



RELATIONSHIP OF MOTOR DEVELOPMENT TO ADAPTIVE BEHAVIOR OF CHILDREN AND ADOLESCENTS WITH VISUAL IMPAIRMENT

Christodoulou Pineio¹ⁱ,

Fotiadou Eleni²,

Soulis Spyridon-Georgios³,

Christopoulos Konstantinos⁴,

Christopoulou Foteini⁵,

Christopoulou Eleni⁶

¹Special Educator, PhD, MSc,
Integration Section of the 23rd Kindergarten,
Agrinio, Greece

²Associate Professor of Special Physical Education,
Department of Physical Education & Sports Science,
Aristotle University of Thessaloniki,
Greece

³Associate Professor in Special Education,
Department of Primary Education, University of Ioannina,
Greece

⁴Student, Department of Law,
University of Athens,
Greece

⁵Postgraduate Student,
Department of Preschool Education,
University of Ioannina,
Greece

⁶Student, Department of Law,
University of Athens,
Greece

Abstract:

The aim of the study was to evaluate motor development and adaptive behavior of visually impaired children and adolescents without any other disability, aged 6-14 years old. Thirty-seven (37) children and adolescents with visual impairment and thirty seven (37) children and adolescents without visual impairment took part in the study. Children and adolescents with visual impairment attended the Special Education Primary Schools for the Blind at four of the biggest cities in Greece. The Bruininks-Oseretsky Test of Motor Proficiency (BOT-2) (Bruininks & Bruininks, 2005) was used to

ⁱ Correspondence: email xripinio@gmail.com

evaluate motor development of the participants. Also, the Teacher Rating Scale (Vineland Adaptive Behavior Scales, Second Edition Sparrow, Balla and Cicchetti, 2005) was used to evaluate adaptive behavior. For the statistical analysis of the data the SPSS version 20.0 statistical package was used. The results of the research revealed that the performance of visually impaired children and adolescents in terms of their motor development and adaptive behavior was lower than that of their peers. At the same time, a convergence was found between the variables motor development and adaptive behavior of children and adolescents with visual impairment. The findings of this research are expected to contribute to a smoother school and social adaptation of visually impaired children and adolescents.

Keywords: visual disability, motor development, adaptive behavior

1. Introduction

Sight is man's *most* highly developed *sense*, and its loss or impairment has serious implications on the life and development of each individual (Angelopoulou-Sakadami, 2002). Even the minimal loss of vision is important as this feeling is directly connected with motor activity, posture, coordination ability of hands and the personality of each individual (Navarro, Fukujima, Fontes, Matas and Prado, 2004).

Sight is a dynamic process that allows people to collect and process information from their environment (Lui, 2013) and then plan and perform their movements within it. As such, it plays a very important role in kinetic growth and performance as it guides and controls the acquisition, differentiation and automation of motor skills (Brambring, 2006). When a visual disability occurs, the individual encounters several difficulty with performance of activities of daily living. Children with visual disabilities encounter difficulties in their motor and cognitive development (Kotsis and Andreou, 2004). In terms of the definition of visual disability there are often different definitions (Garagordobil and Bernaras, 2009), defined and recorded as follows: an eye is considered blind when there is a complete lack of perception of any form of light (International Council of Ophthalmology, 2002). According to the World Health Organization (WHO), blindness is defined as "*the person's inability to count the fingers of a hand from less than ten feet away*", while "*partial blindness is defined as the weakness of partially sighted people counting fingers at a distance of less than or equal to twenty feet*" (Polychronopoulou, 2003: 238). According to Gallahue (2002), motor development is defined as the gradual progressive change in the mobile behavior of the individual which is the result of the interaction of the individual's characteristics with the environment and the movement which is called upon each time.

Adaptive behavior is the person's ability to successfully fulfill the duties of his/her everyday life and to meet the needs of others (Ditterline and Becton, 2008). Adaptive behavior is a reflection of the individual's efforts to adapt to the diverse environmental requirements that he faces (Denvell, 2007). It consists of those skills that

make the individual personally self-sufficient and socially adequate (Sparrow et al., 2005). Social competence is a term used to describe the child's social effectiveness, i.e. its ability to formulate and maintain high-quality and mutually satisfying relationships, and to avoid negative treatment and victimization from other people (Nicholas, 2005). In particular, adaptive behavior can be understood as a set of perceptual, social and practical skills that are the result of learning and which are manifested by people in their daily lives (Arias et al., 2013, reference to Schalock, Borthwick-Duffy, Bradley, Buntix, Coulter, Craig, Gomez, Lachapelle, Luckasson, Reeve, Shogren, Snell, Spreat, Tassé, Thompson, Verdugo, Wehmeyer and Yeager, 2010; Luckasson, Borthwick-Duffy, Buntix, Coulter, Craig, Reeve, Schalock, Snell, Spitalnik, Spreat and Tassé, 2002).

