ARENA-JPA, ISSN 2285-830X
5, pp. 28-45, 2016

How to increase the performance in Special Olimpics (SO) table tennis players

Bechar Inbal[1], Emilia Florina Grosu[2], Vlad Teodor Grosu[3]
[1]Babes – Bolyai University, Cluj –Napoca, & College Tel – Aviv, Israel
[2]Babes – Bolyai University, Cluj – Napoca
[3]Technical University, Cluj -Napoca

Corespondence: Emilia Florina Grosu (emiliaflorina.grosu@gmail.com)

Abstract
Purpose of Study: the present study sought to discover the ways and extent by which a special training program affects the improvement of table tennis skills of SO (Special Olympics) participants. The aims of this study was: 1. to develop an integrative Physical activity program for athletes who participate in table tennis games in SO; 2. To explore the influence of an applicable training program on the balance, hand-eye coordination, power regulation and Movement integration among athletes who participate in table tennis games in SO; 3. To develop skills tests for intellectually disabled athletes who participate in table tennis games in SO, in four aspects: balance, eye-hand coordination, power regulation and coordination.
Methods and Research tools: The samples of subjects tested are aged 30±5 and 32±5, 10 participants in experimental group and 10 participants in control group. 4 Skills tests administered before and after the training program. **Findings and Results** was performed using SPSS 15.0. For the comparison of means between groups of subjects we applied Cronbach's Alpha. Participating in training improved significantly in all four skills tested: balance, hand-eye coordination, power regulation of power and coordination. Compared to the control group which did not show any change in the motor skills of the participants. In the beginning parents did not believe in the trainee's ability to change and improve, but at the end they made a significant change in perception and the ability to recognize their variability.

Conclusions and Recommendations: the conclusion describes a conceptual TTSOT model that combines different disciplines, all of which together make up the training program success. The model represents six different aspects of the same model application components: an aspect of learning (trainee), an aspect of teaching trainer) socio-motivational aspects, ecological aspects, and cognitive- emotional aspects.
The practical implications make practical conclusions concept of training Special Olympics athletes participating in table tennis. Implementation of the model can be expressed in curriculum in schools for special education and in vocational training for Special Olympics Games in the table tennis domain in particular and other sports field including these skills in general.

Key words: Special Olimpics, Intellectual disability, physical activity, motor skills, table tennis.

Problem statement: this study sought to discover the ways and extent by which a special training program affects the improvement of table tennis skills of SO (Special Olympics) participants**.** This study designed to improve four motor skills: balance, hand-eye coordination, power regulation and coordination, of people with intellectual disability and Physical Disabilities. Testing the effect of the training program on four skills was conducted by comparing an experimental group with a control group.

Therefore, work on the motor field serves both as a therapeutic and rehabilitative tool for each functioning domain. Hemayattala & Movahedi (2010) found that the development of motor or mental skills among persons with intellectual disabilities is not enough. These domains have to develop together, in harmony. They maintain the development and nurturing of one domain contributes to the development of the other (Hemayattalab & Movahedi, 2010).

One of the proposed ways for persons with disability to shift to an active state is physical activity (Hotzler, 2004). Physical activity seeking to develop the disabled person's coping ways, challenge and self-realization, is a means that leads to achievements in other domains.

Research in the field of sports with persons with intellectual disabilities mostly show positive influences of physiological aspects such as gaining weight, fitness and health, quality of life, coordination aspects and muscular flexibility, a sense of self-efficacy and self-esteem (Ben Sira et. al., 2005; Ninot & Maiano, 2007; Lejcarova, 2009; Robertson & Emerson, 2009; Franciosi, 2010; Guidetti et al, 2010; Westendorp et. al, 2011; Cuesta – Vargas et al, 2011; Rasool & Ahmadreza , 2010; Hayakawa et al, 2011.(

There are a few organizations engaging in sports for persons with intellectual disabilities. The largest organization is Special Olympics (SO), established in 1968. SO started as a community school program and developed into an organization encompassing some 3.000.000 people around the world competing in more than 30 sports (Maclean, 2008). Most participants are male and at a relatively old age for competitive sport (Gillespie, 2008. (

Few studies were conducted in the SO domain, some of which focused on the physiological advantages and health implications

for SO participants as well as on so influence on the participant's quality of life (e.g. Meghann et al, 2012; Gibson et al, 2011; Hild et al, 2008; Turner et al, 2008). Some of the studies focus on the advantages and disadvantages of participating in SO (e.g. Maclean, 2008; Glidden et al, 2011; Smith et al, 2010; Storey, 2004:2008). Other studies focus on the influence of SO participation on mothers and families of children with intellectual disabilities, both from the perspective of the family unit and that of the influence of participation on the pressure within the family (Weiss & Diamond, 2005; Weiss, 2008).

