (M = 4.8, SD = -.8) were higher than for those without USP (M = 4.4, SD = 1.2). The |A-I| values for those with USP (M = 1.5, SD = 1.2) were lower than for those without USP (M = 2.2, SD = 1.8). Both d values for SC and |A-I| were considered small to moderate practical significance.

In addition to the above-mentioned significant differences, the values of A (p = .07) and A-I (p = .06) were lower in those with USP when compared to those without USP. Except for d values for A (.40), and A-I (.40), the rest of d values among other variables suggested trivial to small (.26 in global self-worth [GSW]) practical significance.

Table 12

Comparison of Physical Self-Concept and Body Image by Unified Sports Participation

Variables	Unified Sports participation		t(87)	*p*	95% CI	*d*
	With USP (n = 43)	Without USP (n = 46)				
PSC						
GSW	4.8 ± 0.8	5.0 ± 0.7	-1.23	.22	[-.7, .2]	.26
PSW	4.8 ± 1.0	4.6 ± 0.9	.73	.47	[-.2, .6]	.19
PS	4.2 ± 0.8	4.2 ± 1.3	.16	.87	[-.4, .4]	.03
PA	4.6 ± 1.0	4.6 ± 1.1	-.08	.94	[-.4, .4]	.02
PC	3.9 ± 1.2	3.9 ± 1.3	-.15	.88	[-.5, .4]	.03
SC	4.8 ± 0.8	4.4 ± 1.2	1.99	.049	[.0, .8]	.42
Body image						
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
A-I	0.9 ± 1.7	1.7 ± 2.3	-1.90	.058	[-.8, .0]	.40
|A-I|	1.5 ± 1.2	2.2 ± 1.8	-2.24	.026	[-.9, -.1]	.48

Note. Effect sizes were also 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.

Associations

Research Question 7: Correlations of variables of demographics, body composition, and body image for physical self-concept

Variables of demographics, body composition, and body image for physical self-concept are shown in a correlation matrix in Table 13. Global self-worth (GSW) was positively associated with years involved in Special Olympics (r = -.23, p = .031), but negatively with waist circumference (WC; r = -.22, p = .042). Between physical appearance (PA) and physical condition (PC) among variables, negative correlations were observed in weight (respectively, r = -.31, p = .004 and r = -0.31, p = .003), BMI (r = -.29, p = .005 and r = -.30, p = .004), WC (r = -.32, p = .002 and r = -.32, p = .002), and waist to height ratio ([WHtR], r = -.28, p = .009 and r = -.28, p = .008). In addition to abovementioned body composition related variables, PA correlated negatively with age (r = -.29, p = .006) but was not discovered in PC. No significant correlations were found in physical self-worth (PSW) and physical condition (PS) among the independent variables. Overall, the results indicated a clear relationship between PA and PC and the body composition related indicators (i.e., weight, BMI, WC, and WHtR). The obtained r ranged from -.32 to .22, which suggested that the relationship, while significant, is weak in strength. However, correlation does not imply causality. In the present investigation, regression analysis was utilized later to explore not only relationships but also the cause and effect between a variety of factors.

Table 13

Correlation Matrix of Independent Variables for Physical Self-Concept

	GSW	PSW	PS	PA	PC	SC
Demographics						
Age	-.16	-.16	-.09	-.29**	-.14	-.11
Severity of ID	.02	.01	.06	-.10	-.04	.11
Years involved in SO	.23*	.03	.05	-.01	-.01	.16
Anthropometrics						.
Height	-.06	-.03	.07	-.13	-.13	-.18
Weight	-.16	-.16	-.17	-.31**	-.31**	-.11
BMI	-.14	-.17	.13	-.29**	-.30**	-.04
WC	-.22*	-.20	.06	-.32**	-.32**	-.07
WHtR	-.20	-.20	.02	-.28**	-.28**	.01
Body image						
Actual (A)	.03	-.13	.05	-.08	-.08	-.19
Ideal (I)	-.05	-.02	.03	.00	.04	.04
A-I	.07	-.12	.03	-.08	-.11	-.22*
|A-I|	.04	-.10	.12	-.10	-.09	-.07

Note. GSW: Global self-worth; PSW: Physical self-worth; PS: Physical strength; PA: Physical appearance; PC: Physical condition; SC: Sport competence; ID: Intellectual disabilities; SO: Special Olympics; BMI: Body mass index; WC: Waist circumferences; WHtR: Waist to height ratio ; Severity ID (mild = 0, moderate = 1); Years involved in SO (0-5 years = 0, 6-10 years = 1, 10 years or more = 2). * $p < .05$. ** $p < .01$

Regressions

Research Question 8: Predictors of Physical Self-Concept Perceptions

Two series of stepwise multiple regressions for each component of physical self-concept and body dissatisfaction (raw A-I and absolute A-I) were performed to generate unstandardized (B), standardized (Beta [β]) coefficients, adjusted R^2, and 95% confidence interval (CI), as summarized in Table 14. The variables entered in the regression analysis for physical self-concept included gender, age, levels of ID (mild, moderate), height, weight, BMI, waist circumference (WC), waist to height ratio (WHtR), CVD (cardiovascular disease) risk (without risk, with risk = 1), years involved in Special Olympics (0-5 years, 6-10 years, 10 years or more), USP (non USP, USP), and body image perceptions (actual rating, ideal rating, and raw A-I, and absolute A-I).

For global self-worth, the stepwise regression model with three predictors (years involved in Special Olympics, age, and WC) produced adjusted $R^2 = .166$, $F (3, 85) = 6.842$, $p < .001$, explaining about 17% of the variance in the outcome variable. Years involved in Special Olympics was the most weighted predictor, $\beta = .361$, $p = .001$, followed by age, $\beta = -.266$, $p = .019$, and CVD risk, $\beta = -.256$, $p = .012$. The results indicated that longer years involved in Special Olympics, younger ages, and lower CVD risk accounted for higher global self-worth. For physical self-worth, there was no predictor for the regression model among the variables (all $p > .05$). For physical strength (PS), gender was the only predictor, $\beta = -.239$, $p = .024$, explaining approximately 5% of variance in the outcome variable, adjusted $R^2 = .047$, $F (1, 87) = 5.293$, $p = .024$. This

indicated that gender had significant negative regression weight, meaning female athletes with ID were expected to have lower PS scores. For physical appearance (PA), the regression model produced adjusted R^2 = .123, F (2, 86) = 7.159, p = .001. The two predictors of WC, β = -.255, p = .017, and age, β = -.213, p = .045, collectively explained about 12% of variance in PA. The results indicated that athletes with ID who had higher PA scores were more likely to have lower WC and be younger. For physical condition (PC), WC was the only predictor, β = -.320, p = .002, explaining approximately 9% of variance in the outcome variable, adjusted R^2 = .092, F (1, 87) = 9.924, p = .002. This indicated that WC had significant negative regression weight, meaning higher PC scores were expected to have lower WC. Lastly, for sport competence (SC), the regression model produced adjusted R^2 = .072, F (2, 86) = 4.388, p = .015. Raw discrepancy of A-I, β = -.246, p = .019, and years involved in Special Olympics, β = .209, p = .046, carried out about 7% of variance in SC. The results indicated that athletes with ID who had higher sport competence scores were more likely to have a lower raw discrepancy of A-I and longer years involved in Special Olympics.

Table 14

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 = .166, F (3, 85) = 6.842, $p < .001$							
CVD risk	-.432	.168	-.256	.079	-2.573	.012	[-.77, -.10]
Years involved in SO	.326	.098	.361	.140	3.324	.001	[.13, .52]
Age	-.028	.012	-.266	.195	-2.400	.019	[-.05, -.01]
Physical self-worth							
No predictor was generated.							
Physical strength							
Adjusted R^2 = .047, F (1, 87) = 5.293, p = .024							
Gender	-.547	.238	-.239	.057	-2.301	.024	[-1.02, -.07]

Physical appearance							
Adjusted R^2 = .123, F (2, 86) = 7.159, *p* = .001							
WC	-.015	.006	-.255	.102	-2.435	.017	[-.027, -.003]
Age	-.032	.016	-.213	.143	-2.034	.045	[-.064, -.001]
Physical condition							
Adjusted R^2 = .092, F(1, 87) = 9.924, *p* = .002							
WC	-.023	.007	-.320	.102	-3.150	.002	[-.038, -.009]
Sport competence							
Adjusted R^2 = .072 , F(2, 86) = 4.388, *p* = .015							
Raw A-I	-.123	.052	-.246	.049	-2.381	.019	[-.225, -.020]
Years involved in SO	.266	.131	.209	.093	2.024	.046	[.005, .527]

Note. N = 89. SO: Special Olympics; USP: Unified Sport participation; 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), height, weight, BMI, WC, WHtR, CVD risk (no = 0, yes =1), weight status (nonoverweight = 0, overweight/obese =1), years involved in Special Olympics (0-5 years = 0, 6-10 years = 1, 10 years or more = 3), USP (non-USP = 0, USP = 1), body image perceptions (actual rating, ideal rating, and raw A-I, and absolute A-I).

CHAPTER V

DISCUSSIONS

Discussion and Interpretation of the Results

This chapter is organized into five sections. This first section discusses interpretations that emerged from this study and then are further compared to the current literature. The second section presents limitations, which need to be noted for caution when replicating this study. The third section provides recommendations in respect to Special Olympics sports programs, actual physical activity participation, and health promotion initiatives. The fourth section demonstrates implications, which suggest important directions for future studies. Finally, conclusions are presented to illuminate the strength of this study's results.

Significance of the Results

The purpose of this study was to examine the relationships among the psychological aspects of physical self-concept and body image, and the differences in factors of age, gender, and comorbidity, severity of ID, weight status, and Unified Sports participation, for athletes with ID. Another purpose was to investigate associations between variables of demographics, anthropometrics, and body image, and physical self-concept, and whether these factors predict physical self-concept perceptions. It is hoped that this study may contribute to our growing understanding of physical self-concept and body image in developing more positive psychological well-being in sports participation

of athletes with ID. Analyses of the physical self-concept and body image data involved several different procedures.