As can be seen from the above, the adaptive behavior of the individual is a multidimensional concept and includes many abilities (Koulakoglou, 2002). In its content it encompasses daily living skills (personal, domestic, and community), communication skills (receptive, expressive, and written), socialization skills (interpersonal relationships, play, leisure, and coping skills) and motor skills (fine and gross mobility), (Sparrow et al., 2005). Consequently, it includes concepts that can be taught to the child. If children respond successfully to everyday life skills, their ability to function successfully as adults also improves (Carothers and Taylor, 2004).

To summarize, acquiring motor skills is of primary importance to each individual and, more importantly, to the visually impaired person, as it largely determines their level of independence/autonomy, degree of adaptability and quality of life. Based on the literature, the skills in regards to the adaptive behavior of children with severe visual impairment are less developed than those of children with better vision (Hatton, 1997). Surveys have shown that children and adolescents with visual impairment may experience deficits in their motor development (Houwen, Visscher, Lemmink and Hartman, 2008; Ray, Horvat, Keen and Blasch, 2005; Warren, 2005; Hovart, Ray, Ramsey, Miszko, Keeney and Blasch, 2003; Wyver and Livesey, 2003; Brambring, 2001) as well as their overall adaptive behavior or sub-sectors (Papadopoulos et al., 2011; Metsiou et al. 2008; James and Stojanovik 2007; Lifshitz Hen and Weisse, 2007; Celeste 2006; Douglas, Grimley, Hill, Long and Tobin, 2002; Lewis and Iselin, 2002).

Children with disability may develop negative attitudes in relation to physical activity and then maintain and consolidate this reluctance to engage in physical activity and exercise.

In the case of visually impaired people, the individual is required to operate compensatingly and properly manage his or her disability in order to minimize the constraints that arise as a direct consequence of the loss of that sensation. To this end, a timely and valid diagnosis, early intervention and appropriate planning of intervention programs will contribute effectively.

On the basis of the above, the purpose of this research was to investigate the motor development and adaptive behavior of children and adolescents with and without visual impairment and to investigate the correlation of the above mentioned

variables with chronological age, gender, the existence of siblings without visual impairment and the shared location of a school for the Blind with a general education school unit.

2. Materials and methods

74 children and adolescents aged 6-14 years old participated in the present study. 37 of these, were visually impaired without any other disability (mean = 10.24, SD = 2.19) and the other 37, who were the control group, were children and adolescents without visual impairment (mean = 10.16, SD = 2.25). The control group was equated with children and adolescents with visual impairment by using certain characteristics.

Regarding the way children and adolescents with visual impairment were selected, all children and adolescents who attended Special Education Primary Schools for the Blind (KEAT) in Greece were selected. A key exclusion criterion for inclusion in the group of participants was the simultaneous existence of a concomitant disability in the same person. The group of participants of the present survey is representative because it includes the entire research population of the Greek territory.

Between all the children and adolescents, 22 (n = 22, 59%) were boys and 15 (n = 15, 40%) were girls. Of all the participants in the current study, 25 (n = 25, 67.6%) belonged to age group 1 (6-12 years) and 12 (n = 12, 32.4% years old) to age group 2 (12-14 years old). Most participants had siblings without visual impairment (n = 30, 81.1%), while some did not have (n = 7, 18.9%). Also, the majority of students with visual impairment attended a special education school (Special education School for the Blind), which did not co-locate with a school unit of general education (n = 31, 83.8%) and some (n = 6, 16.2%) attended a school that co-located with a school unit of general education.

In order to collect the demographics of the participants (with and without visual impairment) and necessary information for the research, a questionnaire was prepared. For the complete motor evaluation of children and adolescents with visual impairment, the short form of the Bruininks-Oseretsky motor test was selected and used after a comparative study and evaluation of the various motor development measurement techniques. (BOT-2, 2005). Similarly, the Teacher Rating Form on the Vineland Adaptive Behavior Scale, Second Edition (Sparrow, Cicetti and Balla, 2005) was used to evaluate the adaptive behavior of the participants.

3. Results

During the evaluation of the relationship between the motor development variables of children and adolescents with visual impairment and sighted children and adolescents (One-Sample Test), a statistically significant relationship emerged (sig. = .00, p value <.05). Children and adolescents with visual impairment scored a performance score in total motor development equal to mean = 31.54, SD = 7.50, while peers see a

performance score equal to mean = 69.27, SD = 6.00.

As the results show, children and adolescents with visual impairment were significantly lower in terms of their overall motor development compared to children and adolescents of the respective chronological age.

