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Engelli bireylerde motor beceri

Emre KARA[1], Abdulkerim ÇEVİKER[2]

[1]Hitit Üniversitesi, Lisansüstü Eğitim Enstitüsü, Beden Eğitimi ve Spor Anabilim Dalı
[2]Hitit Üniversitesi, Spor Bilimleri Fakültesi, Rekreasyon Bölümü

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Özet

Engelli bireylerde motor beceri üzerine yapılmış çalışmalar incelendiğinde sistematik bir derlemeye rastlanmamıştır. Bu çalışma, engelli bireylerde motor becerinin etkisi ve önemini konusu üzerine yayınlanmış bilimsel çalışmaların sistematik derlemesidir. Bu çalışma, sistematik derleme, PRISMA (Preferred Reporting Items for Systematic review and Meta-Analysis) bildirgesine uyarak ortaya konmuştur. Bedensel, Görme, Zihinsel ve İşitme Engelliler gruplarının dışında kalan engel grupları çalışmaya dahil edilmemiştir. PubMed veri tabanında '(motor skill) AND (disabled)" anahtar kelimeleri ile yapılan aramada "Ücretsiz tam metin" sınırlaması yapıldığında sayı 2100'e düşmüş "Randomize-Kontrollü çalışma" ve "Deneysel Araştırma" "Review" sınırlamaları eklendikten sonra yapılan aramada toplam 256 sonuç elde edilmiştir. İnsan üzerinde yapılan çalışmalar ve yaş kriteri de dahil edildiğinde sayı 110'a düştü. Bunlardan 90 tane bilimsel çalışma konu dışı olması sebebiyle dışarıda bırakıldı. Geri kalan 10 yayın çalışmaya dahil edilmiştir. Çalışma sonuçlarına bakıldığında; engelli bireylerde gelişim sürecinin ilk üç yılında motor gelişimin bilişsel gelişim ile ilişki içinde olduğu görülmektedir. Spora katılan ve katılmayan engelli ilkokul çocuklarında motor performans ölçümü sonucunda ve spora katılan çocukların, katılmayan çocuklara kıyasla daha iyi motor performansı gösterdikleri görülmektedir. Engelli bireylerde motor beceri gelişiminin erken tanısının konulması ve motor becerilerde geriliği tespit edilen engelli bireylerde erken eğitim ve egzersiz müdahalelerinin önemli olduğu literatür taraması sonucunda önerilebilir.

Anahtar Kelimeler: Engelliler, motor beceri, sistematik derleme

Motor skills in individuals with disabilities

Abstract

This study is a systematic review of the published scientific studies on the effect and importance of motor skills in individuals with disabilities. The study was conducted following the PRISMA (Preferred Reporting Items for Systematic review and Meta-Analysis) guidelines and did not include disability groups other than those with physical, visual, cognitive, and hearing impairments. A search was conducted using the keywords "(motor skill) AND (disabled)" in the PubMed database, resulting in 256 results which were reduced to 110 after adding limitations of "Randomized-Controlled Study" and "Experimental Study" and "Review." Of these, 90 studies were excluded, and the remaining 10 studies were included in the analysis. The results showed that motor development in the first three years of development is related to cognitive development in individuals with disabilities. Children with disabilities who participated in sports had better motor performance compared to those who did not participate. Early detection of motor skill development and early educational and exercise interventions for individuals with motor skill deficits are suggested based on the results of the literature review.

Keywords: *Disabilities, motor skills, systematic review*

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Sorumlu Yazar/ Corresponded Author: Abdulkerim ÇEVİKER, **E-posta/ e-mail:** kerimceviker@gmail.com

Genişletilmiş Türkçe Özet, makalenin sonunda yer almaktadır.

INTRODUCTION

Disability is a multidimensional concept that includes participation limitations, activity limitations, and impairments with body functions or structures (Altman, 2014). According to the World Health Organization, over one billion individuals have reported at least one type of disability, and 80% of young people with disabilities live in developed countries. Physical disabilities range from visual and hearing impairments to gross motor functions, and young people with physical disabilities are statistically less physically active than non-impaired youth, affecting their health and quality of life (Brault, 2011; Employment and Social Development Canada, 2006). Engaging young people with physical disabilities in sports is seen as a way to increase their physical activity levels and improve their health. However, most youngsters with physical disabilities experience low levels of physical activity compared to their peers without disabilities (Longmuir & Bar-Or, 2000; Giacobbi et al., 2008; Malone, et al., 2012; Goodwin, 2016). This lack of physical activity can negatively impact their health, leading to increased risks of chronic disease and obesity-related secondary conditions. Sport provides internal and external rewards, and organized sport has been associated with greater benefits than physical activity alone. However, numerous barriers restrict young people with physical disabilities' access to disability sport (Martin, 2013; Ceylan et al., 2020; Ilkım et al., 2021; Uzun et al., 2021; Ceylan et al., 2022).

