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Assessment of Physical Fitness Status of Athletes with Intellectual Disabilities Participating in Special Olympics Programs in Nairobi County, Kenya

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ABSTRACT Information on the fitness status of people with disabilities in Kenya is scanty, particularly for those who participate in Special Olympics sports. The study aimed to assess the physical fitness level of athletes with Intellectual Disability participating in the Special Olympics program in Nairobi region and compare their fitness levels across different centers and gender, using the commonly used race-specific percentiles. A total of 208 children from four Special Olympics program centers with the overall mean age of 16.8 years were assessed. Assessment protocol includes the anthropometry, body composition and physical fitness variables. There was a significant differences in physical fitness characteristics among the participants. This information should be used by program developers to design and improve program that enhance the capacity of athletes with intellectual disabilities in terms of exercise prescription, nutritional considerations, and motivating the athletes to stay in the course. This will improve their motor skills and general quality of life.

INTRODUCTION

There is accumulated evidence of the benefits of sports participation for individuals with disabilities. Regular exercise training has been shown to induce significant improvements in both cardiovascular and muscular fitness (Duran et al. 2001; Jassen and LeBlanc 2010; Grandison et al. 2012) in persons with disabilities. In addition to the physiological benefits, also psychological benefits from sports participation have also been shown to occur (Hutzler and Bar-Eli 1993). Over the last 15 years, there has been a growing belief that sport, properly conducted, provides opportunities for experiencing success and achievement of positive feelings about many aspects of self. Sports participation and competition can provide the ideal type of mastery challenge to help individuals stretch themselves far beyond the limitations that their disability may initially offer.

Hutzler and Bar-Eli (1993) and Ferreira and Fox (2004) summarized that (a) general improvements in self-esteem and athletic status result from sport participation, and (b) sport participants with disabilities have significantly higher self-esteem than inactive individuals with disabilities. Thus, it has been suggested that sport represents a potentially important avenue for the development of positive physical and psychosocial characteristics (Martins et al. 1995; Clark et al. 2015). Although, positive effects of exercise and physical activity on health and well-being for individuals with Intellectual Disabilities (ID) has been established (Lloyd 2016), but there is a paucity of information about the ef-

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fects of involvement of persons with disabilities in physical activities in Kenya. Current enrollment of individuals with disabilities in Special Olympics (SO) programs around the country has been rising but there is no documented research on effectiveness of these programs in enhancing the fitness levels of the participants.

In general, previous studies have reported that individuals with ID demonstrated poor fitness levels on standard fitness tests (Gillespie 2003; Spinks et al. 2007). This has been reported on measures of cardiovascular endurance, body composition, and muscular strength and endurance (Mac Donncha et al. 1999). A study examining fundamental gross motor skills and fitness levels of youth with intellectual disabilities have however been conducted mainly with Caucasian samples from North America and Europe (Mactavish and Dowds 1998). Relatively, little is known about the physical fitness of youths with ID from other countries (Chaiwanichsiri et al. 2000) and in particular, there are limited published studies on physical fitness levels of youth with ID from Africa.

The purpose of this study was to describe the fundamental gross motor skills and fitness levels of youth with intellectual disabilities identified from Special Olympics programs in the county of Nairobi. The study aimed to assess the physical fitness level of athletes with ID participating in the Special Olympics programs in Nairobi region of Kenya, and compare their fitness levels across different centres using the commonly used gender-specific percentiles. The data gathered during this study could be used as baseline to understand the type and nature of athletes who participate in Special Olympics sports in Kenya. In addition the information could be used by program developers to design programs that enhance the capacity of athletes with intellectual disabilities to improve their motor skills.

METHODOLOGY

The study targeted 300 athletes with ID registered in four Special Olympics clubs in the County of Nairobi. These include Kenyatta University (80), Treeside (60), Mathare (80) and Nairobi University club (80). From the list of registered athletes in each club, athletes were encouraged to participate in the study. Criteria for exclusion included the athlete's inability to independently participate in the activities, and behavioural problems that could endanger the athlete or others. The participants, caregivers, and coaches were fully informed in advance regarding the objectives of the study and agreed to fill the informed consent form. A total of 208 children with the mean age of 16.8 years old meeting the requirements successfully completed the study tasks.