Overall, except for the severity of ID (mild vs moderate), several group differences among variables in either physical self-concept or body image or both were discovered. With regard to predictions, the overall results suggested that there was no single predictor across physical self-concept constructs. That is, each physical self-concept construct seemed to have its own specific predictors. For example, Global self-worth (GSW) could be explained by years involved in Special Olympics, cardiovascular (CVD) risk, and age. Gender and waist circumference (WC) were the only predictors for physical strength (PS) and physical condition (PC), respectively. Physical appearance (PA) and sport competence (SC) had two predictors each (WC and age for PA, and A-I and years involved in Special Olympics for SC). No predictor was identified for physical self-worth (PSW). The summary of the major results was briefly tabulated and split into demographics, associations, and predictions in Table 15. Important findings in comparisons with the current literature are illuminated below.

Table 15

Summary of Major Results

Research Focus	Variables	Results
Demographics		
(Research questions 1-6)	Ages	PA: 12-20yr > 20-35yr A: 12-20yr < 20-35yr
	Genders	PS: male > female
	Weight Status	PA: non OW/B > OW/B PC: non OW/B > OW/B A: non OW/B < OW/B A-I: non OW/B < OW/B |A-I|: non OW/B < OW/B
	Comorbidities of ID	PS: ASD > ID SC: DS > ID, DS > ASD
	Severity of ID	No group difference
	USP	SC: non USP < USP |A-I|: non USP > USP
Associations		
(Research question 7)		Positive: GSW & Years involved in SO Negative: GSW & WC PA & Weight, BMI, WC, WHtR: PC & Weight, BMI, WC, WHtR: SC & A-I
Regressions		
(Research question 8)	GSW	CVD risk^{-}, Years involved in SO^{+}, Age^{-}
	PSW	No predictor identified

	PS	Gender^{-} (male = 0, female = 1)
	PA	WC^{-}, Age^{-}
	PC	WC^{-}
	SC	A-I^{+}, Years involved in SO^{+}

Note. Global self-worth (GSW), physical self-worth (PSW), physical appearance (PA), physical strength (PS), sport competence (SC), physical condition (PC); OW/B: overweight/obese; actual body image ratings (A), actual minus ideal ratings (A-I), absolute values of actual minus ideal ratings (|A-I|). All results listed in the table referred to statistical differences ($p < .05$). The positive symbol ($^{+}$) indicated a predictor was positively related to an outcome variable. The negative symbol ($^{-}$) indicated a predictor was negatively related to an outcome variable.

In the present study, the overall self-descriptions were positive while one (i.e., PC) of the six constructs in the hierarchical conceptual model tended to be negative. More specifically, GSW and PSW were rated the highest two, which are also the top two levels (GSW on the top, followed by PSW) of the hierarchical conceptual model (see Figure 1). This observation seemed to show that athletes with ID, in general, may have greater positive self-esteem (GSW), along with better feelings of satisfactions or confidences in a physical self, than the four domain specific physical self-concept constructs in this hierarchical model. Among the values of the six constructs, the average of the five (except for PC) ranged from 4.2 to 4.9 (above 4 was regarded a positive perception). Of the four subdomains, PA was rated highest, followed by SC and PS. PC (sample question: I can run a long time without getting tired) was the lowest (M = 3.9), falling into the negative responding rating scale. These results were consistent with those

of Pestana (2015), indicating that self-descriptions of people with ID were more likely to have more positive attributes (e.g., a feeling of nice looking) in their daily life; while several domains seemed to be relatively negative (e.g., a domain of physical condition regarding slow ambulation; participant's response from Pestana's study: I can't stand for more than ten minutes). Thus, such findings may underscore the nature of well-being (overall positive feelings) in areas of physical domains in people with ID.

Interpretations of the Results

Age and gender. With regard to self-descriptions in either the general population and those with ID, the factor of age may blunt positive physical self-concept perceptions (e.g., Donohue et al., 2010; Marsh, 2002) and body dissatisfaction, in particular, for mid-age women (Cromley et al. 2012; Tiggemann & Lynch, 2001; Tiggemann, 2004). All the perceptions measured in the present study were relatively positive (except for PC); however, the discrepancy in self-descriptions between age groups existed in the PA and actual body image rating, but not in body dissatisfaction (raw discrepancy of actual-ideal ratings). The younger age group (12-20 years) with ID had more positive PA than the older age group (20-25 years) and perceived themselves a smaller body size than their counterparts. It was not surprising because there were several significant differences in weight, BMI, WC, and weight status (nonoverweight/obese vs overweight/obese) between the 12-20 years and 20-35 years group. The older group had greater obesity-related parameters than the younger group. These findings may explain the younger group's perception of a smaller body size and lesser dissatisfaction than their

counterparts. Stated another way, the older age group tended to be more dissatisfied with their body size when compared to the younger age group; although not significant, the mean difference between the two age groups appeared to approach significance ($p = .052$).

Donohue et al. (2010) addressed that due to a sense of reality and with an increase of age, children with ID could become aware of their limited perceived competence or actual ability, which may not keep progressively developing in such areas and later in a multidimensional manner. Within the same context, it was clear to see a logical perception in the present study that having lower but still positive PA, and also having a tendency toward greater body dissatisfaction in the older age group. These results are consistent with those reported for the general population and those with ID on body image between genders in previous studies (e.g., the general population in Tiggeman, 2004; sample with ID in Donohue et al., 2010).

In addition to the results of age groups, a gender difference in PS was discovered. Male athletes with ID were reported to have greater PS than their female counterparts. The result was not surprising because men, in general, have more strength and physical energy than females (Miller, Macdougall, Tarnopolsky, & Sale, 1993). However, this result was the single gender difference in physical self-concept in the present study. Conversely, Bégarie et al. (2011) reported all the physical self-concept constructs (except for PSW) in boys with ID were statistically higher than girls.

Comorbidities of intellectual disabilities. In the present study, an attempt was made to explore the differences in physical self-concept and body image perceptions between ID comorbidities (ID only, Down syndromes [DS], and autism spectrum disorders [ASD]). The preliminary findings suggested that athletes with ASD (also with ID) were reported to have greater PS perceptions than those with ID only (M = 3.9, a negative perception). Note that the group comparison between those with ID and those with DS nearly reached statistical significance (p = .070) despite the PS values in DS were practically higher than those in ID only. In addition, athletes with DS had greater SC than those with ID only, and those with ASD. Overall, athletes with ID only, who felt a negative perception in PS (sample question: I am stronger than others), and this group also seemed to have greater body dissatisfaction (raw discrepancy) than those with DS. Put differently, body image perceptions in those with ID, resulted with an inclination toward a higher raw discrepancy of actual-ideal ratings when compared with those with DS (p = .053). It was surprising because in the correlation matrix, raw discrepancy was significantly and negatively associated with SC, but not with PS. However, the correlation matrix reflected overall associations without considering individual comorbidities of ID. When compared with Salaun et al. (2014), no significant correlation was uncovered between body dissatisfaction and any physical self-concept construct, and no further comparison between comorbidities were conducted. Thus, compared to the current literature, the present study was the first one to examine such psychological attributes in different comorbidities of ID. Also, another conclusion drawn above should

be interpreted in relation to the nature of individual comorbidity of ID that may have its specific perceptions for physical self-concept and body image. Athletes with DS seemed to have a more optimistic outlook (higher physical self-concept and lower body dissatisfaction) for sport participation than those with ID or those with ASD. Within this perspective, understanding and differentiating conditions among comorbidities of a disability may facilitate future physical activity and sports participation (Abdullah, Ampofo-Boateng, Latif, & Mat, 2011). Such positive experiences of physical activity and sports participation, facilitated by appropriate instructional strategies, may also, in return, bring about benefits of self-esteem, social/peer acceptance, and self-efficacy (Vargas, Flores, & Beyer, 2012).

Weight status, CVD risk, and body image. Regarding the group difference between the nonoverweight/obese group and overweight/obese group, it was not surprising, that PA and PC in the nonoverweight/obese group were higher than the overweight/obese group and that all body image perceptions (except for ideal ratings) in the nonoverweight/obese group were lower than the overweight/obese group. The most likely explanation rested in the nature of weight related indicators. Except for height, the results of weight, BMI, WC, and WHtR revealed their relevance to PA and PC in the correlation matrix. In other words, poorer weight, BMI, WC, and WHtR were likely to have lower PA and PC among athletes with ID. Such findings confirmed what Reel et al. (2013) and Bégarie et al. (2011) reported which identified negative physical appearance perceptions were reflected by a higher BMI in a physical activity context. Current results

of GSW and PSW values between weight statuses did not significantly differ ($p = .13$ and .17), but showed a small to moderate practical significance (both ES above .30), indicating that both values in those in the overweight/obese group seemed to be higher than those who were overweight or obese. Similar study by Bégarie et al. (2011) confirmed that the lower perceived global self-esteem and physical values existed in an obese group.

Another study by Fairclough et al. (2012), measuring weight status and physical self-concept on children without disabilities, suggested that normal weight status appeared to be positively correlated to physical condition and body attractiveness. The findings of this present study identified that athletes with ID and with normal weight status had higher scores in PA and PC than those in the overweight/obese group. The present study is consistent with those involving the general population suggesting that whether for people with or without ID, poorer weight-related indicators (e.g., BMI, WC) and weight status (overweight or obese) appeared to lead to a lower perceived physical appearance and physical condition.

With regard to body image perceptions, the outcomes were reasonable that those with a normal weight status perceived themselves to have a smaller body size and more positive body satisfactions (i.e., both raw and absolute discrepancies were significantly lower than those with overweight/obese statuses). Findings from the present study implied that athletes with ID who had different weight status may perceive similar body image perceptions as the general population. It seemed to be inferred that people with ID

who had weight problems (i.e., overweight and obesity) were perceived to have less confidence in their appearance and stamina. Thus, these findings reported in this paper have demonstrated that weight problems can negatively influence both physical self-concept and body image of athletes with ID and further addressed an urgent need to ameliorate obesity threats.