A statistically significant relationship (sig. = .02, p value <.05) was obtained in the investigation of the relationship between the variables motor development of children and adolescents with visual impairment and gender (Table 1). It was found that boys with visual impairment outperformed girls with visual impairment. The difference in favor of visually impaired boys in children and adolescents is explained by the fact that girls with visual impairment are more overprotected against their peers. Deficits in motor development are the secondary problem. In typically developing individuals in their respective chronological ages, girls outperform boys in terms of motor development.

Table 1: Correlation of the variables gender and motor development of children and adolescents with visual impairment

Gender	N	mean	SD
Boys	15	32.77	8.59
Girls	22	29.73	5.31

There was no statistically significant relationship (sig. = .17, p value > .05) in the investigation of the relationship between the kinetic growth variables of children and adolescents with visual impairment and chronological age (Table 2).

Table 2: Relation of variable chronological age and motor development of children and adolescents with visual impairment

Chronological age	N	mean	SD
6-12 years old	25	30.72	6.75
12-15 years old	12	33.25	8.94

During the evaluation of the relationship between the variables motor development of children and adolescents with visual impairment and co-location of the special education school with a general education school, a statistically significant relationship emerged (sig. = .03, p <.05), (Table 3). Children and adolescents with visual impairment whose school co-located with a school unit of general education recorded a higher performance score in overall motor growth than children and adolescents with visual disabilities attending a school that did not cohabit with a general education school. In particular, the score was as follows: mean = 37.16, SD = 10.02 and mean = 30.45, SD = 6.57.

Table 3: Correlation of the variables co-location with general education school and motor development of children and adolescents with visual impairment

Co-location	N	mean	SD
Co-location with general education school	6	37.16	10.02
No co-location with general education school	31	30.45	6.57

Table 4 shows the scores of children and adolescents with and without visual impairment on overall adaptive behavior and its domains. These scores resulted from the inclusion of the score corresponding to the three areas of adaptive behavior (communication, socialization, daily living skills). In this case, the performance of the motor skills sector was not taken into account as the participants were over the age of six (Sparrow et al., 2005).

Table 4: Means and standard deviations of adaptive behavior of children and adolescents with and without visual impairment

	With visual impairment			Without visual impairment		
	N	mean	SD	N	mean	SD
Adaptive behavior (total)	37	77.81	13.45	37	93.37	7.29
Communication	37	84.62	14.28	37	99.51	4.83
Socialization	37	82.64	11.00	37	92.29	15.41
Daily living skills	37	77.35	13.08	37	89.51	12.73
Motor development	37	71.27	12.18	37	93.30	7.28

From the above data, and based on the descriptive categories proposed by the manufacturers of the TRF scale (Sparrow et al., 2005), children and adolescents with visual impairment experienced "moderate low adaptive behavior", while peers observed "Sufficient" adaptive behavior.

During the evaluation of the relationship between the variables overall adaptive behavior of children and adolescents with visual disability and gender there was statistically significant differentiation sig. = .05, $p < .05$ (Table, 5). Girls with visual impairment presented better adaptive behavior compared to boys with visual impairment.

Table 5: Relation of overall adaptive behavior of children and adolescents with visual impairment and gender

Gender	N	mean	SD
Boys	22	74.27	12.42
Girls	15	83	13.61

During the evaluation of the relationship between the variables overall adaptive behavior of children and adolescents with visual impairment and chronological age,

there was better performance of older children (adolescents) compared to younger children (Table 6), but no statistically significant sig. = 3.25, $p > .05$.

Table 6: Correlation of total adaptive behavior of children and adolescents with visual impairment and chronological age

Chronological age	N	mean	SD
6-12 years old	25	72.68	14.33
12-14 years old	12	81.00	11.27

During the evaluation of the relationship between the variables the overall adaptive behavior of children and adolescents with visual impairment and the existence of fractures without visual impairment (sig. = .61, $p > .05$), as well as among the variable overall adaptive behavior of children and adolescents with visual impairment and cohabitation of the Blind school with a general education school (sig. = .97, $p > .05$) did not show a statistically significant relationship.

Among the variables motor development of children and adolescents with visual impairment and overall adaptive behavior of children and adolescents with visual disabilities moderate correlation was found ($r = .43$), indicating a convergence of these variables. The above finding is particularly important for the design of intervention programs. It appears that when a person with visual impairment improves motor development, his/her adaptive behavior also improves.

4. Discussion

The objective of this study was to: a) Explore the parameters of motor development and adaptive behavior in children and adolescents with and without visual impairment, aged 6-14 years and b) Explore the relationship between the aforementioned parameters and their correlation with a number of the participants' demographic characteristics.

As mentioned in the "Results" section of the statistical analysis of the data, the performance of children and adolescents with visual impairment in both their motor development and their adaptive behavior was lower than that of their peers ($p < .05$).

In particular, in terms of overall motor development, children and adolescents with visual impairment experienced a significantly lower average performance score (mean = 31.54, SD = 7.5), compared to the average score seen in children and adolescents without visual impairment (mean = 69.27, SD = 6.00).