The physical fitness status was evaluated using the European test of physical fitness (EUROFIT). A detailed description of the tests was given in Oja and Tuxworth (1995). The anthropometric measurements include height/stature, body weight, waist circumference, waist to hip ratio (WHR) and three skinfold sites (triceps, biceps, and calf). In addition, grip strength, and balance was evaluated. Measuring of stature was done by having the participant stand on the footplate of the stadiometer without shoes. The individual was positioned with heels close together, legs straight, arms by the side, shoulders relaxed. The participant was asked to inhale deeply and to stand fully erect without altering the position of the heels. The participants' head was held in the Frankfort horizontal plane and the headpiece lowered snugly to the crown of the head with sufficient pressure to compress the hair. The reading was made with the measurer's eyes parallel to the headpiece for accuracy, as recommended by Marfell-Jones et al. (2006).

The participants were weighed without shoes on and wearing only lightweight garments. They were asked to stand on the centre of the platform of electronic weighing scale. The body weight of the individual was recorded to the nearest 0.1 kg. Body mass index (BMI) was defined as body mass in kilogram (kg) divided by height in meters (m) squared (kg/m^2). Harpender skinfold device was used to assess the skinfold of the participants which was assessed closed to 0.2 mm (Van de Vliet et al. 2006). To total body fat, in percentage, was then obtained following the Van de Vliet et al. (2006) and Durning and Wommersley (1974) procedures. Eurofit physical fitness test batteries were determined according to the guideline used in Van de Vliet et al. (2006) study. The test involved the assessment of the Flamingo balance, flexibility, explsoive power, static power, muscular tolerance, and aerobic tolerance. The data collected for each parameter was evaluated against norms and percentile ranks developed by internationally recognized institutions. BMI data was evaluated using the Body Mass Index-for-age percentiles

developed by the National Centre for Health Statistics in collaboration with the National Centre for Chronic Disease Prevention and Health Promotion (CDC 2011).

RESULTS AND DISCUSSION

Demographics – Gender and Age

A total of 208 (male = 142/68.3%; female = 66/31.7%) athletes from four centres were assessed and their physical fitness levels recorded (Table 1). In general, it has been reported that youths with disabilities are faced with many obstacles to take part in sport, especially female compared to their boys counterpart (O'Connor 2010). Some of the limiting factors of female with disabilities are due to the traditional values, taboos, and being a female, little or no sport hero to emulate, and the distress in gaining access to sporting activities, equipment, and facilities (O'Connor 2010). Observationally, not many of the participant parents or guardians felt comfortable having their girls go out to play due to the fear of them being molested. As shown in Table 2, the overall mean age of the athletes from the four centre was 16.8 years. The mean age value for male athletes was 17.4 years while the mean age value for female athletes was 15.8 years. The athletes from the Mathare club were generally older while those from Kenyatta University club were younger. Majority of those from Mathare club were in the vocational training centre and have completed basic school education while those from the other centre still attend primary school.

Table 2: Mean ages (years)

Site	*Male*	*Female*	*Mean*
Mathare	18.9	18.8	18.9
KU	14.4	15.3	14.7
Treeside	18.3	16.0	17.2
Nairobi Uni.	17.9	12.9	16.3
Mean	17.4	15.8	16.8

As shown in Table 3, majority of the participants falls under 10-15 years age categories. Very few athletes were below the age of 10 in these clubs as there are no young athlete programs in place in these centres. The attitude towards sport participation among the youths with disabilities remain generally negative in Kenya, and has reduced the participation levels in young athletes SO activities. The reasons for their attitudes and low levels of participation were that (1) the schools for disable individual seems to be too expensive and many could not afford it; (2) emotional discouragement and negative parenting; (3) rejection from the parents, as some of this children sometimes faces rejection from their fathers; and (4) rejection from schools which make them always stays at home (Craig 2015). In Kenya, many of the Special Olympics athletes get jobs as manual workers or return to their rural homes once they are through with basic schooling and have no time to join SO programs as supported by Siperstein et al. (2013).