Studies have shown that obesity is an epidemic and growing public health issue for people with ID, which needs imperative initiatives to prevent it (Must et al., 2014; Robertson, Emerson, Baines, & Hatton, 2014). According to Centers for Diseases Control and Prevention (2014), an increase of childhood obesity (aged 6-11 years) rate between 7% in 1980 and 18% in 2010 in the United States has indicated continued rate of childhood obesity. Grondhuis and Aman (2014) noted abnormally elevated weight status (i.e., obesity), as a stigma, that brought psychological complications such as body dissatisfaction starting in youth with developmental disabilities, including ID.

In comparison with Reel et al. (2013), who investigated body image and BMI among 103 Special Olympics athletes, aged 18 to 61 years, using the FRS questionnaire, the descriptive results from the present study were similar to Reel's findings. Three comparisons were made; mean average of BMI for genders met the cut-off point for being classified into an overweight status or worse (i.e., obesity, the average BMI in female participants in Reel's study was 33.02 ± 9.28). Second, it was estimated that 77.5% of samples with ID in the present study chose smaller body image ratings as an ideal than those chosen as their actual body image ratings. This may imply that more

athletes with ID may want to lose weight, which seems to be in line with Reel's findings (80%). Third, among genders, more females (72.4% vs 51%) with ID desired to have thinner physiques; while approximately 17% of female and 15% male athletes with ID in the present study wanted to have larger physiques. Most importantly, gender differences were not confirmed in both studies, indicating that athletes with ID, overall, in males and females preferred thinner body sizes. The results of correlation coefficients between body dissatisfaction (raw and absolute discrepancies) and BMI were in accord with the findings of Reel et al. (2013), indicating moderately negatively correlations (r = -.430 and -.436 vs -.46).

Among obesity-related parameters (e.g., weight, waist circumference [WC], BMI, and WHtR), our results only confirmed that WC was solely identified as a predictor for PA and PC. One possible reason provided by Salaun et al. (2014) was that an awareness of greater WC could be more visually observable (meaning a perception or input from an extrinsic stimulus) for individuals with ID, than BMI or WHtR. This viewpoint was based on the fact that BMI or WHtR was more a single abstract for depicting a physical index, which may be too challenging to comprehend for people with ID (Salaun et al., 2014). However, the adverse associations between PA, PC, and these obesity-related indicators were confirmed, which lent some credence to assumptions that body morphological variables, physical self-concept, and body image should be related in some way (Salaun et al., 2014).

According to Draheim, McCubbin, and Williams (2002), individuals with ID pose higher CVD risk than the general population. The variable of CVD risk WHtR values > .5), revealed that those with DS may be greatly exposed to having a potential health condition (i.e., greater risk of CVD) more than those with ID and without DS (i.e., with ID only) in the current research. Among athletes with DS, 94% of them (n =17) were considered having a CVD risk in comparison with those with ID but without DS (80%). The values of WHtR in the current study for those with DS was also greater than those with ASD (but not statistically higher than those with ID). A partial explanation for a higher WHtR and CVD risk may lie in the fact that people with DS, including adolescents and adults, were more likely to be obese (meaning higher body weight and BMI causing more health conditions) than those with ID only (Bhaumik et al., 2008; Pan et al., 2016). As for those with DS, the biological risks, also causing obesity, have been identified in the literature, such as a decreased resting metabolic rate, hypothyroidism, and increased leptin (Murray & Ryan-Krause, 2010). However, researchers claim the cause of overweight or obesity may be primarily due to the factors of lifestyles (e.g., physical inactivity, unbalanced nutrient intake; Barnes et al., 2013; Marin & Graupera, 2011; Phillips & Holland, 2011) and environmental influences (caregiver knowledge and perceptions of healthy lifestyle; Melville et al., 2009). Phillips and Holland (2011) claimed that individuals with ID, especially those with DS, were more likely to be physically inactive and to have more obese problems, causing a sedentary lifestyle later (Barnes et al., 2013; Draheim, 2006; Phillips & Holland, 2011). The sedentary lifestyle

leads to related poor physical fitness and obesity and related obesity conditions (Draheim, 2006; Hsieh et al., 2014). For people with DS, abnormal weight status, along with poor diet, were considered as the integral cause of hypertension and CVD. In the present study, a greater WHtR, which is a risk indicator of CVD, was seen in the subgroup with the comorbidity of DS. This finding clearly supports the literature that people with DS have a greater CVD risk, which includes athletes with ID and the comorbidity of DS.

Actual-ideal Body Image Discrepancy Model in people with ID. In the present study, neither raw or absolute discrepancy of body image ratings predicted GSW or PSW, but did so for the subdomain of SC. Specifically, the raw discrepancy, along with years involved in Special Olympics, were major predictors for SC. The results did not echo the findings (overall positive feelings in self-esteem and body image) of Gatti et al. (2014) in adolescents without disabilities, demonstrating that "I like my body, therefore, I like myself." However, there was a tendency toward statistical significance (p = .051) in the raw discrepancy variable, to be a predictor for GSW, within the regression model. Although the present study was unable to affirm this possible predictor, such findings tended to correspond with the theorized patterns of the actual-ideal body image discrepancy model in the general population.

Some scholars may question the empirical evidence for appropriateness of the actual-ideal body image discrepancy model in self-concept research. For example, an ideal perception could be very unrealistic and varied due to methodology issues (e.g.,

individuals' personal characteristics and settings), which may fail to explain the complexation of formation of psychological conceptualization (Boldero et al., 2005).

Unified Sports participation. With regard to Unified Sports participation (USP, meaning inclusive sports settings where participants with and without ID competing other similar composing groups), the participants with USP perceived greater SC than those without USP. Conversely, those who had USP perceived lower absolute discrepancy of actual-ideal ratings. Note that the variables of actual (p = .065) and raw discrepancy (p = .058) had a tendency toward greater values in those without USP. 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 & Siegle, 2008; Duvdevany, 2002). However, the results of the present study appeared to be inconsistent with Ninot et al.'s. (2005; see Chapter 2). Such disagreement may be due to the different sports involvement in terms of an inclusive setting. Ninot et al.'s. study was to examine the effects of four different settings, including the segregated swimming (traditional Special Olympics training and competition), integrated swimming (interschool competition with those without disabilities), adapted physical activity (school swimming class), sedentary group (no training and competition) over 32 months, on perceived sport competence and general self-worth among 32 participants with ID. The decreased perceived sport competence in the integrated group, only when compared to the sedentary group, may be partially a result of the effects of greater involvement (because of competing with their counterparts

in interschool meets) during integrated swimming training and competitions. The environmental conditions of the integrated training competitions in Ninot et al.'s study were not limited to an only USP-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. This may explain why perceived lower sport competence in the integrated scholastic group was observed in Ninot et al.'s (2005) but not in the present study. In addition, in Ninot et al.'s study, the significant difference in perceived competence and actual sports performance only existed in the comparison between those who were involved in integrated scholastic sports and those who had sedentary lifestyles. No significant difference was observed between those who were involved in integrated scholastic sports and those who participated in traditional Special Olympics swimming programs, or those in traditional Special Olympics swimming programs and a sedentary group. 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 when competing against their counterparts, despite improved athletic performance found in all groups (except for the sedentary group) after 32 months of swimming 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 USP information collected, the dichotomy method (yes or no) recorded in the database could not differentiate whether a participant attended either traditional Special Olympics sports, Unified Sports programs only, or a combination of both traditional and Unified Sports programs. 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.

Limitations

Although this exploratory research was based on an existing database, it has yielded findings which have theoretical and practical implications. However, its design is not without flaws. Several issues were presented as follows:

Sampling

In the current investigation, the sample size of 89 participants was sufficient for regression analysis within four predictors. However, as for examination of mediated roles, the sample size was too small to evaluate mediation analysis to reach empirical power (Fritz & MacKinnon, 2007). For example, with one predictor, α set at .05, power of .8, and medium effect size of .14, the computed sample needed for mediation analysis is 403 (Fritz & MacKinnon, 2007). Thus, the study was unable to examine the transmitted effect of a third mediating variable of an independent variable on a dependent variable (i.e., physical self-concept constructs) due to a small sample size. Put another way, if the researcher had a sufficient sample size (over 405 participants), it would have

been possible to examine whether body image perceptions among people with ID with different weight statuses could be an intervening variable (mediator) leading to either positive or negative physical self-concept perceptions.

An extended concern due to sampling issues was that all data sets were from the state of Texas. That is, threats to generalization were due to the fact that 89 data sets (i.e., athletes with ID) were collected from Texas and that an intact sample was used. According to the Special Olympics Texas 2014 Impact Report (Special Olympics Texas, 2014), the six sports competitions were hosted by Special Olympics Texas, including athletics, basketball, cycling, soccer, gymnastics, tennis, and equestrian. The majority of athletes with ID in sports competitions in the Texas Summer Games participated in track and field (roughly 47%) and basketball (40%). Knowing the database only included those who participated in the Summer Games, those who primarily played more Special Olympics winter sports (e.g., power lifting and figure/speed skating) were not collected in the database. In other words, the possible impacts of these winter sports on physical self-concept in athletes with ID are unclear. 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.

Instruments

At present, the methodological concern of how to validate physical self-concept for this population has been raised (Kittelsaa, 2014; Maïano et al., 2009). Besides using qualitative methods such as semi-structured interviews or proxy reports to observe daily

life experiences of people with ID, as reported in the database, a reliable and valid assessment tool to measure self-understanding of individuals with ID is still critically lacking (Maïano et al., 2009). Research focusing on subjective physical self-concept and perceived body image in people with ID is still scarce due to subjects' characteristics of limited cognitive abilities and comprehension capability (Barnes et al., 2013). The intellectual disability version of the physical self-inventory (PSI-VS-ID) developed by Maïano et al. (2011) has paved a new way for assessing physical self-concept (a psychological status) of adolescents and young adults with ID. 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 term "physical self-concept" and its multidimensional model in the present study followed the definitions which were used in the original questionnaire (PSI-VS-ID with a total of 6 constructs with 12 items). Some other important perceived physical related constructs were not measured. For example, other physical self-concept questionnaires for people without disabilities (i.e., PSPP) had 9 constructs with 98 items. Questions regarding flexibility, coordination, health status, and being physically inactive were not utilized (meaning excluded during the validation process) in PSI-VS-ID, partially due to comprehension and cognitive functioning issues.