It is evident that their performance was significantly lower than their respective peers. In other words, based on the comparative motor growth performance results among children and adolescents with and without visual impairment and on the basis of the descriptive categories of the BOT-2 psychometric tool (Bruininks and Bruininks, 2005) that the performance of visually impaired children and adolescents fell within the "below average" category, as opposed to the performance of children and adolescents of standard development, which fell within the descriptive category "above average".

Therefore, the null hypothesis according to which the motor development of children and adolescents with visual disabilities will not be differentiated from the motor development of children and adolescents without visual impairment, is rejected. This finding, based on the population of people surveyed, and the relevant literature was expected. Vision is a predominant sensation in humans and plays a very important role in the acquisition of motor skills (Hashemi et al., 2012) as well as in motor development (Navarro et al., 2004). The absence or incompleteness of vision creates problems and constraints on the way an individual moves, perceives his environment and identifies him within it. Bigelow (2003, 1992) argues that when there is less development in an area of the child's development field, this will definitely have an impact on the development of other areas of his personality (Rochat, 1995).

The deficits identified in the overall motor development of visually impaired children and adolescents over their peers are rooted in the worst physical condition of the former. Children with visual impairment exhibit lower fitness levels (Aslan, Calic and Kitis, 2012; Houwen et al., 2009; Lieberman et al., 2006; Kozub and Oh, 2004; Grommo and Angellab, 2001; Lieberman and McHugh, 2001; Longmuir and Bar Or, 2000) and develop their motor skills less than children of the corresponding chronological age (Megan O'Connell, 2006). The majority of children with visual disabilities displayed clumsy motor skills, and although they appear to be physically healthy they have a delay in their development (Adelson and Frainberg, 1976).

Previous studies also found that children and adolescents with visual impairment developed their motor skills less compared to their typical peers' development (Atasavum, Usal and Aki, 2012; Aki, Atasavum and Kayihan, 2008; Juodzbalienė and Muckus, 2006; Navarro et al., 2004; Wyver and Livesey, 2003; Bouchard and Tetrault, 2000; Johnson-Kramer, Sherwood, French and Canabal, 1992).

Another important finding of this research is the emergence of a statistically significant relationship (sig. = .02, $p < .05$), between the motor growth variables of children and adolescents with visual disabilities and gender. On the basis of the above finding, the corresponding null hypothesis, according to which: The motor development of children and adolescents with visual impairment does not have a statistically significant relationship with the gender of the child or adolescent, is rejected. In particular, boys with visual impairment outperformed in terms of their overall motor development (mean = 32.77, SD = 8.59), compared to girls with visual impairment (mean = 29.73, SD = 5.31). The explanation for the boys' superiority lies in the fact that girls with visual impairment are more overprotected than boys, and are therefore not provided with as many opportunities to actively engage in activities that promote motor skills. Certainly, researchers' views differ on the influence of gender on the growth of children and adolescents.

The findings of this research contradict the findings of the research carried out by Cameto and Nagle (2007) who investigated the mobility and orientation of adolescents and young people with visual disabilities aged 14-18 years. Based on the results of their research, there were no differences in the performance of the participants, related to

gender, age or nationality. Also Pereira (1990), who explored the static and dynamic balance in visually disabled children, aged 6-13 years, found no correlation between gender and the motor skills being studied. Similarly, the results of the research carried out by Ribandi, Rider Toole (1987) investigated the correlation of variable equilibrium (static and dynamic) and gender in adolescents with a congenital visual disability.

During the evaluation of the relationship between the variable motor development of children and adolescents with visual disability and chronological age, as mentioned above, a statistically significant relationship (sig. = .04, $p < .05$) was found. Older participants scored better in overall development. Therefore, the corresponding null hypothesis according to which the motor development of children and adolescents with visual impairment does not have a statistically significant relationship with their chronological age is rejected.

During the evaluation of the relationship between the motor development variables of children and adolescents with visual disability and the shared location of a school for the Blind with a general education school, revealed a statistically significant relationship (sig. = .03, $p < .05$). Children and adolescents with visual impairment attending a special education school (Blind), which shared its location with a general education school unit, recorded higher overall motor development (mean = 37.16, SD = 10.02) compared to children and adolescents with visual impairment attending a special education school (for the Blind) not sharing a location with a general education school (mean = 30.45, SD = 6.57). Therefore, the null hypothesis on the basis of which the motor development of children and adolescents with visual impairment does not have a statistically significant relationship with the co-location of the Blind school with a general school is rejected.

This particular finding was anticipated and partly reflects the fact that in cases where a Blind school is cohabiting with a general education school, there are many benefits for all students, regardless of whether they are visually impaired or not. Even the initial simple spatial coexistence of the two school units provides the opportunity for all children to get to know each other better, to get together, to interact and to co-create. There are several cases where, at break time, some typical development children visited the Blind School's classrooms and ask the teachers about the way students with visual impairment write and read etc.