Over the years, several studies related to various sports in SO have been conducted (e.g. Meghann et al, 2012; Gibson et al, 2011; Hild et al, 2008; Turner et al, 2008).

This study is based on four main *theories:*

*Views of Physical Activity - S*port and Physical Activity: In the context of rehabilitation, the connection between sport and Physical disability is important as it serves as a bridge beyond the physical limitations with which disabled individuals must grapple in their lives (Hutzler, 2012). In addition, this chapter includes an overview on the theory of sensory motor development (ayres, 1972).

Development and Learning Theories - Piaget' s Cognitive Development (1976), Engaged in various stages of human development while explaining the characteristics of each stage of development. Another theory regarding the issue is learning theories: Structural Cognitive Modifiability Theory (Feuerstein & Rand, 1997, 1999; Feuerstein, 1991; Feuerstein et al., 1997; Feuerstein et al., 1979). This theory deals with the significance of mediation and its importance for the promotion of different skills. According to the findings, reviewed all articles on motivation and motivation for learning in particular (e.g. Katz & Cohen, 2014).

The Ecology of Human Development - This chapter provides an overview on the development of the ecosystem in general (Bronfebrener, 1979), and the family as an ecosystem of humanity .In addition, will provide an overview engaged in intellectual disability (Ronen, 2005) and studies conducted in this population (e.g. Lifshits, 2014).

Physiological and Educational Theories of Table Tennis (e.g.Van Biesen et. al., 2014). Describing some studies conducted in the field they are in the normal population and people with special needs.

This suggests the importance of this research which examines the effect of a special training program on the physiological aspects of intellectual disabled people participating in table tennis.

Within the framework of the present study an intervention-training program- Special OTP- **S**pecial **O**lympics **T**raining **P**rogram was implemented.

Research hypotheses

The series of exercises included in the training program will improve the participants' performance in the four established criteria: eye-hand coordination, body-balance, power regulation, and coordination.

Participants, whose parents/siblings implement the program at home as well, will advance faster than those who had not.

Dependent variable: balance, eye-hand coordination, power regulation and coordination

*Independent Variable***:** integrative physical activity training program.

Methods: In the course of the present study, an training program was implemented-

Special OTP- Table Tennis Training Program for people with cognitive Disabilities age 30± 5 -32± 5.

In this study, an training program was implemented People with moderate intellectual disabilities, integrating the principles of teaching people with moderate intellectual disabilities, Taking into account the physical limitation added the cognitive limitations, And the importance of mediation as discussed in the literature review.

The pilot study procedure - In order to answer this question, three stages were undertaken:

a. Examining existing research tools in each one of the chosen four skills. This showed that there are a number of valid tests that examine these skills but they are unsuitable for an intellectually disabled population group. In light of participants' severe impai-

ments, it was recognized that they would not be able to undertake these tests and adapted tools would need to be built.

b. Constructing a test to examine each of the four skills. The skill tests, as can be seen in the methodology chapter that follows, were constructed in such a way that the first two motor actions in each skill were taken from known validated tests. The remainder were chosen according to motor actions linked to these skills, for example in the hand-eye coordination skill test, one of the actions was to throw and catch a ball. The tests were sent to 11 experts in different fields: special education, physical education and table tennis experts for analysis and validation.

c. Internal consistency testing

This training program was implemented for six months. All the participants Participated in all the trainings, twice a week, at least 90 minutes per workout. The lessons took place in Large sports hall. The training program is divided into five stages. Every step focuses on a different skills and more complex skills. Figure 1 shows the gradual plan.