Table 1: Distribution of participants centre location

Gender	*Centre*					
	KU	*Nairobi*	*Mathare*	*Treeside*	*Total (%)*	
Male	37	45	30	30	142	(68.3%)
Female	18	21	8	18	66	(31.7%)
Total	55	66	39	48	208	(100%)

Table 3: Distribution of participants by age category and gender

Site	*Mathare*		*Treeside*		*Nairobi Uni.*		*KU*		*Total*
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	
8-10	7	1	1	1	9	6	4	1	30
10-15	6	3	8	9	4	3	20	11	64
16-20	11	6	5	6	6	5	10	4	54
>20	19	6	5	1	12	1	2	2	47
Total	42	16	19	17	31	15	36	18	195

Height

Table 4 shows the average height (151 cm) by age category for all participants. The mean height value for male was 152.1 cm while for female athletes was 148.9 cm. The athletes (156.8 cm) from Mathare club were generally taller compared to athletes from other clubs. The mean height for the four clubs were not significantly different at $p < 0.05$. The height for participants by age category was however significantly different $F(3) = 22.076$, $p < 0.00$. Results concerning participants' mean height by gender are provided in Table 5. The significant difference in height by gender showed that male were taller than girls and linearly correlated with age. However, those in the age categories of 13-16 and 17 -20 did not differ significantly which could be due to the effect of the adolescent growth spurt.

Table 4: Mean height according to age category

Age categories	*Number*	*Mean height*	*Std. dev*
= or <8	13	125.8	20.9
9-12	48	142.5	17.91
13-16	53	150.5	12.54
17-20	47	158.3	13.46
>20	47	161.5	13.11
Total	208	151.3	17.62

Table 5: Mean height (cm) by gender

Site	*Male*	*Female*	*Mean*
Mathare	158.2	152.9	156.8
KU	143.9	153	146.9
Tree side	153	149	151.5
Nairobi Uni.	153.3	140.3	148.9
Mean	152.1	148.8	151

Weight

Table 6 shows the mean value for body weight for all participants. The overall mean value for all the participants was 45.3 kg. The results also showed that the female (45.2 kg) athletes were heavier than their male (44.8 kg) athletes' counterparts. Female has commonly been reported to be weightier than male. This findings was supported by Onagbiye et al. (2017) which found the female youths to be heavier than their male colleagues (Table 7). Club wise, disabled athletes from Mathare club were generally heavier compared to their counterparts from other clubs. Athletes from Kenyatta University club had lowest mean body weight score (41.45 kg). This could be attributed mainly to their age differences, and nutritional status of the participants (Solima et al. 2014) coupled with the adolescent growth spurt (Cook et al. 2013).

Table 6: Mean weight of participants (kg)

Centre	*Mean*	*N*	*Std. deviation*
KU	41.45	55	13.61585
Nairobi	47.17	66	18.38692
Mathare	45.11	39	11.88552
Treeside	47.16	48	12.83087
Total	45.27	208	14.95651

Table 7: Mean weight by gender

Site	*Male*	*Female*	*Mean*
Mathare	48	51	49
KU	40.2	43.2	41.2
Treeside	47	47.5	47.2
Nairobi Uni.	43.9	39.3	42.4
Mean	44.8	45.2	45

Body Mass Index (BMI)

The BMI of the athletes participating in Special Olympic programs were evaluated using the BMI-for-age and gender percentiles for general children population (Table 8). The results revealed that 77 (47.5%) were either underweight or tending towards being underweight. Furthermore, 58 (35.8%) were within BMI normal range which constituted the majority, 16 (9.87%) were overweight while 11 (6.83%) were obese. Obesity is one of the fastest growing health issues facing health specialists and healthcare organizations throughout the world. Lloyd et al. (2012) who studied the BMI status of children and youth with intellectual disabilities by world region, gender and age, found a high rates of overweight/obesity among individuals with intellectual disabilities. Spinks et al. (2007) also indicated that athletes with ID are more likely to be overweight or obese. As noted from the assessment of the nutritional intake of all the participants, it was revealed that most had one meal in a day and in most of the cases the meals were not balanced. It is therefore not a surprise that many were underweight. This is of concern as many of the athletes may not be receiving adequate nutrition which calls for the weight management quick intervention (Spanos et al. 2013; Lloyd et al. 2012).