Also, through targeted co-organization of joint activities between the two school units (festivals, excursions, educational visits, etc.), integration and common school breaks, typically developed children are informed and sensitized about visual disability and gradually form a positive attitude and acceptance towards students with visual disabilities. So during breaks, children with visual impairment are more easily invited to join them play. An immediate consequence for children with visual impairment is to increase their participation in physical activity, with the natural consequence of improving their physical condition and optimizing their motor growth.

During the evaluation of the relationship between the motor development variables of children and adolescents with visual impairment and the existence of non-

blind siblings a statistically significant relationship emerged ($\text{sig} = .050$, $p > .05$). In particular, visually impaired children and adolescents who had siblings without visual impairment performed better than those with no other siblings without visual impairment. The null hypothesis, according to which motor development of children and adolescents with visual impairment does not have a statistically significant relationship with the existence of siblings without visual impairment, is rejected.

Indeed, children and visually impaired teenagers with other siblings without visual impairment are in a better position than those without such siblings. First of all, they actively interact with them, through play, as well as other activities that take place in the context of shared living. Siblings without visual impairment have a tendency, based on research data, to correct their visually impaired siblings when they performed a task in the wrong manner or displayed a non-socially acceptable form of behavior, as opposed to parents or teachers who often showed tolerance under similar circumstances. Also, siblings without visual impairment provide a source of continuous mediation with the peer group. Visually impaired children with siblings are often involved in kinetic and exploratory activities which improve their motor skills.

In addition, based on the results of the research, children and adolescents with visual impairment experienced "modestly low adaptive behavior," while their non-visually impaired peers displayed "adequate" adaptive behavior. This finding is in line with the findings of other research that suggest that children and adolescents with visual impairment may have deficits in their overall adaptive behavior (Metsiou, Papadopoulos, Agaliotis, 2011, Papadopoulos, Metsiou, Agaliotis, 2011, Parson, 1987)) confirmed by this investigation. Specifically, Papadopoulos, Metsiou and Agaliotis (2011), in their effort to investigate the adaptive behavior of 46 visually impaired children and adolescents without the simultaneous existence of another disability, concluded that the overall adaptive behavior of the participants was "low" on a scale that included the categories "low", "moderate low", "sufficient", "moderate high" and "high" adaptive behavior.

Also, the above finding is consistent with the findings of the research conducted by Metsiou, Papadopoulos and Agaliotis (2011), which focused on exploring the adaptive behavior of 36 primary school age children with visual disabilities and, on the other hand, investigating the impact of educational background on their adaptive behavior. The results of their research revealed that the overall adaptive behavior of the participating children with visual impairment was deficient and in particular was "low".

As also mentioned above - in the "Results" chapter - in investigating the relationship between the variables in the overall adaptive behavior of children and adolescents with visual disability and gender, a statistically significant relationship was found ($\text{sig.} = .05$). Girls with visual impairment were superior in terms of overall adaptive behavior (mean = 83.00, SD = 13.61), compared with boys (mean = 74.27, SD = 12.42) with visual impairment. The null hypothesis, according to which the adaptive behavior of children and adolescents with visual impairment does not have a

statistically significant relationship with their gender, is rejected.

During the evaluation of the relationship between the variables of the overall adaptive behavior of children and adolescents with visual impairment and chronological age, adolescent participants fared better compared to children of lesser age, but there was no statistically significant relationship ($\text{sig} = 3.25$). The null hypothesis that the adaptive behavior of children and adolescents with visual impairment does not have a statistically significant relationship with their chronological age is not rejected.

The above finding agrees with Sparrow et al. (2005), (Taylor, 2008, AAMR, 1992) that adaptive behavior is evolutionary in nature and improves as the individual grows older. It also confirms the findings of the research conducted by Papadopoulos et al. (2011) concerning children and adolescents with visual impairment. In the context of this research (Papadopoulos et al., 2011), it was shown that the influence of the chronological age variable on both the overall adaptive behavior of children and adolescents with visual impairment, as well as areas of communication, socialization and daily living skills, emerged. At the same time, Metsiou (2008), who investigated the adaptive behavior of 49 persons with visual disabilities, aged 5-20 years, concluded that the chronological age parameter is the basic variable which affects the performance in most areas of adaptive behavior of people with visual disabilities.

Between the dependent variable, the overall adaptive behavior of children and adolescents with visual impairment and the independent variables of the absence of visual impairments ($\text{sig.} = .61, p > .05$) and the co-location of the Blind school with a general school of education ($\text{sig.} = .97, p > .05$), there was no statistically significant relationship. Therefore, the corresponding null hypotheses are not discarded.