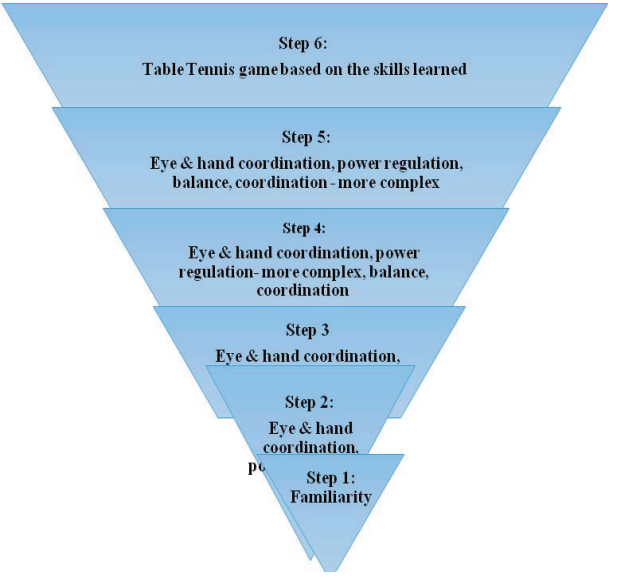

Figure 1. Gradual training program (Bechar, I. 2016)

Step 1 is based on the familiarity between the players themselves and the players' coach to acquire basic trust and creating motivation for further training

Step 2 includes a very basic exercise to develop hand-eye coordination and power regulation.

Step 3 includes more complex Exercises for developing hand-eye coordination and power regulation.

Step 4 includes all four skills: hand-eye coordination, power regulation, balance, coordination but basic Exercises.

Step 5 includes all four skills: hand-eye coordination, power regulation, balance, coordination but some complex Exercises integrating table tennis play

Step 5 includes performances in table tennis

Each of the steps is divided into sub-steps as can be seen in detail of each training plan in the program.

The pilot study of the skills tests

A pilot study of the skills tests was conducted prior to the study specified in third part of the thesis. The pilot program was conducted after writing the skills tests and the validity of 11 specialists.

Results and discussion: The results are presented in a logical sequence, given the most important findings first and addressing the stated objectives. The important aspects of the results obtained the following tables. The relevance of the findings in the context of existing literature or contemporary practice should seen here.

Validity and reliability

In order to examine the reliability of each measure comprising the test, Alpha Cronbach coefficients were calculated that demonstrated internal consistency between components of each measure. The results are presented as follows:

Table 2. Results of reliability analysis of balance measure

Reliability Statistics	
Cronbach's Alpha	N of Items
.896	8

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
a1	11.80	12.622	.564	.893
a11	11.50	10.278	.775	.873
a12	12.00	11.556	.760	.877
a13	12.10	11.211	.850	.870
a2	12.00	11.333	.566	.894
a3	12.00	10.667	.565	.902
a4	11.80	10.844	.779	.873
a5	12.00	11.556	.760	.877

The analysis demonstrated a high reliability level across the whole measure ($\alpha = 0.896$), table 2. The above table shows that there was no need to remove any component from the general measure.

Table 3. Distribution of results of balance measure

Components	Low	Medium	High	Total
Balance reactions – Paratrooper reflex*	20%	80%	0	100%
Symmetry (2 sides)	20%	50%	30%	100%
Powerful	40%	60%	0	100%
Responsiveness	50%	50%	0	100%

Transfer of weight from one foot to another 5 times in a row*	50%	40%	10%	100%
Standing on one leg for half a minute*	60%	20%	20%	100%
In game – cross steps across the table from side to side	30%	60%	10%	100%
In game - stop and hit the ball after leg movement	40%	60%	0	100%

Distributions show that balance abilities were generally low. In most components, none of the subjects achieved a high level and in three of them, only a small percentage achieved a high level.

Table 4. Results of consistency reliability of hand-eye coordination measure

Reliability Statistics	
Cronbach's Alpha	N of Items
.829	7

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
b1	10.80	7.067	.337	.864
b21	10.60	6.489	.649	.793
b22	11.20	6.400	.725	.779
b23	11.70	7.122	.671	.794
b3	11.80	7.067	.712	.789
b4	11.50	7.833	.452	.824
b5	11.60	7.156	.676	.794

The analysis demonstrated a high reliability level across the whole measure (α = 0.829). The above table shows that there was no need to remove any component from the general measure.