Table 8: Body Mass Index for athletes in the four centres

	Centre				
Status of BMI	*KU*	*Nairobi*	*Mathare*	*Treeside*	*Total*
< 5th (Underweight)	13	11	3	8	35
5th to < 25th (Tending towards underweight)	18	11	5	8	42
25th to < 85(optimal/ heavy weight)	13	11	15	19	58
85th to < 95th (Overweight)	5	6	0	5	16
> 95th (Obese)	2	4	2	3	11
Total	51	43	25	43	162

Skinfolds

Skinfold measurement taken from three sites (triceps, biceps and medial calf) were computed. The mean scores showed that Mathare athletes had the lowest skinfold mean score (13.55 ±5.13 while the participants from Treeside school had the highest skinfold mean score of 22.82 ±13.51. The skinfold measures were significantly different at $p < 0.05$ (Table 9). The athletes from Treeside had a higher mean skinfold measure. All the athletes in Treeside centre were in boarding school and this may explain their health status. In addition the skinfold measure for females and males were observed to be significantly different. Females tends to have a higher skinfold measure for the three sites assessed as shown in Table 10.

Table 9: Mean sum of skinfold measures

Centre	*Mean*	*N*	*Std. deviation*
KU	22.819	47	13.51729
Nairobi	17.6988	54	9.64800
Mathare	13.5522	59	5.13339
Treeside	21.0495	59	10.36956
Total	20.4416	219	1 1 .54269

Flexibility

Flexibility could be regarded as the ability of body parts to move through distinctive varieties of motion, so as to assist other body parts (Karinharju 2005). Using the sit and reach box, 184 athletes were assessed for flexibility. The mean scores for athletes according to age categories showed that overall, athletes in the age category of 13-16 years had a higher sit and reach mean of 27.0 ± 9.86 while those in the age category of 9-12 years had the lowest mean of 24.2 ± 8.00. These scores were however not significantly different at $p < 0.05$ (Table 11). Furthermore, being able to maintaining flexibility may be necessary for the movement, balance, and harmonization. This findings could be attributed to the level of maturity and variation in the muscle elasticity among the participants of this study (Karinharju 2005).

Table 11: Mean score for sit-and-reach in cm by age categories

Age categories	*Number*	*Mean*	*Std. Dev*
= or <8	9	25.4111	10.74389
9 -12	39	24.1962	8.00371
13-16	46	27.0152	9.86935
17-20	46	25.7424	11.13203
>20	44	24.4739	11.97656
Total	184	25.4133	10.37674

F=.504, p<0.733

Waist and Hip Circumference

All participants from the four centres were assessed for their waist and hip circumferences.

Table 10: Triceps, biceps, and calf skinfolds (mm)

Site		*Triceps*			*Biceps*			*Calf*		
	N	*Male*	*Female*	*Mean*	*Male*	*Female*	*Mean*	*Male*	*Female*	*Mean*
Mathare	59	5.2	11	6.8	3.2	6	4	9.6	15.6	11.3
KU	54	7.9	6.7	7.5	4.4	3.2	4	10.9	6.9	9.5
Treeside	47	9.4	15	11.5	5	7.6	5.9	12.8	18.6	14.9
Nairobi Uni.	59	6.5	11	7.8	3.7	6.3	4.5	10.9	16.8	12.7
Mean	219/54.75	7.3	10.9	9.1	4.1	5.8	4.6	11	14.5	12.8

On average athletes from Mathare centre and Treeside had the highest mean value for the waist circumference (68.1cm), while those at University of Nairobi (UON) had the lowest (64.8 cm). The measures were however not significantly different (F = l .628 p < 0.169). Female athletes in all the centres except UON had a higher mean waist circumference than male athletes. Furthermore, the hip circumference was taken for all athletes in the four centres. The lowest mean score was 76.9 cm for athletes at UON centre while the highest was 90.2 cm for athletes of KU. The differences in hip circumference was significant (F=3.617, p < 0.007). Post hoc analysis showed this difference was between those athletes in the category of 8-12 years and those above 17 years (Table 12).

Waist to Hip Ratio

Waist to hip ratio is the circumference of the body at the level of the navel divided by the circumference at the widest point around the buttocks. The waist/hip ratio is used as a convenient method of assessing the distribution of body fat. Men tend to have high ratios indicating that most fat is distributed around the waist; women have low ratios indicating fat distribution around the hips. The mean waist to hip ratio for all athletes ranged from 0.73 cm for athletes at KU to 0.84 cm for athletes at UON centre. This ratio is within the accepted ranges for both male and female for body fat distribution. There were no significant differences noted for different age categories.