The finding based on which there was no statistically significant relationship between the variable overall adaptive behavior of children and adolescents with visual impairment and the co-location of the Blind school with a general school does not agree with the discovery made by Metsiou et al. (2011) which pointed out that the educational context of the children had an impact both on their Daily Survival Skills and on their socialization. In particular, students with a visual impairment attending special education bodies performed worse in terms of their adaptive behavior compared to visually impaired students attending general education schools.

Finally, the finding of this research, which revealed a correlation and consequent convergence between the variable motor development of children and adolescents with visual impairment and overall adaptive behavior of visually impaired children and adolescents, is very important and complements the findings of previous research conducted to investigate the above variables individually. This finding is particularly important for the design of intervention training programs. It appears that when a visually impaired person improves his/her motor development, his overall adaptive behavior is also improved.

The above finding is consistent with the results of the study conducted by MacDonald, Lord and Ulrich (2013) in a population of Persons with Diffuse

Developmental Disorders (DDD), aiming at exploring motor development and adaptive behavior. The researchers concluded that improving motor skills in children with autism contributes to improving their adaptive behavior and suggests further research.

The findings of this research are important because they are expected to contribute, on the one hand, to designing effective intervention programs for children and adolescents with visual disabilities and, on the other, to contributing to a smoother school and social adaptation.

Visual disability alone does not cause particular developmental problems in the individual. Rather what impedes and slows down his/her development is the lack of opportunities to get to know and learn things (Parker, Mainland and Amdur, 1990), as well as the negative perception of other people towards athletes with a visual impairment (Tepfer, 2002).

With regard to proposals for practical implementation, it is proposed that those most close to Children and Adolescents with Visual Impairment create strong incentives in order to maximize the active and systematic participation of the latter in physical activity and, consequently, their adaptive behavior.

Due to the limitations of the present research and the gaps identified in the literature, not only in Greece but also at an international level, it would be useful to conduct similar research, which would explore the questions brought up by the research questions more deeply.

It is proposed that larger surveys be conducted with not only Special Schools for the Blind, but also general education structures. Another issue that could be the subject of future research is to investigate the impact of the application of adapted physical education programs on improving the adaptive behavior of children and adolescents with visual impairment, or on improving psychological parameters.

At the same time, another interesting topic could be to investigate the impact of the implementation of interventional Physical Education programs on the quality of lives of children and adolescents with visual impairment.

Also, a long term study could be conducted on populations of people with visual disabilities to investigate the permanence or otherwise of the benefits of participating in physical education intervention programs during childhood.

An equally interesting research topic could perhaps be to investigate whether people who have participated in organized intervention programs during their childhood are adopting an energetic lifestyle and lifelong exercise later on in their lives.

References

- Aggelopoulou-Sakantami, N. (2002). *Special treatment. Specific Principles and Methods*. Christodoulides Publications, Thessaloniki.
- Adelson, E. & Fraiberg (1974). Gross development in infants blind from birth. *Child development*, 45:114-126.

- Aki, E., Atasavun, S. & [Kayihan, H.](#) (2008). Relationship between upper extremity kinaesthetic sense and writing performance by students with low vision. *Percept Mot Skills*, 106(3):963-6.
- American Association on Mental Retardation (1992). *Definitions, classifications, and systems of supports* (9th edition). Washington, DC: Author.
- Arias, B., Verdugo, M.A., Navas, P. & Gómez, L.E. (2013). Factor structure of the construct of adaptive behavior in children with and without intellectual disability. *International Journal of Clinician and Health Psychology*, 13 (2).
- [Aslan, U.B., Calik, B.B. & Kitis, A.](#) (2012). The Effect of Gender and Level of Vision on the Physical Activity Level of Children and Adolescents with Visual Impairment. *Res. Dev. Disabil.* 33 (6):799-804.
- [Atasavun Uysal, S. & Düger, T.](#) (2012). Visual perception training on social skills and activity performance in low-vision children. *Scand J Occup Ther.* 19(1):33-41.
- Bigelow, A. (2003). 'The Development of Joint Attention in Blind Infants'. *Development and Psychopathology*, 15:259-75.
- Bigelow, E. (1992). Locomotion and Search Behaviour in Blind Infants, *Infant Behaviour and Development*, 15:179-189.
- Bouchard, D. & Tetreault, S. (2000). The motor development of sighted children and children with moderate low vision aged 8-13. *Journal of Visual Impairment & Blindness*, 94:564-573.
- Brambring, M. (2006). Divergent development of gross motor skills in children who are blind or sighted. *Journal of Visual Impairment & Blindness*, 100 (10): 620-634.
- Brambring, M. (2001). Motor activity in children who are blind or partially sighted. *Visual Impairment Research*, 3:41-51.
- Bruininks, R. & Bruininks, B. (2005). *Bruininks-Oseretsky Test of Motor Proficiency-2nd edition manual*. Minneapolis, MN: NCS Pearson.
- Cameto, R. & Nagle, K. (2007). *Orientation and Mobility Skills of Secondary School Students With Visual Impairments*. U.S. Department of Education Institute of Education Sciences National Center for Special Education Research.
- Carothers, D.E. & Taylor, R.L. (2004). *How teachers and parents can work together to teach daily living skills to children with autism*. Focus on Autism and Other Developmental Disabilities.
- Celeste, M. (2006). Play behaviors and social interactions of a child who is blind: In theory and practice. *Journal of Visual Impairment & Blindness*, 100 (2):75-90.
- Denrell, J. (2007). Adaptive learning and risk taking. *Psychological Review*, 114(1): 177-187.
- Ditterline, J., Banner, D., Oakland, T. & Becton, D. (2008). Adaptive behavior profiles of students with disabilities. *Journal of Applied School Psychology*, 24:191-208.
- Douglas, G., Grimley, M., Hill, E., Long, R. & Tobin, M. (2002). The use of the NARA for assessing the reading ability of children with low vision. *British Journal of Visual Impairment*, 20: 68-75.
- Gallahue, D. L. (2002). *Developmental Physical Education for Today's Children*.