Table 5. Distribution of results of hand eye coordination measure

Components	Low	Me-dium	High	Total
Eye tracking* - following pencil or flashlight Sequence traceability – Cross-ing the center line	20%	20%	60%	100%
Catch ball from 2 meters with two hands				
Football	10%	20%	70%	100%
Tennis ball	20%	60%	20%	100%
Paddles ball	50%	50%	0	100%
In game – Right Serve	60%	40%	0	100%
In game - Thump the ball correctly when the player is in static mode	30%	70%	0	100%
In game - Thump the ball correctly when the player is in dynamic mode	40%	60%	0	100%

Distributions shows that hand eye coordination abilities were low. The football catching measure was especially high. 70% of participants demonstrated a high level of ability catching a large ball, see table no.5.

Table 6. Results of reliability analysis of power regulation measure

Reliability Statistics	
Cronbach's Alpha	N of Items
.803	10

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
c1	12.80	6.844	.564	.778
c21	12.30	8.011	.441	.790
c22	12.90	7.211	.409	.808
c23	13.30	6.678	.664	.760
c3	13.30	7.122	.790	.748
c4	13.10	7.211	.753	.752
c51	13.60	8.489	.531	.786
c52	13.70	9.567	.000	.813
c53	13.70	9.567	.000	.813
c54	13.60	8.489	.531	.786

Table 7. Distribution of results of power regulation measure

Component	Low	Medium	High	Total
Throwing one type of ball to same target from different distances*	30%	50%	20%	100%
Throw different size balls to same target*				
Football	0	60%	40%	100%
Tennis ball	40%	40%	20%	100%
Table tennis ball	70%	20%	10%	100%
In game - hit the ball across the net, the opponent's court	60%	40%	0	100%
In game – hit next to the net	40%	60%	0	100%
In game - bat on ball:				
Hit	90%	10%	0	100%
Spin	100%	0	0	100%
Chop	90%	0	0	100%
Serve	100%	10%	0	100%

Distributions show that power regulation abilities are very low. One can discern that the majority of athletes are at a low level in most components, particularly those connected with the game itself such as serve and the like.

The analysis demonstrated a high reliability level across the whole measure (α = 0.803). The above table shows that there was no need to remove any component from the general measure, see table no.8.

Table 8. Results of reliability analysis of coordination measure

Reliability Statistics	
Cronbach's Alpha	N of Items
.815	5

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
d1	6.10	4.100	.364	.838
d2	6.30	2.233	.713	.769
d3	6.20	2.622	.803	.712
d4	6.60	3.156	.678	.761
d5	6.80	3.511	.619	.785

The analysis demonstrated a high reliability level across the whole measure (α = 0.815). The table above shows that there was no need to remove any component from the general measure.

The pilot study population

Ten people participated in the pilot with moderate intellectual disabilities and motor disabilities aged 30±5 and 32±5, see table no.9.

The pilot study results:

Table 9. Distributions of results of coordination measure

Components	Low	Medium	High	Total
Motor pattern design includes two steps* (e.g. throw a ball and catch it)	10%	90%	0	100%
Dribbling while walking at least 3 times in a row*	50%	30%	20%	100%
Gambol at least 4 times in a row*	30%	60%	10%	100%
In game – hit the ball while moving legs	60%	40%	0	100%
In game - change position depending on body position of the opponent's hit and ball positions	80%	20%	0	100%

Distributions show that coordination abilities were low. Most athletes demonstrated a low or medium level of ability. Most showed a medium level of simple motor pattern planning skills of 2 steps as seen in the first component.

In summary, distributions of the test results prior to the program show that, in general, subjects' abilities were very low in all four measures.

Conclusions

In conclusion, the pilot results led to the conclusion that the tests constructed were suitable for intellectually disabled people and valid for the research field and that a test that mixes components from existing tests with movement components from the game itself, provides a greater internal consistency. According to this approach the researcher must act objectively in order to reach an understanding of reality, neutralize himself or herself and his/her

views, and adhere to the formal rules of reliability and validity in conducting the research (Shlasky & Alpert, 2007). Van Peer et. al. (2012) argue that scientific research allows us to discover things about the world in the deepest, most powerful way in the history of human research. However, its critics argue there is no one truth, and that the reality that the researcher examines is subjective, despite the research tools that he or she may chooses to use (Hakak, Kacen & Krummer and Nevo, 2001). This research examined the impact of the training program on four indices, being: balance, eye-hand coordination, power regulation, and coordination according to skill tests and examination of internal consistency by Cronbach's alpha.