Recently, more concerns in regard to ecological validity of applying a line-drawn silhouette method (e.g., FRS recorded in the database for this study) for body image measure have been raised as well (Gardner & Brown, 2010). For example, a simple two-dimensional line drawing used to represent a human being may not truly reflect a real individual (Bateson, Cornelissen, & Tovee, 2007). In addition, the use of FRS may suffer from a lack of a validation process for individuals with ID, meaning that it is still unclear whether the design of FRS is credible to measure what it is intended to measure. To enhance the comprehension of a visual-matching task (identifying oneself with an image of a body shape) for people with cognitive disabilities, it may be better to use real photography as a stimulus rather than line-drawn images (Manzanero, Contreras, Recio, Alemany, & Martorell, 2012). Thus, the present author has acknowledged that the validity of any inferential results may be limited to the scope of the current instrument.

Power Analysis

According to a *G*Power* software (Faul et al., 2009), a sample size of 89 data sets was sufficient to have four predictors to meet a desired level of power (set at .80, as suggested in an empirical study). According to Polit and Beck (2008, p. 605), if a value of correlation coefficient was .25, a recommended sample size was 126 to meet a desired level of power. If a value of correlation coefficient was .20, with a sample of 89, the power was less than .70. Thus, the sample size of 89 data sets in the present study appeared to be problematic when running correlation analysis to meet the value of .80. With regard to inspecting significant associations in the current study, most of them

exceeded .25. In addition to a possible insufficient power, another concern which should be noted is the small sample size which may lead to a type 1 error rate (i.e., false positive). Thus, the problems of a small sample size may limit the interpretations.

Data Collection

Due to the method of secondary analysis, it is readily acknowledged that the exploratory study was limited to the scope of the existing database (i.e., lack of control during the data collection process, Portney & Watkins, 2009). Moreover, research questions for a study may need to be searched to fit the existing data, unlike other research methods (e.g., quasi-experimental design), looking at interest of research in the literature, and then considering demographical factors and appropriate experimental control for a study.

No athlete or parent interviews were conducted to report additional sports involvement; only data entered on the competition enrollment form were utilized to complete the database. Therefore, perceived self-concept feelings due to exercise intensities, frequencies, and or duration of sports practice could not be collected.

Recommendations

Special Olympics and Unified Sports

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). Special Olympics International has provided year-round Olympic-type sports training and competitions, and is regarded as the largest sports organization serving children and

adults with ID in the world. According to a 2014 Reach Report, the Special Olympics International organization claimed to reach over 4.5 million athletes with approximately 95,000 competitions in over 170 countries, promoting social inclusion in Unified Sports and related health promotion programs in community-based settings (Pan & Davis, 2015; Special Olympics, 2014). A large-scale study by Marks et al., (2010) evaluated Special Olympics health promotion programs (sports training, health and fitness training, nutrition education) that ran in 6 to 12 week cycles across five different states (Colorado, Illinois, Massachusetts, South Carolina, and Texas). The results indicated that after the programs, there was a significant decrease in average body weight from 178.2 to 176.3 lbs ($p < 0.01$) and the positive psychological benefits among Special Olympics athletes. These benefits, such as improved self-confidence, more positive attitudes toward exercise, and decreased barriers to exercising were self-reported, whereas the clinical improvement of abdominal fat, flexibility, aerobic fitness and muscular strength and endurance were also found, but was not considered to be statistically significant (Marks et al., 2010). An increasing number of recent publications and empirical studies have assessed the health promotion that sports participation, such as Special Olympics, can facilitate physiological and psychological health among people with ID (Briere & Siegle, 2008; Baran et al., 2013; Cuesta-Vargas et al., 2011; Marks et al., 2010; McConkey et al., 2013; Özer et al., 2012; Pan & Davis, 2015; Stanish et al., 2016; Wilski et al., 2012).

The current study did not explore actual sport competence and fitness levels, but simply focused on intrinsic perceptions of self-descriptions in terms of physical self-

concept and its relationship with demographics and weight-related indicators. Within the context of USP (with vs. without) in the present study, there were no group differences in demographics (gender, age group, comorbidities and levels of ID, CVD risk) or weight-related indicators (height, weight, BMI, waist circumference, waist to height ratio). However, regarding the self-descriptions in a physical domain, the only difference in six physical self-concept constructs was in sport competence (SC), indicating that greater SC perception was discovered in athletes with USP, but not in those without Unified Sports experiences (i.e., only participating traditional Special Olympics sports). 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 & Davis, 2015; Special Olympics, 2014).

Personal development in Unified Sports is of central interest in the context of health promotion among people with ID (McConkey et al. 2013; Wilski et al., 2012). The involvement of Unified Sports is significant access to expand their life experiences (Harada & Siperstein, 2009). That is, through the participation of people with and without ID, there were three major advantages, including physical (sports skills and fitness levels, teamwork), mental (self-confidence, self-esteem and the ability to communicate with others.), and social (friendship: their relationships with other individuals, mutual trust, greater participation in public events) areas in this field (Wilski et al., 2012). As many other studies, including Baran et al. (2013) and McConkey et al. (2013) have pointed out, Unified Sports programs facilitated sports skills and positive self-descriptions of athletes

with and without ID. For example, Baran et al. (2013) stressed that Special Olympics athletes who were involved in Unified soccer training improved their physical fitness capabilities (e.g., standing broad jump and sit-ups) and soccer skills (e.g., run and kick, slalom, overall soccer competence skills, etc). Their counterparts without disabilities also had increased fitness and soccer skills. The connection between the benefits of physical fitness and psychological well-being improvement was made explicit through sports participation such as Special Olympics. 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.

However, with regard to the aforementioned research studies, none specifically explored physical self-concept and body image perceptions between those with and without Unified Sports experiences among individuals with ID. The preliminary findings in the present study in relation to the effect of Unified Sports experiences on physical self-concept indicated that those with USP tended to have greater perceived sport competence than those without USP. 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 to fulfill the mission of Special Olympics. Conversely, the results of body image revealed in this study that with USP, absolute discrepancies were less than those without Unified Sports experiences. The actual body

image rating and raw discrepancies in those with USP practically seemed to be indicative of the tendency toward lower than those with USP. Such findings were not significantly different, being with $p = .07$ and $p = .06$, respectively, but their magnitudes (.40 each) of the USP effect demonstrated a small to moderate practical significance. These outcomes implied that there was some benefit to involvement in inclusive physical activity settings, resulting with participants with ID perceiving smaller body shapes and less body dissatisfaction.

Indisputably, there is some evidence that the involvement of either traditional Special Olympics sports or USP may have considerably contributed to possible psychological well-being, improved fitness, and other positive health results. This meaningful involvement gives rise to a new insight and offers more promising possibilities in a way which advocates disability awareness through such inclusive sports participation. It is likely that the present study would have significant practical importance to make more efforts to popularize Special Olympics programs and inclusion by means of Unified Sports.

Actual Physical Activity/Sports Participation in People with ID

In the present investigation, sports practice, in respect of actual physical activity participation (e.g., its intensities and frequencies) was not included in the database. Actual physical activity participation and its effect on the development of physical self-concept in people with ID was unclear. However, the literature supports that the experience of physical activity participation is believed to have an impact on

psychological attributes for people with and without ID (Ayaso-Maneiro et al., 2014; Eime et al., 2013). Discussions of operational elements of actual physical activity participation (e.g., intensity, frequency, duration, and modality) is beyond the scope of the paper. However, with the higher intensity and frequency of regular sports practice, body image as well as physical fitness of Special Olympics athletes appeared to be improved compared to nonathletes with ID (Özer, 2005). Special Olympics athletes may be considered more "physically active" than those individuals with ID who do not participate in Special Olympics sports (Cuesta-Vargas et al., 2011). A fundamental premise of "physically active" in Special Olympics athletes was defined on the basis of intensities, frequencies, and duration of physical activity/sports practice (Cuesta-Vargas et al., 2011; Válková, Qu, & Chmelík, 2014). Those with ID who had an exercise routine (i.e., higher frequency of moderate physical activity at least 30 min per day in a week) also had lower obesity rates (Hsieh et al., 2014) and improved sports skills (Baran et al., 2013; Duvdevany, 2002).

Válková et al. (2014) addressed another perspective with respect to the reason why Special Olympics athletes may be considered more "physically active". The likely explanation was attributable to having greater sports ability (e.g., high-level sports: 800-meter sprint vs low-level sports: 50-meter walk sports event) than those who primarily participated in low-level sports. Individuals who performed better fundamental sports skills (e.g., run faster, jump higher) could meet physical activity guidelines (exceeding 10,000 steps per day). Not surprisingly, if there is an associated or secondary condition

constraining bodily movement and experiences, an individual with ID under that condition may have to limit his or her capability of participating in high-level sports events or practice. Other similar studies which reviewed or examined physical activity levels (e.g., Sundahl, Zetterberg, Wester, Rehn, & Blomqvist, 2016; Taliaferro & Hammond, 2016; Temple, Frey, & Stanish, 2006) pointed out that the majority of individuals with ID, including adolescents and young adults, had poorer physical activity levels than those without disabilities. Specifically, as noted in Temple's (2009) review article, less than one-third of individuals with ID met moderate physical activity levels, and roughly one-fourth met the guideline of 10,000 steps per day. However, the way that the impact of specific physical activity intensity manipulates physical self-concept needs more empirical interventions.