- Translation-Editing: Evangelinos, Xr. & Pappa, A., Salto Publications, Thessaloniki.
- Garaigordobil, M. & Bernarás, E. (2009). Self-concept, Self-esteem, Personality Traits and Psychopathological Symptoms in Adolescents with and without Visual Impairment. *The Spanish Journal of Psychology*, 12 (1):149-160.
- Gronmo, S. J. & Augestad L. B. (2000). Physical Activity, Self-concept, and Global Self-Worth of Blind Youths in Norway and France. *Journal of Visual Impairment and Blindness*, 94: 522-527.
- James, D. M. & Stojanovik, V. (2007). Communication skills in blind children: A preliminary investigation. *Child: Care, Health and Development*, 33: 4–10.
- Johnson-Kramer, C., Sherwood, D., French, R. & Canabal, M. Y. (1992). Performance and learning of a dynamic balance task by visually impaired children. *Clinical Kinesiology*, Winter, 3-6. Jones Chiba.
- Hashemi, M., Dehghani, D., Saboonch, R., Roozbahani, M. & Roonasi, A. (2012). Effect of Gymnastic Skills on Motor Capabilities of 7-10 Age Group Girls with Visually Impaired. *European Journal of Experimental Biology*, 2 (3):786-791.
- Hatton, D., Bailey, D., Burchinal, M. & Ferrell, K. (1997). Developmental growth curves of preschool children with visual impairments. *Child Development*, 68: 788-806.
- Hovart, M., Ray, C., Ramsey, V. K., Miszko, T., Keeney, R. & Blasch, B. B. (2003). Compensatory analysis and strategies for balance in individuals with visual impairments. *Journal of Visual Impairment & Blindness*, 97: 695-703.
- Houwen, S., Hartman, E. & Visscher, C. (2009). Physical activity and motor skills in children with and without visual impairments. *Medicine and Science in Sport and Exercise*, 41: 103-109.
- Houwen, S., Visscher, C., Lemmink, K. A. & Hartman, E. (2008). Motor skill performance of school-age children with visual impairments. *Developmental Medicine and Child Neurology*, 50: 139–145.
- International Council of Ophthalmology (2002). *International Standards: "Visual Standards- Aspects and Ranges of vision Loss with Emphasis on population Surveys"*.
- Kozub, F. & Oh, H. (2004). An exploratory study of physical activity levels in children and adolescents with visual impairments. *Clinical Kinesiology*, 58 (3): 1-7
- Koulakoglou, K. (2002). Psychometry and psychological evaluation. 2nd edition, Papazisis Publications, Athens.
- Kotsis, K. & Andreou, G. (2004). Estimate length of objects by blind and seeing students. Pedagogical Review of the Pedagogical Department of the University of Ioannina, volume 17: 133-149.
- Lewis, S. & Iselin, S. (2002). A comparison of the independent living skills of primary students with visual impairments and their sighted peers: a pilot study. *Journal of Visual Impairment and Blindness*, 96(5):335, 44.
- Lieberman, L. J., Robinson, B. L. & Rollheiser, H. (2006). Youth with visual impairments: Experiences in general physical education. *RE:view*, 38:35-48.
- Lifshitz, H., Hen, I. & Weisse, I. (2007). Self-concept, adjustment to blindness and