The development of motor skills is a prerequisite for physical activity, including sports participation, which provides several health benefits such as cardiovascular and muscle fitness. If children do not master basic motor skills in early childhood, it will be difficult for them to learn context-specific motor skills due to a proficiency barrier (Barg et al., 2010; Martin-Ginis et al., 2010). Sport is a physical and competitive activity that people practice in an institutionalized setting for both internal and external rewards. At the same time, sport feeds on these elements (Gül et al., 2021). Therefore, it is necessary to pay attention to young children's motor skill development in early childhood. Unfortunately, young children with developmental disabilities often experience motor skill deficits. Young children aged 5 to 10 years with autism spectrum disorder (ASD) showed significant gross motor skill delays compared to age-matched peers without disabilities (Coakley & Donnelly, 2009; Liu et al., 2014; Logan et al., 2015; Lepage, 2018; Ku et al., 2020).

Participation in motor skills intervention is one of the promising ways to promote motor skills in children with and without disabilities. Motor skills intervention provides children with organized and structured opportunities to learn motor skills. Types of motor skills intervention

include, but are not limited to, physical activity-based, technology-based, family-inclusive, and group-based interventions. A systematic review of studies found clear associations between basic motor skill proficiency and physical activity during childhood and adolescence. Logan et al. (2012) found a moderate effectiveness of motor skills intervention on motor skills in children without disabilities, with object control and locomotor skills improving significantly from before to after the intervention (Logan et al., 2012; Case & Yun, 2019; Ku et al., 2020).

In conclusion, disability is a complex and multidimensional concept that affects over one billion individuals worldwide. Young people with physical disabilities are statistically less physically active than non-impaired youth, which affects their health and quality of life. Engaging young people with physical disabilities in sports is seen as a way to increase their physical activity levels and improve their health, but numerous barriers restrict their access to disability sport. The development of motor skills is a prerequisite for physical activity, and participation in motor skills intervention is a promising way to promote motor skills in children with and without disabilities.

When the studies conducted to date are examined, it is seen that the number of studies on motor skills in individuals with disabilities is not sufficient. For this reason, the effects on motor skills in individuals with disabilities have not been scientifically explained. When the studies on motor skills in individuals with disabilities were examined, a systematic review was not found. This study is a systematic review of scientific studies published on the effect and importance of motor skills in individuals with disabilities. While conducting a systematic review on the subject, current scientific studies were reviewed.

METHOD

PRISMA statement

This study is a systematic review. The PRISMA (Preferred Reporting Items for Systematic review and Meta-Analysis) statement was used as a method in this study. The PRISMA statement was developed by the National Institute for Health Research at York University in 2009.

Systematic review

Systematic reviews are scientific examinations in which original research on a specific topic is reviewed in detail and extensively, and the findings are synthesized using exclusion and inclusion criteria. In the literature, it is possible to find a large number of studies on topics that may contradict each other. The main reason for the emergence of systematic reviews is to draw

meaningful and applicable conclusions from this seemingly complex and contradictory situation. A systematic review is a retrospective search of relevant research articles. The literature search was conducted in PubMed and Google Scholar databases by using 6 keywords in English and Turkish to cover studies from the last 5 years to the present day. The keywords Motor Skill, Disabilities, Physically Disabled, Visually Disabled, Mentally Disabled and Hearing Disabled were used in the search.

Inclusion and exclusion criteria

Physical, Visual, Mental and Hearing Impaired groups were analyzed. The criteria for inclusion in the review were randomized and controlled, experimental and clinical studies and access to the full text of the study. Disability groups other than the Physically, Visually, Mentally and Hearing-Impaired Groups were not included in the study. Makale seçim kriterleri

A search of the PubMed database with the keywords '(motor skill) AND (disabled)' identified a total of 3,116 publications. When “free full text” was restricted, the number dropped to 2100. “Randomized-controlled trial” and “Experimental research A total of 256 studies were found in the search after the “Review” study limitations. When human studies and age criteria were included, the number dropped to 110. Of these, 90 scientific studies were excluded due to their irrelevance. After a comprehensive search, 10 scientific studies were included in this study.

There are no ethical drawbacks in systematic review studies, and there is no risk of material or moral harm to the researchers.

FINDINGS

In this study, 10 research articles selected according to systematic review criteria were analyzed. The studies included in the study cover the period between 2010 and 2022.