As for Special Olympics athletes who did not have improved fitness levels (see Cuesta-Vargas et al., 2011), this may be due to the degree of intensity of a specific sports format which did not reach the desired training effects. In the present study, it was concluded that the samples of Special Olympics athletes had positive feelings in relation to physical self-concept. This phenomenon is fairly consistent with what is known about people without disabilities who had physical exercise routines and perceived positive reflections. These findings support those without disability were likely to have positive physical self-concept perceptions, and as a result, greater psychological well-being (Martín-Albo, Núñez, Domínguez, León, & Tomás, 2012). Accordingly, regular participation in Special Olympics may help individuals with ID maintain

exercise/physical activity habits associated with ameliorating secondary conditions and sedentary lifestyles, but may also improve psychological well-being (Hsieh et al., 2014; Marks et al., 2010; Wilski et al., 2012).

The importance of actual physical activity/sports participation has been discussed. The impact of the sports involvement may influence not only obesity problems, but mediate the development of physical self-concept and body image in a way associated with exercise training principles. For instance, the relationship between time spent in moderate-to-vigorous intensity physical activity, weight status, and psychological attributes examined in the present study may influence perceived sport competence or other physical self domains. These underlying influences were unclear and under investigated due to the scope of the existing database.

Information in the literature regarding actual physical activity participation between proxy reporting (e.g., parent reporting) and objective measurement (i.e. use of HR monitors and accelerometers) seemed to conflict to some extent (Matthews et al., 2011). Stated another way, the troubling aspect of such disagreement was that results from proxy reporting in people with ID may not be stable when compared to objective measurements (Hinckson & Curtis, 2013). A study using an accelerometry approach to objectively measure physical activity in people with ID (not specified if there were Special Olympics athletes) by Barnes et al. (2013) suggested that about one-fourth met the physical activity recommendation (30 min of moderate intensity physical activity for most days in a typical week) as similarly observed in a study by Válková et al. (2014).

The two studies underscored the importance of actual physical activity participation and the associated risks of reduced physical activity levels based on an objective measurement. The consequences of reduced physical activity levels were addressed by Barnes et al. (2013), who also pointed out that approximately 80% (235 participants) of adults with ID (aged 18-65 years) were overweight or obese. Of these, 26% (76 participants) reported that they had no regular exercise habit. Programmatic and organized physical activity participation (e.g., Special Olympics sports programs) was expected to combat the tendency to develop metabolic diseases (obesity) and sedentary conditions (Barnes et al., 2013; Marks et al., 2010; Wilski et al. 2012) in people with ID. The findings of Barnes et al. (2013) were in agreement with other research, demonstrating that adults with ID had a sedentary lifestyle and may have higher incidences of health conditions compared to the general population (e.g., obesity and cardiovascular disease; Draheim et al., 2002; Haveman et al., 2010; Hsieh et al., 2014). This led researchers to consider the importance of ongoing physical activity participation in people with ID. Maintaining and improving positive physical self-concept through physical activity participation can contribute to the essence of psychological well-being for persons with ID.

Assistance given to people with ID for quality physical activity participation access included environmental and social supports (Temple, 2009). Over 40% of adolescents with ID felt frustrated and found it difficult to learn, despite the fact that they still enjoyed experiencing physical activities and sports (Stanish et al., 2016). This

implication revealed that the involvement of external social support should be considered in their physical activity participation in order to facilitate psychological well-being and obtain health fitness benefits. Coaches, staff and parents were mainly associated with ongoing participation in the future (Marks et al., 2010; Temple, 2009) in order to remove external barriers such as transportation, financial issues, lack of awareness of available sports programs, lack of social support, and lack of policy guidance (Bodde & Seo, 2009; Temple, 2009). Put differently, improved physical activity participation and removal of barriers can be facilitated by family involvement, organized exercise structures, and affordable community physical activity programs (Draheim, 2006; Taliaferro & Hammond, 2016). Another study simply noted that parental support and perceptions determined the degree of the commitment to sports participation (Melville et al., 2009). Although the present study investigated physical self-concept in relation to sports participation, in order to further explore how actual physical participation and barriers interfere with the development of physical self-concept, additional research may be needed to consider parental influences on child's self-descriptions. This research will enhance the potential for more meaningful involvement in physical activity and will help individuals with ID to gain greater benefit from sports participation.

Health Promotion Initiatives

There is a need for health promotion for this "vulnerable" population (Robertson et al., 2014). Individuals with ID are considered to be a "vulnerable" population due to a high risk of obesity, tobacco use, and poorer nutrition intake in their daily life (Robertson

et al., 2014). For example, with regard to the nutrition aspect, unhealthy dietary patterns or unbalanced intake in individuals with ID, including DS, have been documented (Ball et al., 2012; Marin & Graupera, 2011; Robertson et al., 2014; Wong, Dwyer, & Holland, 2014). Physical self-concept may be impacted not only by personal characteristics (e.g., gender, age, comorbidities, and weight status) but also by societal factors (e.g., parents, significant others, and mass media), especially in females (U.S. Department of Education, 2003). The culturally devalued aspects can exacerbate poor self-efficacy in relation to a behavior change for a healthier lifestyle (Moreno-Murcia et al., 2011).

According to Robertson et al. (2014), approximately two-thirds of participants with ID ate fruit less than four days in a typical week, while only about two-fifths of those without ID did so. Thus, for health related educators, increasing the awareness of the obesity problem as a public health issue is still an important characteristic of a healthy lifestyle intervention. Enabling factors for promoting physical activity in healthier lifestyles of this population could include motivation for participation, social connections, and policy-wide and financial support (Temple & Walkley, 2007). This initiative is continuously needed to garner more attention and move forward to create feasible plans for everyone. In a review article by Heller, McCubbin, Drum, and Peterson (2011) investigating the detriments of health promotion interventions in adults with ID, a combined intervention of physical activity and nutrition education may facilitate better health behaviors and, in some cases, the improvement of weight status was also reported. Multiple components (e.g., exercise and dietary habits) of an intervention are needed to

ensure the promotion of healthy lifestyles in adults with ID (Bodde, Seo, Frey, Van Puymbroeck, & Lohrmann, 2012; Marks et al., 2010; Spanos, Melville, & Hankey, 2013).

Also, in considering negative body image and body dissatisfaction issues, the use of body awareness in focus groups may help improve body self-image in adults with ID who were obese and unhappy about their body images (Rubbert, Bisnauth, & Offen, 2014). After 9 weeks of group activities including the learning content related to healthy eating, body shape and self-esteem, participants with ID reported that the influence of negative messages caused by peers, family, and social media were reduced (Rubbert et al., 2014).

As mentioned in previous sections regarding parental influences in their child's health awareness or practice, a health promotion program may not only focus on adolescents themselves, but also on parents' subjective attitudes toward obesity and healthy lifestyles in order to ensure sustained and consistent health awareness. Thus, family involvement in health promotion initiatives should be indispensable and critical in facilitating better self-descriptions in a physical domain, and may also have a lasting positive influence into adulthood for individuals with ID.

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 existing database. 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 to .17) revealed the fact that the variables entered into the regression models may not be sufficient to have greater explanatory power in the present study. Such findings also implied that there are likely other critical factors that may manipulate the development of physical self-concept. For example, 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 (J.-D. Lin et al., 2010; Melville et al., 2009; Spanos, Hankey, et al., 2013; Spanos, Melville, et al., 2013), especially concerning participation in community-based activity programs (Marks et al., 2010; Temple, 2009). Parents who held more positive attitudes involving physical activity played a critical role in facilitating regular physical activity in their child, aged 16 to 18 years, with ID (J.-D. Lin et al., 2010).

In addition to the potential impact on physical self-concept, 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). Correlates between child and parents' BMI and frequency of fast food provision were found in the literature (George, Shacter, & Johnson, 2011). Correlates were also identified between the child's BMI and parental physical activity (habits of being physically active and healthy foods). These inferred that a parental role concerning a child's BMI was formative (George et al., 2011; Mikulovic et al., 2011).

Individuals with disabilities generally were socially stigmatized, particularly those with ID (Kittelsaa, 2014). The construct of negative societal factors (e.g., socioeconomic status, parent's perception toward health) caused physical inactivity and obesity (J. -D. Lin et al., 2010; Rimmer et al., 2010; Yoshioka & Takeda, 2012). If people with ID think of themselves as having intrinsically-fixed perceptions, they would be aware of their self-image and their experience with disability without the capability to progress from their innate state. Because of this, it becomes an imperative step to advocate physical activity/exercise for people with ID in order to break the restrictive perception.

Medication use may impair one's motivation and may cause one to fail to follow instructions in answering the questionnaire. People with ID who have had medications on a regular basis may have difficulty truly expressing psychological states and understanding a response process through the required questionnaires. Lin et al. (2005) and Yen, Lin, Loh, Shi, and Hsu (2009) pointed out that regular medication use was relatively common in adolescents with ID (approximately 25%), in particular, for the

treatment of epilepsy and psychiatric problems. Medication use (e.g., antipsychotics, antidepressants), to some extent, may have side effects, including weight gain, lack of efficacy, and abnormal cognitive functioning (Cohen, Glazewski, Khan, & Khan, 2001; Edelsohn, Schuster, Castelnovo, Terhorst, & Parthasarathy, 2014). Likewise, Hsieh et al. (2014) concluded that adults with ID who had taken medications regularly were more likely to gain weight. In the current research, the body composition/health risk indicators (i.e., weight, BMI, WC, WHtR) were correlated to PA and PC, although medication use among athletes with ID was not considered. Clearly from the present study that weight problems may have negative impacts on the physical self-concept perceptions of athletes with ID, but the results cannot reflect whether there is a behavioral or psychological impact resulting from any type of medication.

One of the important findings by Saluan et al. (2014) was that an overestimation of physical-sport competence (i.e., positive illusory bias) predicted several physical self-concept perceptions and body image dissatisfaction for people with ID. That is, this perception which dictated the degree of such psychological attribute greatly contributed to the physical self of individuals with ID. As Varsamis and Agaliots (2011) and Saluan 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. Therefore, the “unrealistic” life experience decreases the likelihood of

understanding the possible discrepancy of competence in their physical selves when compared to those without disabilities. The present investigation did not further examine how the overestimation of physical-sport competence would contribute to the development of physical self-concept. Instead, this study does allow self-description researchers to study this interesting perspective of the psychological mechanism (positive illusory bias) involved when considering the effect of early successful experiences. This may be applied to improve instructional methodology, along with coaching techniques to reinforce self-efficacy and develop a healthier lifestyle.