A further conclusion that arose from the pilot stage was that the four chosen skills were indeed part of many skills connected to this branch of sport, but were indeed basics of the game and the most significant skills.

Following the pilot study of the training program, the conclusion was to introduce

The following changes:

1. Need more than 1 trainer to be able to work individually
2. Skill of hand and eye contact within the basic training is the easiest for the participants where they experienced success. The study will start with exercises on this skill and then continue to other skills.

The importance of the present study

The Research can help to understand how a training program can improve specific skills included in the program, such as - eye-hand contact, coordination, and balance and power regulation, in people with intellectual disabilities

Another practical significance is the use of training these skills for other sports areas with similar skills. The theoretical importance is that people with intellectual disabilities have the ability to learn through a physical activity training program even at an older age.

Another theoretical significance is that this program can be implemented in special education schools.

Acknowledgments*:* to all persons involved in this research which is part of a great study realize by Bechar Indbal in PhD Thesis.

References

1. Ayers,A. J. (1972). *Sensory Integration and the Child*. Los Angeles: Western Psychological Services
2. Ayers, J. (1991). *Sensory Integration and Learning Disorders*. Los Angeles: Western Psychological Services.
3. Ben-Sira, D. Reiter, S. Almosani, Y. (2005). The influence of different physical education teaching styles on the quality of life of youngsters with moderate and light mental disability. *Bi'Tnua: Physical Education and Sports Journal, 7 (3-4): 139-176* (in Hebrew).
4. Bronfenbrenner, U. (1979). The Ecology of Human Development: *Experiments by Nature and Design.* Cambridge, MA: Harvard University Press. 16-85
5. Cuesta - Vergas, A. I., Paz - Lourido, B. P., Rodriguez, A. (2011). Physical fitness profile in adults with intellectual disabilities: differences between levels of sport practice. Research in *Developmental Disabilities, 32, 788-794.*
6. Feuerstein, R., Rand, Y. and Hoffman, M. (1979).: Cognitive modifiability in retarded adolescents: effects of Instrumental Enrichment. *American Journal of Mental Deficiency 83: 539–550*.
7. Feuerstein, R., Klein, P.S. & Tennenbaum, A. (1991), *Mediated Learning Experience* (M.L.E)
8. Franciosi, E., Baldari, C., Gallotta, M. C., Emerenziani, G. P., Guidetti, L. (2010). Selected factors correlated to athletic performance in adults with mental retardation. *Journal of Strength and Conditioning Research. Vol. 24, Iss. 4 59-64.*
9. Glidden, L. M., Bamberger, K. T., Draheim, A. R., Kersh, J. (2011). Parent and Athlete perceptions of Special Olympics participation: Utility and danger of proxy responding. *Journal of Intellectual and Developmental Disability, Vol. 49(1), 37-45.*

10. Gibson, J. C., Temple V. A., Anholt, J. P., Gaul, C. A. (2011). Nutrition needs assessment of young Special Olympics participants. *Journal of Intellectual and Developmental Disability, Vol. 36(4), 268-272*

11. Gillespie, M. (2008). Participation patterns in an urban special Olympics program. *British Journal of Learning Disabilities, 37, 21-27*

12. Guidetti, L., Franciosi, M., Gallotta, M. C., Emerenziani G. P. (2010). Could sport specialization influence fitness and health of adults with mental retardation? *Research in Developmental Disabilities, 31, 1070-1075*.

13. Hakak, y. Kasan, L. Kromer Nevo, M. (2001). *All Measurements? Critical Views on Scaling and Quantification.* Beear Shva: Ben Gurion University. Pp 9-87 (Hebrew(.

14. Hayakawa, K., Kobayashi, K. (2011). Physical and motor skill training for children with intellectual disabilities. Perceptual and Motor Skills 112, 2, 573-580.

15. Hemayattalab, R., Movahedi, A. (2010). *Effects of Different Variations of Mental and Physical Practice on Sport Skill Learning in Adolescents With Mental Retardation*.