Table 1. Studies included in the systematic review

Study Description	Research Group and Sample Size	Materials and Methods of the Study	Results Found
Malak et al. (2013) **"Motor skills, cognitive development and balance functions of children with Down syndrome"**	The study group consisted of 79 children with DS (42 boys, 37 girls), with a mean age of 6 years 3 months ± 4 years 6 months. Participants were divided into 3 groups according to age range: < 3 years, 3 - 6 years, > 6 years. Children were assessed using the Gross Motor Function Measure-88 (GMFM-88) and the Pediatric Balance Scale (PBS).	Motor functions were measured in 5 dimensions in the GMFM-88: 1) reaching and rolling (17 items), 2) seating (20 items), 3) crawling and kneeling (14 items), 4) standing (13), 5) walking, running and jumping (24 items). Pediatric Balance Measurement (PBS): Each testing session lasted 10 - 20 minutes. According to the criteria, each of the 14 tasks was scored from 0 - 4. A child who successfully completed all tasks earned a maximum of 56 points.	In the study, motor development of children with Down syndrome, especially in the first three years of life, was found to be associated with cognitive development. In addition, balance functions are closely related to motor skills in these children. Appropriate motor and balance scales such as the PBL and GMFM-88 can be used to plan treatment for children with DS and assess the functional abilities needed in daily life.
Brian et al. (2021) **"A Comparison of the Fundamental Motor Skills of Preschool-Aged Children With and Without Visual Impairments"**	Participants (N = 25; boys = 12; girls = 13) included children aged 3-5 years.	The Test of Motor Development-3 (TGMD-3) was administered to children between the ages of 3 years and 10 years and 11 months, which includes 13 basic motor skills divided into two subscales (locomotor skills and ball skills).	Children without visual impairment were found to perform significantly better than their peers with visual impairment in terms of locomotor and ball skills.
Winders et al. (2019) **"A schedule of gross motor development for children with Down syndrome"**	Longitudinal data were collected on 509 children with DS born between 2000 and 2013 from two large pediatric hospitals.	Forty-four defined gross motor skills were measured and participants' data were recorded. These tests were the Bayley Scale of Infant Development, Gesell or Peabody Developmental Motor Scale.	No statistically significant difference was observed in the 44 skills applied to children with DS in terms of gender and age.

Table 1. (table continuation) Studies included in the systematic review

Study Description	Research Group and Sample Size	Materials and Methods of the Study	Results Found
Clutterbuck et al. (2018) **"Active exercise interventions improve gross motor function of ambulant/semi-ambulant children with cerebral palsy: a systematic review"**	School-age ambulant/semi-ambulant children with cerebral palsy (CP)	A systematic review was conducted. Five databases were searched for articles involving school-aged children with CP who were active, participating in exercises, with gross motor outcomes measured at the Activity/Participation level.	We reviewed 34 reported studies on gross motor function. There is moderate positive evidence for Gross Motor Activity Training plus additional physiotherapy and Physical Fitness Training. There is weak positive evidence for Modified Sport and Non-Immersive Virtual Reality.
Mano et al. (2018) **"Adaptive behaviour and motor skills in children with upper limb deficiency"**	The study involved 10 children aged between 1 and 6 years with unilateral upper limb deficiencies.	Vineland Adaptive Behavior Scales were used to measure adaptive behaviors and motor skills.	In the study, the domain standard score of motor skills was significantly lower than the median score and a negative correlation was found with age. It was stated in the study that children with upper extremity deficiency have individual weaknesses in motor skill behaviors and these weaknesses increase with age.
Kanagasabai et al. (2014) **"Association between motor functioning and leisure participation of children with physical disability: an integrative review"**	Children with physical disabilities aged 6-12 years	A systematic review was conducted. The Mixed Method Evaluation Tool was used to assess the quality of qualitative and quantitative studies involving children with physical disabilities aged 6-12 years. They synthesized and compared information from both types of studies to determine to what extent and in what ways motor ability influences leisure participation.	Thirty-five studies were included and analyzed for the review. Twenty-four studies used quantitative methodology and 11 studies used qualitative methodology. They identified associations between motor skill and six dimensions of leisure participation, including variety, intensity, context, preferences, enjoyment and quality of participation. Motor function was found to have a weak to moderate association with participation in specific types and dimensions of leisure activities.