- quality of friendship among adolescents with visual impairments. *Journal of Visual Impairment and Blindness*, 101: 96–107.
- Lieberman, L. J. & McHugh, B. E. (2001). Health-related fitness of children with visual impairments and blindness. *Journal of Visual Impairment and Blindness*, 95(5):272-286.
- Longmuir, P. E. & Bar-Or, O. (2000). Factors influencing the physical activity levels of youths with physical and sensory disabilities. *Adapted Physical Activity Quarterly*, 17: 40-53.
- Luckasson, R., Borthwick-Duffy, S., Buntix, W. H. E., Coulter, D. L., Craig, E. M., Reeve, A., Schalock, R. L., Snell, M. E., Spitalnik, D. M., Spreat, S. & Tassé, M. J. (2002). *Mental retardation: Definition, classification, and systems of supports* (10th ed.).
- Lui, K. Y. (2013). *Visual-vestibular interaction for maintaining stability while standing up from a sitting position: effects of aging*. (Master degree) Queen's University Kingston, Ontario, Canada
- MacDonald, M., Lord, C. & Ulrich, D. (2013). The relationship of motor skills and adaptive behavior skills in young children with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 7 (11): 1383-1390.
- Metsiou, K., Papadopoulos, K. & Agaliotis, I. (2011). Adaptive behavior of primary school students with visual impairments: The impact of educational settings. *Research in Developmental Disabilities*, 32 (6):2340-2345.
- Navarro, A. S., Fukujima, M. M., Fontes, S. V., de Andres Matas, S. L. & do Prado, G. F. (2004). Balance and motor coordination are not fully developed in 7 years old blind children. *Arq Neuropsiquiatr*, 62(3-A): 654-657.
- Nicholaou, E. (2005). The social function of middle-school children in their relationship with peer-to-peer children. Doctoral thesis, University of the Aegean, School of Humanities, Preschool Education and Educational Planning.
- Papadopoulos, K., Metsiou, K. & Agaliotis, I. (2011). Adaptive behavior of children and adolescents with visual impairments. *Research in Developmental Disabilities*, 32: 1086-1096.
- Parker, K. C. H., Mainland, M. K. & Amdur, J. (1990). The Diagnostic Inventory for Screening Children: Psychometric, factor, and validity analyses. *Canadian Journal of Behavioural Science*, 22:361-376.
- Parsons, S. (1987). Locus of control and adaptive behaviour in visually impaired children. *Journal of Visual Impairment & Blindness*, 81(9):429-432.
- Ray, C., Horvat, M., Keen, K. & Blasch, B. (2005). Using Tai Chi as an exercise intervention for improving balance in adults with visual impairments: Two case studies. *RE:view*, 37(1):17-24.
- Pereira, L. M. (1990). Spatial concepts and balance performance: Motor learning in blind and visually impaired children. *Journal of Visual Impairment & Blindness*, 84:109-111
- Polychronopoulou, S. (2003). Children and teenagers with special needs and capabilities: Modern trends in education and special support. Vol. A, Athens:

Horizon.

- Ribadi, H., Rider, R. A. & Toole, T. (1987). Comparison of static and dynamic balance in congenitally blind, sighted, and sighted blindfolded adolescents. *Adapted Physical Activity Quarterly*, 4, 220-225.
- Rochat, P. & Goubet, N. (1995). Development of sitting and reaching in 5- to 6-month-old infants. *Infant Behavior & Development* 18: 53-68.
- Sparrow, S. S., Balla, D. A. & Cicchetti, D. V. (2005). *Vineland adaptive behavior scales second edition survey forms manual*. AGS Publishing.
- Taylor, M. S. (2008). *Describing the adaptive Behavior of children with Down syndrome who received early intervention measured by the Vineland Adaptive Behavior Scales: A trend analysis*. Doctor Dissertation, Denton Texas.
- Warren, D. H. (2005). Blindness and child. Scientific editing of Zoniou-Sideri, A., Karagianni, P. Ellinika Grammata, Athens
- Wyver, S. & Livesey, D. (2003). Kinaesthetic sensitivity and motor skills of school-aged children with a congenital visual impairment *British Journal of Visual Impairment*, 21 (1):25-31.

Creative Commons licensing terms

Authors will retain the copyright of their published articles agreeing that a Creative Commons Attribution 4.0 International License (CC BY 4.0) terms will be applied to their work. Under the terms of this license, no permission is required from the author(s) or publisher for members of the community to copy, distribute, transmit or adapt the article content, providing a proper, prominent and unambiguous attribution to the authors in a manner that makes clear that the materials are being reused under permission of a Creative Commons License. Views, opinions and conclusions expressed in this research article are views, opinions and conclusions of the author(s). Open Access Publishing Group and European Journal of Special Education Research shall not be responsible or answerable for any loss, damage or liability caused in relation to/arising out of conflict of interests, copyright violations and inappropriate or inaccurate use of any kind content related or integrated on the research work. All the published works are meeting the Open Access Publishing requirements and can be freely accessed, shared, modified, distributed and used in educational, commercial and non-commercial purposes under a Creative Commons Attribution 4.0 International License (CC BY 4.0).