Implications for the Future Studies

Despite the encouraging results of the study as to the positive effects of sports participation provided by Special Olympics, future research is required in a number of directions to help consolidate the study of physical self-concept. Thus, based on the findings of the study, possible future studies are as follows:

1. Since the present study drew more attention to the physical self-concept of Special Olympics athletes only, the next logical step can be to investigate whether physical self-concept or body image differs between those who currently participate in physical activity/exercise on a regular basis and those who are considered as having a sedentary lifestyle. This may serve as a basis for physical self-concept research in promoting a more physically active lifestyle for individuals with ID in their adulthood.

2. An area of future research that should be considered is the effect of medication on the state of mind in people with ID. Approximately 25% of individuals with ID (see

Lin et al., 2005) had regular and long-term medication use, which may partially skew physical self-concept in some way associated with motivation, weight gain, and sports participation. The interaction between these factors may cause a difference in psychometric outcomes in this population. Thus, it may be interesting to examine whether certain medication use influences one's physical self-concept and sports participation.

3. Additional research focusing on these psychological aspects of comorbidities of ID may be of interest and value in applying better motivational and instructional methods for coaches and teachers, and in facilitating exercise adherence to health behavior change for individuals with ID. Thus, more understanding of the impact of such psychological well-being among different comorbidities of ID could be a promising line of inquiry.

4. The potential of parental influence in relation to parents' lifestyles, and reflection of their physical self-concept and body image onto their child's physical self-concept clearly needs further exploration. As for the influence of parents' lifestyles, for example, the understanding of parents' physical activity levels, time spent with their child with ID in physical activity, meal-preparation for family will help to ascertain which is likely to impact those self-descriptions.

5. Salaun et al.'s (2014) study stressed that positive illusory bias was the major predictor across several individual physical self-concept constructs, along with body image dissatisfaction perception. While the present study did not adopt the variable of positive illusory bias in regression analysis, the implementation of this variable into the

future interpretation of the physical self-concept model in athletes with ID may be the next step to clarify the model.

6. Although the present study investigated physical self-concept associated with several demographical differences and associations among variables, more research is still needed to explore whether physical self-concept could be improved by a given physical activity modality (individual sport versus team sport) in respect of its intensities, frequency, and duration, and the combination of physical activity and other components (e.g., teaching self-efficacy techniques and positive self-talk). This may readjust an individual's predisposing belief in their physical self-concept. Such work will be beneficial in aiding practitioners to integrate psychological elements in the development of proactive intervention for people with ID.

7. Despite this study's appropriate use of the current data through the internal consistency testing in the database for the present research, we cannot neglect the fact that the PSI-VS-ID was developed for French samples with ID (French version) and English-speaking individuals with ID (English version). That is, it has not been fully validated using American samples with ID and may not truly reflect their evolved psychological mechanism due to bodily movement and physical activity experiences. Thus, the instrument used for the original data collection in the database should be subject to constant revision and alteration in order to be more valid and reliable for American samples with ID.

8. Due to a concern in relation to a two-dimensional line-up drawing which may lack ecological validity for body image measurement, a real photo-graphic body image measure associated with BMI categories may be more appropriate for people with ID. Future research has to be carried out in a variety of cultural settings to find out how ecological validity could apply to the real photography technique in self-description research. As such, this may obtain more reliable and objective data in a physical domain and may find more evidence for physical self-concept research for people with ID.

9. A bigger sample size (e.g., more than 405 as suggested) would provide the ability to run correlation and mediation analysis. For example, domain-specific psychological features could be a mediator in physical activity behaviors (e.g., Beasley & Garn, 2013), and can also be explained by a ratio (BMI; WHO, 1995). Likewise, Morano et al. (2011) suggested that body image played a mediating role in physical self-concept. An interesting avenue of investigation might be to consider whether physical self-concept being a mediating role could influence sports participation and related obesity indicators. In the present investigation, the study's focus was primarily physical self-concept constructs as outcome variables. However, physical self-concept may be thought of as a mediating role, further affecting physical activity particpation and weight-related indicators. Another benefit of a bigger sample size is that it may also assist researchers in reexamining the application of the actual-ideal body image discrepancy model that may have better explanatory power to influence physical self-concept in athletes with ID.

Conclusions

This research was intended to examine group differences in demographics in relation to physical self-concept and body image, and the association of physical self-concept with demographics, anthropometrics, and body image in athletes with ID. At present, research focusing on physical self-concept and body image perceptions in people with ID is still very scarce. The current study contributes to the understanding of multifaceted associations among variables between those who participated in Unified Sports participation and those without such experience. This appears to be the first study to examine the relationship between these variables and to explore how these variables may contribute to psychological well-being in a physical domain. Overall, it seems possible to assert that athletes with ID in the current study and using data recorded in the database, had positive psychological well-being. One of the major findings suggested that greater global self-worth (i.e., global self-esteem) was explained by the lower CVD risk indicator, more years involved in Special Olympics, and an older age in years. The second major finding was that different demographic factors appeared to be crucial underlying influences on individual physical self-concept constructs. For example, athletes with ID who were not overweight or obese were more likely to have better feelings in not only physical self-concept but also in body image perceptions. The effects of USP amplified perceived sport competence, but caused greater body dissatisfaction.

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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APPENDIX A

Texas Woman's University (TWU) Institutional Review Board Approval

Institutional Review Board
Office of Research and Sponsored Programs
P.O. Box 425619, Denton, TX 76204-5619
940-898-3378
email: IRB@twu.edu
http://www.twu.edu/irb.html

DATE: April 14, 2016

TO: Mr. Cheng-Chen Pan
Kinesiology

FROM: Institutional Review Board (IRB) - Denton

Re: Exemption for Examination of Associations of Physical Self-Concept of Athletes with Intellectual Disabilities (Protocol #: 19010)

The above referenced study has been reviewed by the TWU IRB (operating under FWA00000178) and was determined to be exempt from further review.

If applicable, agency approval letters must be submitted to the IRB upon receipt PRIOR to any data collection at that agency. Because a signed consent form is not required for exempt studies, the filing of signatures of participants with the TWU IRB is not necessary.

Although your protocol has been exempted from further IRB review and your protocol file has been closed, any modifications to this study must be submitted for review to the IRB using the Modification Request Form. Additionally, the IRB must be notified immediately of any adverse events or unanticipated problems. All forms are located on the IRB website. If you have any questions, please contact the TWU IRB.

cc. Dr. David Nichols, Kinesiology
Dr. Ronald Davis, Kinesiology
Graduate School

APPENDIX B

The Intellectual Disability Version of the Very Short Form of the Physical Self-Inventory (PSI-VS-ID)

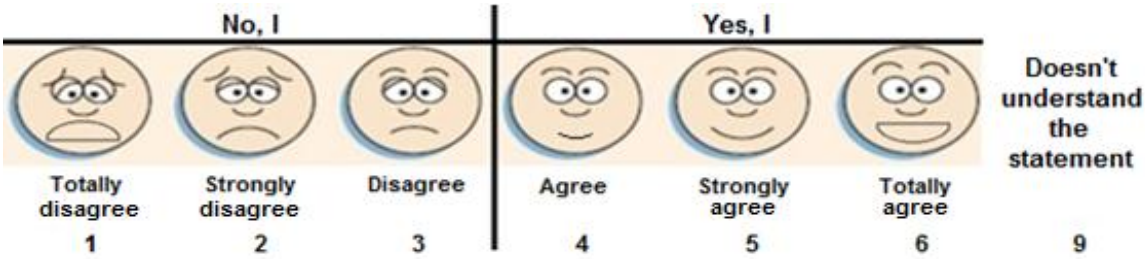
QUESTIONNAIRE

DIRECTIVES FOR THE PERSON IN CHARGE OF TEST ADMINISTRATION

This questionnaire evaluates global self-esteem (or global self-worth) and physical self-perceptions (generic physical self-perceptions, sport competencies, strength, physical appearance, and physical condition). Before administrating this questionnaire, you need to ensure that all sentences and vocabulary used in this test are clearly understood by participants. To this end, you need to ask them open-ended questions on the terms that are used in the questionnaire. For instance: What does it mean to be happy? What does it mean to have strength? To be stronger?

If some of these words are unclear for a participant, you can propose synonyms. However, you need to ensure that you are using a neutral language that will not in any way influence the way the participant will answer the items and the meaning of the full sentence. If a participant still does not understand a sentence/word, even after many attempts made to explain them, then this participant must not answer this specific question.

The answer scale represented here was devised to facilitate the answering process for the participants. Before you start the administration of the questionnaire, you need to present these figures to each participant and explain to him/her that they represent an answering scale going from "*No, I Totally disagree*" to "*Yes, I Totally agree*". At the end of each sentence, you need systematically present this answer scale, ask the participant to show you the figure that best represents his/her answer to the sentence, and have him/her circle that answer.



DIRECTIVES FOR THE PARTICIPANT

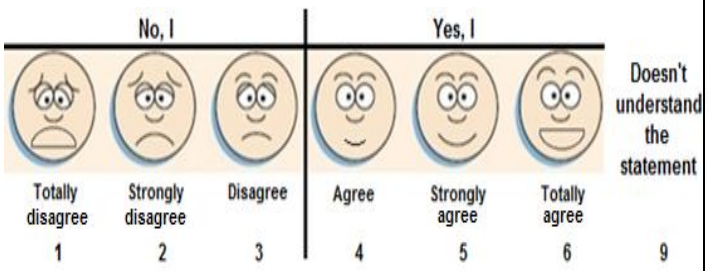
I will read you sentences to understand what **YOU THINK about YOURSELF and your BODY** and what **YOU ARE ABLE TO DO WITH YOUR BODY**. This is not an exam. There is no right or wrong answer, and everyone's answers will be different. After reading the sentence, I will ask you to tell me whether **'yes' you agree** or **'no' you disagree** with this sentence. You must answer according to what **YOU THINK about YOURSELF and your BODY** or what **YOU DO WITH YOUR BODY**. There are a few sentences that you may have trouble understanding. If you do not understand a sentence or a word in a sentence, tell me, **'I don't know what that means'**. It's okay; I will try to explain it to you or find other words.