Hand Grip Strength

A higher levels of fitness could improve the health status of children with intellectual disability (Karinharju 2005). All athletes were tested for handgrip strength in both the right and left hand. Overall the mean handgrip strength in kilogram ranged from 11.74 kg to 13.7 kg. Most athletes showed more strength in the right handgrip than their left handgrip. In addition, the male athletes were far stronger than female athletes (13:9). In terms of age categories, those athletes under the age of 10 years had the lowest hand grip strength (0.6 kg) while those above 20 years had the strongest grip (15.3 kg). The differences by age categories were significantly different F (4) = 2. 125; p < 0.001.

Explosive Strength

Athletes were tested on their explosive strength using the standing broad jump test. Male athletes recorded higher scores on the average (79.4 cm) compared to their female counterparts (74.2 cm). Conversely, a good muscular show is essential for creating effective movement in individuals with disabilities (Karinharju 2005). It is therefore important for the individual with intellectual disability to be encouraged to participate in physical activity, so as to improve their quality of life. In addition, athletes from KU had more explosive power (male 94.9cm, female 87.6cm) than the rest. The least jump was by athletes from Treeside whose average jump was 56.2 cm for males and 51.9 cm for female athletes. In terms of age categories, athletes who were 20 years and above had a highest score (86.89 cm) while those below 10 years had the least jump score (60.13 cm). The differences between the four groups were significant F (2.465, p< 0.049).

Endurance

The 9 minute cooper test was used in assessing the endurance level of all the participants. The mean distance covered by the athletes in the four centres was calculated (1.3km)

Table 12: Waist and hip circumference (cm)

Site		*Waist circumference*			*Hip circumference*		
	No. of athletes	*Male*	*Female*	*Mean*	*Male*	*Female*	*Mean*
Mathare	59	66.8	71.4	68.1	79.4	86.3	81.4
KU	54	65.3	66.8	65.8	95.6	79.4	90.2
Treeside	47	68.1	68.1	68.1	80.6	84.2	82
Nairobi Uni.	59	66.4	61.2	64.8	77.7	75.1	76.9
Mean	219/54.75	66.7	66.9	66.8	83.3	81.3	82.3

F=3.617, p<0.007

and male athletes recorded having covered longer distance (1.33km) than female athletes (1.2 km) in the 12 minutes. Majority of the athletes in all the centres found this test difficult and could not continue till end of time. There is the need for more training to build endurance for athletes with intellectual disability.

CONCLUSION

The findings from the four Special Olympics centres which focused on general physical fitness variables revealed similar findings to previous studies. Male athletes performed better than female athletes on all measures of fitness tests. Female athletes had a higher BMI and skinfold measure compared to their male counterparts. Although, older athletes were bigger in body size, taller and heavier, they were however not more fit than younger athletes.

RECOMMENDATIONS

Findings from this study provide baseline data needed to assist health professionals and educators in developing specific recommendations and effective interventions to improve fitness in this population. This study therefore should also form a basis for further research to develop norms for this population in Kenya. On the other hand, affordable educational training should be put in place for the intellectual disabilities individual. Rejection of ID persons in various schools should be curtailed by government intervention. Access to schooling, sport equipment and facilities should be granted to persons with ID, while taboos should be forbidden so as to create an atmosphere that would give persons with ID a chance to showcase their talents. Lastly, a regular health status screening should be put in place so as to improve ID person's fitness levels and quality of life.

REFERENCES

Chaiwanichsiri D, Sanguanrungsirikul S, Suwannakul W 2000. Poor physical fitness of adolescents with mental retardation at Rajanukul School, Bangkok. *J Med Assoc Thai*, 83: 1387-1392.

Clark HJ, Camiré M, Wade TJ, Cairney J 2015. Sport participation and its association with social and psychological factors known to predict substance use and abuse among youth: A scoping review of the literature. *Int Rev Sport Exerc Psychol*, 8: 224-250.

Cook HD, Committee on Physical Activity and Physical Education in the School Environment (CPAPESE), Food and Nutrition Board; Institute of Medicine; Kohl HW III 2013. Educating the Student Body: Taking Physical Activity and Physical Education to School. Washington (DC): National Academies Press (US). Physical Activity and Physical Education: Relationship to Growth, Development, and Health. From <https://www.ncbi.nlm.nih.gov/books/NBK201497> (Retrieved on 9 August 2017).

Craig J 2015. Young Athletes Program Helps Kenyan Kids with Intellectual Disabilities. From <https://www.voanews.com/a/young-athletes-program-helps-kenyan-kids-with-intellectual-disabilities/3118267.html> (Retrieved on 9 August 2017).