16. Hild, U., Hey, C., Baumann U., Montegomery, J., Euler, H. A., Neumann, K. (2008). High prevalence of hearing disorders at the special Olympics indicate need to screen persons with intellectual disability. *Journal of Intellectual Disability Research, Vol. 52(6), 520-528*

17. Hotzler, Y. (2004). Psychological-Social Empowerment among persons with disabilities via physical activity. Motor Behavior: Psychological and Sociological Aspects. Jerusalem: Hebrew University: Magnes Publications (In Hebrew).

18. Hozler, Y. Oz, M. Barak, S. (2013). Motivation for physical activity among athletes with intellectual disabilities participate in developmental activities-organizing Special Olympics athletes without disabilities compared. Wingate: Israel (from Hebrew).

19. Hutzler, Y. Shoshni, R. (1995). Physical Education in Special Schools and Kindergartens In Israel: Available and Desirable Situation. Journal of Physical Education & Sport Sciences 101-122.

20. Katz, I., Cohen, R. (2014). Assessing autonomous motivation in students with cognitive impairment. *Journal of Intellectual and Developmental Disability*.

21. Lejcarova, A., (2009). Coordination Skills in 9 To 11 Years Old Pupils At Practical Elementary Schools in Relationship To Their Degree Of Intellectual Disability. *Acta Univ. Palacki. Olomuc., Gymn. 39 (4), 53-62*.

22. Lifshitz, H., Weiss, I., Tzuriel, D., & Tzemach, M. (2011). New model of mapping difficulties in solving analogical problems among adolescents and adults with intellectual disability. *Research in Developmental Disabilities, 32(1), 326-344*.

23. Maclean, W. E. (2009). Special Olympics: the rest of the story. Research & Practice For Persons *With Severe Disabilities, Vol. 33, 3, 146-149*

24. Meghann, L., Viviene, A. T., John, F. (2012). International BMI comparison of children and youth with intellectual disabilities participating in special Olympics. *Research in Developmental Disabilities, 33 (6) 1708-1714*

25. Ninot, G., Maiano, C. (2007). Long - term effects of Athletics meet on perceived competence of individuals with intellectual disabilities. *Research in Development Disabilities 28, 176-186*.

26. Rasool, H., Ahmadreza, M., (2010). Effects of different variation of mental and physical practice on sport skills learning in adolescents. *Research in Developmental Disabilities, 31 (1) 81-86*

27. Robertson, J., Emerson, E. (2010). Participation in sports by people with intellectual disabilities in England: A brief report. Journal of Applied Research in Intellectual Disabilities, 23, 616-622.

28. Shlaski, S. Alpert, B. (2007). *Ways of Writing a Qualitative Research* - Dismantling Reality Structuring Text. Tel Aviv: Mofet. Pp 214-219 (Hebrew).

29. Smith, G., Cahn, A., Ford, S. (2010). Sports commerce and peace: The special case of special Olympics. Journal of Business Ethics, Vol. 89(4), 587-602.

30. Storey, K. (2009). The More Things Change, the More They are the Same: Continuing Concerns With the Special Olympics. *Research & Practice for Persons with Severe Disabilities. Vol. 33 Issue 3, p 134-142.*

31. Turner, S., Sweeny, M., Kennedy, C., Macpherson, L. (2008). The Oral health of people with intellectual disability participating in the UK special Olympics. *Journal of Intellectual Disability Research, Vol. 52(1), 29-36*

32. Van Biesen, D. Mactavish, J. Vanlandewijck, Y. (2014). Comparing Technical Proficiency of Elite Table Tennis Players with Intellectual Disability: Simulation Testing Versus Game Play. Perceptual & Motor Skills: *Physical Development & Measurment, 118, 2, 608-621*

33. Van Peer, W. Hakemulder, F. Zyngier, S. (2012). *Scientific Methods for the Humanities*. 4-76 Philadephia: John Benjamin Publishing Conpany

34. Weiss, J. A. (2008). Role of special Olympics for mothers of adults Athletes with intellectual disability. *American Journal on Mental Retardation, Vol. 113(4), 241-253*..

35. Weiss, J. A., Diamond, T. (2005). Stress in parents of adult with intellectual disabilities attending special Olympics competitions. *Journal of Applied Research in Intellectual Disabilities, 18, 263-270*.

36. Westendrop, W., Houwen, S., Hartman, E., Visscher, C., (2011). Are gross motor skills and sports participation related in children with intellectual disabilities? Research in Developmental Disabilities, 32 1147-1153.