After each sentence, you must **CROSS or TICK** the box that corresponds to **YOUR ANSWER**. You must **CROSS or TICK**: the **1st box** if your answer is 'No, I totally disagree'; the **2nd box** if your answer is 'No, I strongly disagree'; the **3rd box** if your answer is 'No, I disagree'; the **4th box** if your answer is 'Yes, I agree'; the **5th box** if your answer is 'Yes, I strongly agree'; or the **6th box** if your answer is 'Yes, I totally agree'. I will explain to you the meaning of 'No, I totally disagree'; 'No, I strongly disagree'; 'No, I disagree'; 'Yes, I agree'; 'Yes, I strongly agree'; 'Yes, I totally agree'.

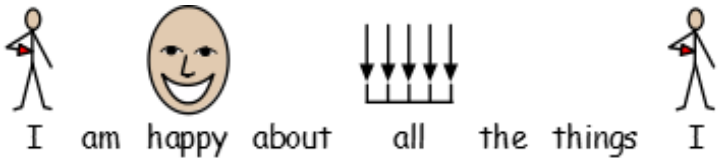
Now, we will begin the questionnaire. I will read you the sentence slowly. Ask me if you would like me to repeat it.

1.

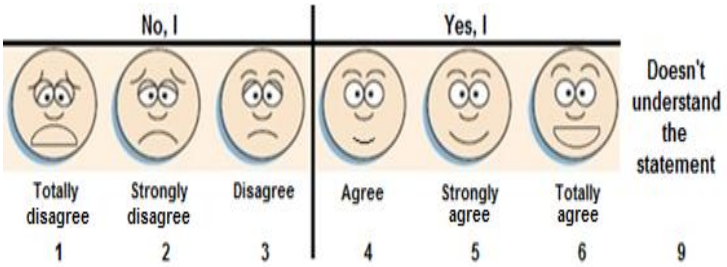

I
like
myself.


No, I
Yes, I
Doesn't understand the statement
Totally disagree
Strongly disagree
Disagree
Agree
Strongly agree
Totally agree
1
2
3
4
5
6
9

2.

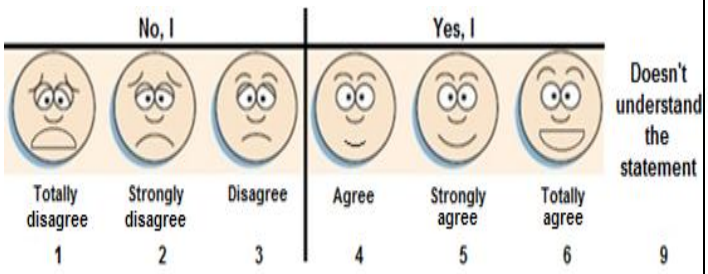

I
am
happy
about
all
the
things
I


can
do
with
my
body.


No, I
Yes, I
Doesn't understand the statement
Totally disagree
Strongly disagree
Disagree
Agree
Strongly agree
Totally agree
1
2
3
4
5
6
9

3.


I
am
stronger
than
others.


No, I
Yes, I
Doesn't understand the statement
Totally disagree
Strongly disagree
Disagree
Agree
Strongly agree
Totally agree
1
2
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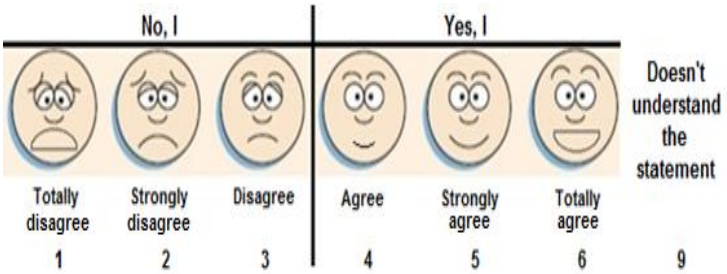
5
6
9

4.


My
body
is
nice
to
look
at.


No, I
Yes, I
Doesn't understand the statement
Totally disagree
Strongly disagree
Disagree
Agree
Strongly agree
Totally agree
1
2
3
4
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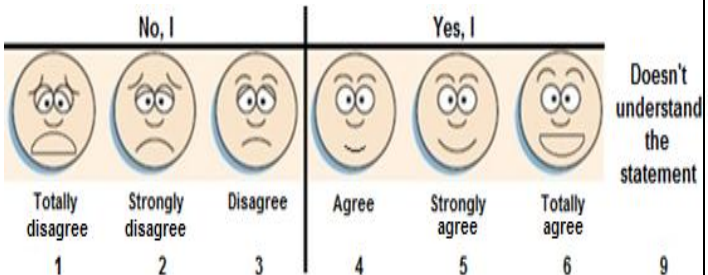
6
9

5.

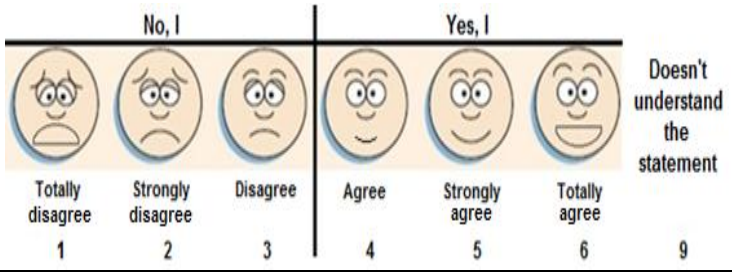

I
can
carry
heavy
things.


No, I
Yes, I
Doesn't understand the statement
Totally disagree
Strongly disagree
Disagree
Agree
Strongly agree
Totally agree
1
2
3
4
5
6
9

6.


I
can
run
a
long
time
without


getting
tired.


No, I
Yes, I
Doesn't understand the statement
Totally disagree
Strongly disagree
Disagree
Agree
Strongly agree
Totally agree
1
2
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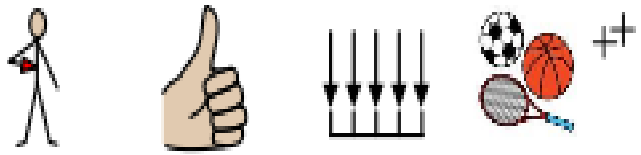
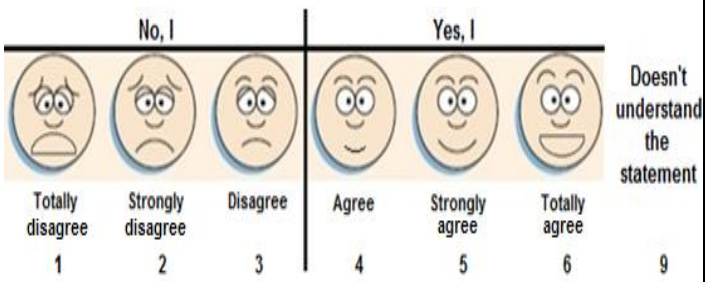
6
9

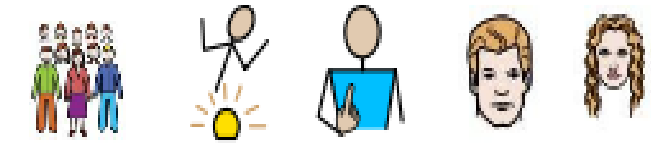
7.



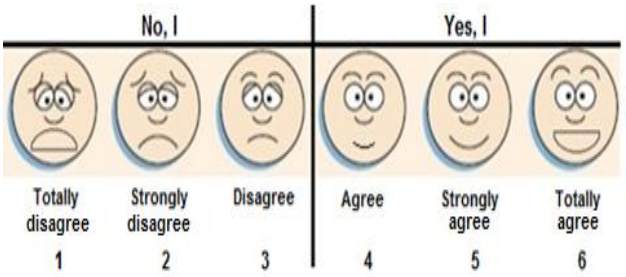
I am good in all sports.



8.



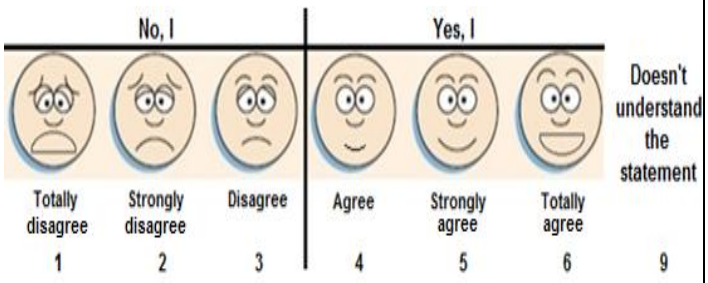
Everybody finds me good-looking.



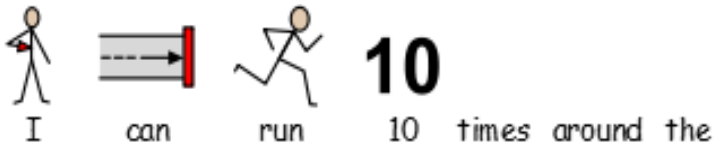
9.

I am happy with myself & what I

can do with my body.

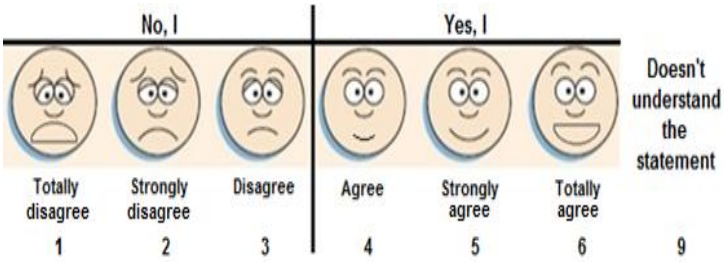


10.