Duran FS, Lugo L, Raminez L, Eusse E 2000. Effects of an exercise program on the rehabilitation of patients with spinal cord injury. *Arch Phys Med Rehabil*, 82: 1349-1354.

Durnin JVGA, Wommersley J 1974. Body fat assessed from total body density and its estimation from skinfold thickness: Measurements on 481 men and women aged from 16 to 72 years. *Br J Nutr*, 32: 77-97.

Ferreira JP, Fox KR 2004. Self-perceptions and Exercise in Groups with Special Needs: Preliminary Analyses, Physical Activity and Promotion of Mental Health. *Proceedings of the First International Symposium of Exercise and Health Psychology.* Coimbra (PT): Universidade de Coimbra, pp. 33–40.

Gillespie M 2003. Cardiovascular fitness of young Canadian children with and without mental retardation. *Ed Train Dev Disabil*, 38: 296-301.

Grandisson M, Tetreault S, Freeman AR 2012. Enabling integration in sports for adolescents with intellectual disabilities. *J Appl Res Intellect Disabil*, 25: 217-230.

Hutzler Y, Bar-Eli M 1993. Psychological benefits of sports for disabled people: A review. *Scand J Med Sci Sports*, 3: 217–228.

Jassen I, LeBlanc AG 2010. Review systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *Int J Behav Nutr Phys Act*, 7: 1-16.

Karinharju K 2005. Physical Fitness and its Testing in Adults with Intellectual Disability. From <https://jyx.jyu.fi/dspace/bitstream/handle/123456789/9670/URN_NBN_fi_jyu-2005401.pdf?sequence=1> (Retrieved on 9 August 2017).

Lloyd M, Temple VA, Foley JT 2012. International BMI comparison of children and youth with intellectual disabilities participating in special olympics. *Res Dev Disabil*, 33: 1708-1714.

Lloyd M 2016. Physical activity of individuals with intellectual disabilities: Challenges and future directions. *Curr Dev Disord Rep*, 3: 91-93.

MacDonncha C, Watson AWS, McSweeney T, O' Donovan DJ 1999. Reliability of Eurofit physical fitness items for adolescent males with and without mental retardation. *Adapt Phys Activ Q*, 16: 86-95.

Mactavish JB, Dowds MJ 1998. Physical activity and sport for individuals with intellectual disability. In: AK Steadward Chanias, G Reid, ML Hoover (Eds.): Exercise Effects on Health-related Physical Fitness of Individuals with an Intellectual Disability: A Meta-analysis. *Adapt Phys Activ Q*, 15: 119-140.

Marfell-Jones M, Olds T, Stewart A, Carter L 2006. *International Standards for Anthropometric Assessment.* ISAK.

Martin JJ, Adams-Mushett C, Smith KL 1995. Athletic identity and sport orientation of adolescent swimmers with disabilities. *Adapt Phys Activ Q*, 12: 113-123.

Oja P, Tuxworth B 1995. *Eurofit for Adults: A Test Battery for the Assessment of the Health-related Fitness of Adults*. Strassbourg: Council of Europe, Committee for the Development of Sport.

O'Connor K 2010. *Gender and Women's Leadership: A Reference Handbook*. SAGE.

Onagbiye SO, Mulubwa M, Young MEM, Toriola AL 2017. Relationship between cardiorespiratory fitness and selected anthropometric variables among school-going adolescent in Nigeria. *Anth*, 29: 65-72.

Siperstein GN, Parker RC, Drascher M 2013. National snapshot of adults with intellectual disabilities in the labor force. *J Vocat Rehabil*, 39: 157-165.

Soliman A, De Sanctis V, Elalaily R 2014. Nutrition and pubertal development. *Indian J Endocrinol Metab*, 8: S39.

Spanos D, Melville CA, Hankey CR 2013. Weight management interventions in adults with intellectual disabilities and obesity: A systematic review of the evidence. *Nutr J*, 12: 132.

Spinks AB, Macpherson AK, Baina C, McClurec RJ 2007. Compliance with the Australian national physical activity guidelines for children: Relationship to overweight status. *J Sci Med Sport*, 10: 156-163.

Van de Vliet P, Rintala P, Frojd K, Verellen J, Van Houtte S, Daly DJ, Vanlandewijck YC 2006. Physical fitness profile of elite athletes with intellectual disability. *Scand J Med Sci Sports*, 16: 417-425.

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