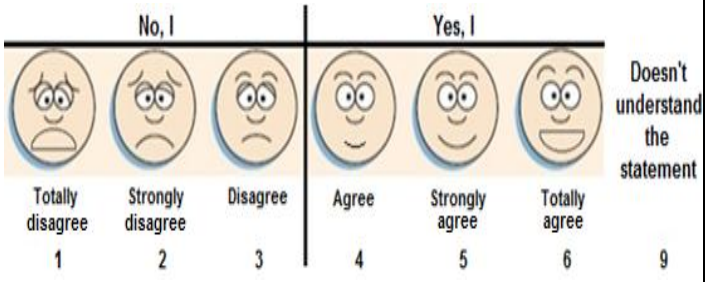
I can run 10 times around the

basketball court without stopping.

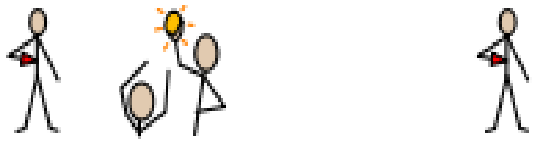


11.

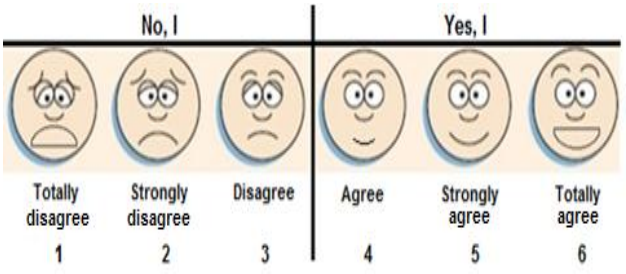
I do things well in sports.



12.



I want to stay as I am.



Thanks a lot for your answer

1. I like myself	GSW
2. I am happy about all the things I can to do with my body	PSW
3. I am stronger than others	PS
4. My body is nice to look at	PA
5. I can carry heavy things	PS
6. I can run a long time without getting tired	PC
7. I am good in all sports	SC
8. Everybody finds me good-looking	PA
9. I am happy with myself and what I can do with my body	PSW
10. I can run 10 times around the basketball court without stopping	PC
11. I do things well in sports	SC
12. I want to stay as I am	GSW

Note. GSW : Global self-worth ; PSW : Physical self-worth ; PC : Physical condition ; SC : Sport competence ; PA : Physical appearance ; PS : Physical strength.

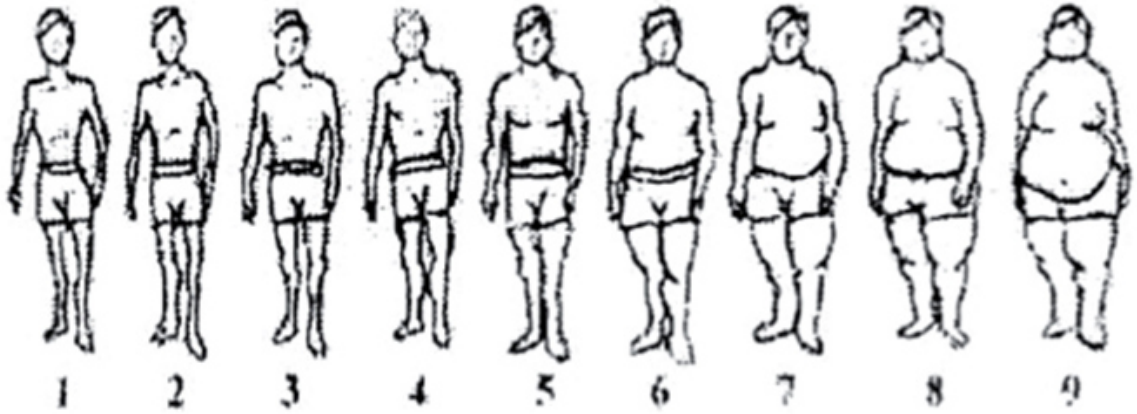
Estimate the mean for each scale
Scale range : 1 to 6.

APPENDIX C

Figure Rating Scale

For Men **Date:** _____ **Name:** _____ **#:** _____

1. Which figure looks like you?



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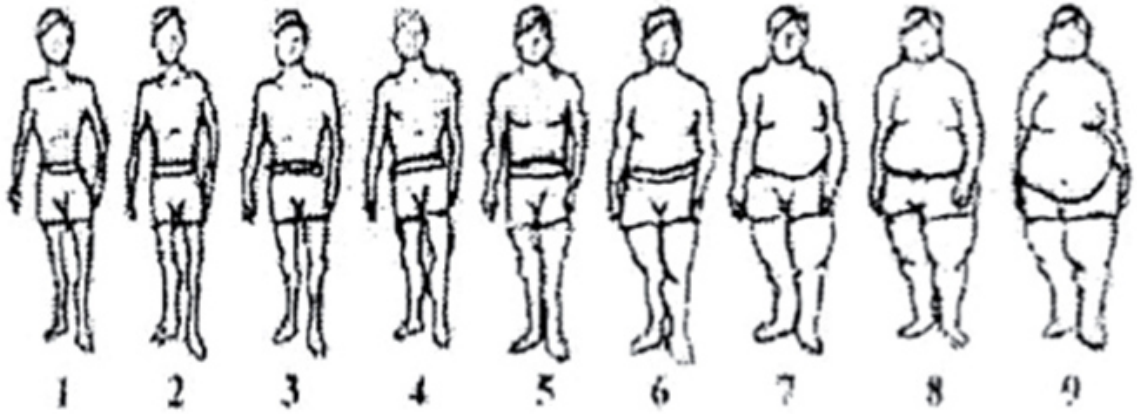
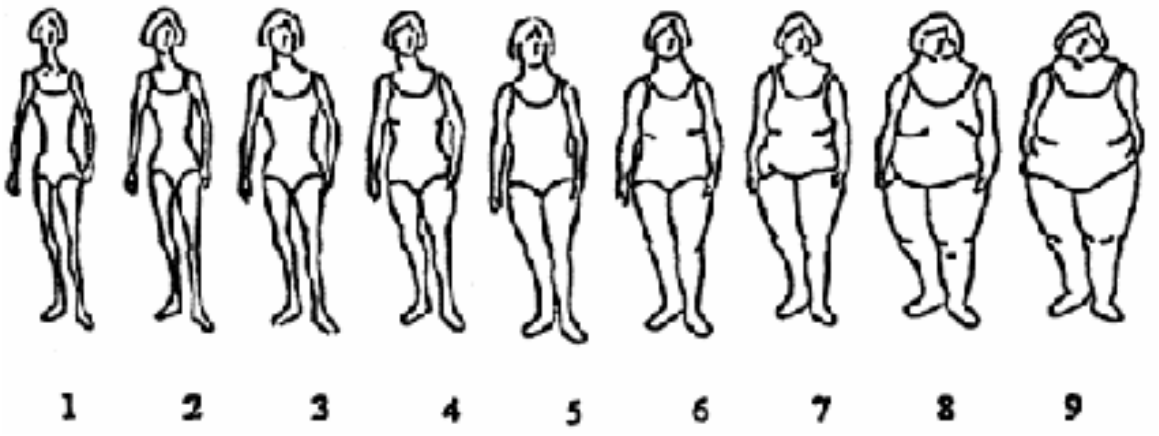
2. Which figure would you like to be?



For Women **Date:** _____ **Name:** _____ **#:** _____

1. **Which figure looks like you?**



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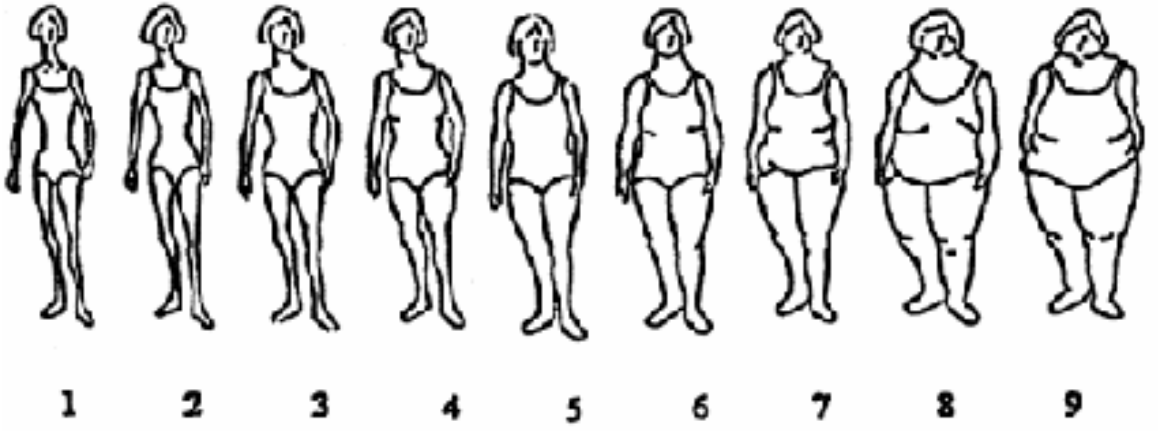
2. **Which figure would you like to be?**



APPENDIX D

Internal Consistency of PSI-VS-ID

Internal Consistency of PSI-VS-ID

Subscales	No. of item	Sample question	Cronbach's α
Global self-worth	2	I like myself	.76
Physical self-worth	2	I am happy about all the things I can to do with my body	.65
Physical condition	2	I can run 10 times around the basketball court without stopping	.67
Sport competence	2	I am good in all sports	.81
Physical appearance	2	Everybody finds me good-looking	.71
Physical strength	2	I can carry heavy things	.77

Note. N = 20. Overall internal consistency (α) = .86.

APPENDIX E

One-Week Test-Retest Correlation Coefficients for Genders in FRS

One-Week Test-Retest Correlation Coefficients for Genders

Rating	Male (n = 7)	Females (n = 7)
Actual	0.86 *	0.86 *
Ideal	0.85 *	0.82 *
A-I	0.86 *	0.91 *
|A-I|	0.70 *	0.76 *

Note. A-I, actual minus ideal ratings; |A-I|: absolute values of actual minus ideal ratings. *$p < 0.05$. N = 14