Table 1. (table continuation) Studies included in the systematic review

Study Description	Research Group and Sample Size	Materials and Methods of the Study	Results Found
Park (2015) **"Comparison of motor and process skills among children with different developmental disabilities"**	Participants were 39 children with developmental disabilities, 25 males (64.1%) and 14 females (35.9%) with an average age of 7.5 years.	Participants' motor and process skills were compared across three different disabilities: pervasive developmental disorder, cerebral palsy and intellectual impairment.	In the study, significant differences were found in motor skills between diagnoses. The results of the study revealed that the cerebral palsy group had weaker motor skills than the pervasive developmental disability and intellectual disability groups.
Emami-Kashfi et al. (2019) **"Effects of a Motor Intervention Program on Motor Skills and Executive Functions in Children With Learning Disabilities"**	45 male primary school students with Learning Disabilities aged 7-9 years old took part in the study and were randomly assigned to one of three groups: two experimental groups and one control group.	Experimental Group A participated only in the motor program, Experimental Group B participated in both the motor program and regular education at the same time, and the Control group participated only in regular education.	The study showed that both experimental groups significantly improved their motor skills and executive functions, although there was no significant improvement compared to the control group.
Pitchford et al. (2021) **"Fundamental Motor Skill Delays in Preschool Children with Disabilities: 2012 National Youth Fitness Survey"**	In the study, 329 preschool children (4.00 ± 0.04 years old) from mixed disability groups participated in the Gross Motor Development Test.	The TGMD-2 test was used to measure the basic motor skills of the children participating in the study.	Poor basic motor skills were observed among preschool children with disabilities.
Wagner et al. (2013) **"Gross motor skill performance in children with and without visual impairments-Research to practice"**	A total of 23 individuals, boys (N=14; mean age = 10.00 years) and girls (N=9; mean age = 10.44 years) aged 6-12 years with no light perception and no other disability were included in the study.	The Test of Gross Motor Development (TGMD-2) was used to determine the gross motor skill performance of the participants in both study groups.	In the study, children with visual impairment showed significantly worse performance in all locomotor and object control skills assessed.

DISCUSSION AND CONCLUSION

In this section, results from the 10 studies selected in the findings section will be presented and discussed in the light of the literature.

Malak et al. (2013) in their study on the motor development of children with Down syndrome (DS) found that motor development was found to be related to cognitive development, particularly in the first three years of life. In addition, balance functions in these children were closely related to motor skills among such children. It was commented that with appropriate motor and balance scales such as PBL and GMFM-88, it is possible to plan treatment for children with DS and assess functional abilities needed in daily life. Especially in the first years of life, the link between motor and intellectual development is very strong. Movement is considered the basis for learning new skills, even cognitive skills, in the first years of life (Diedrichsen et al., 2010). Infants and toddlers learn about the world by touching, putting toys in their mouths and observing. A child's motor skills influence social, language and cognitive experiences, so a delay in motor development can lead to delays in other areas of development (Pangalos et al., 1994).

Brian et al. (2021) found that children without visual impairments performed significantly better than their peers with visual impairments in locomotor and ball skills. Regardless of the presence of visual impairments, many participants struggled to demonstrate basic motor skills, with ball skills being the biggest problem. Brian et al. (2019) suggested that preschoolers in the United States may be experiencing a decline in basic motor skills. That is, the basic motor ability of today's children is significantly lower than the basic motor ability of children 20-35 years ago (Brian et al., 2019b). Moreover, the presence of a formal disability generally increases the risk of developmental delay in preschool-aged children (Brian et al., 2019a). Thus, Brian et al.'s results for children with visual impairment are consistent with data from other samples including a variety of disabilities (e.g., Brian et al., 2019b), and this is of concern.

Winders et al. (2019) found no statistically significant differences by gender and age in 44 skills administered to children with DS. The study presents a gross motor development chart for children with DS derived from prospectively collected data from a large population. The gross motor development of the child with DS can be assessed relative to the performance of other children with DS, which may enable early identification of age-appropriate or delayed development, allowing appropriate referrals for targeted intervention. In the US population born between 2000 and 2013, there is significant variability in the age range for the acquisition of

gross motor skills. This variability is much wider in children with DS than in typically developing children (Shea, 1991).

In another study by Clutterbuck et al. (2018) on school-aged ambulant/semi-ambulant children with cerebral palsy (CP), there was strong positive evidence for gross motor activity training including gross motor activity training and progressive resistance training plus additional physiotherapy. According to the study results, there was a moderate positive association for gross motor activity training plus additional physiotherapy and physical fitness training. There was weak positive evidence for modified sport and non-immersive virtual reality. There was strong evidence against gross motor activity training plus progressive resistance exercise without additional physiotherapy.

Mano et al. (2018) conducted a study on children with upper limb deficiency and found that the domain standard score of motor skills was significantly lower than the median score and there was a negative correlation with age. It was stated that children with upper limb deficiency have individual weaknesses in motor skill behaviors and these weaknesses increase with age. In the first year of life, children with unilateral upper limb deficits at the level distal to the elbow have no demand for complex movements and their motor skill level is comparable to the general level of adaptive behavior. However, it is considered good for children to start wearing prostheses under the age of 2 years so that they will accept them without objection. Although prostheses are not necessary when children are under 1 year of age and they can compensate for their motor function through their residual limbs, prosthetic introduction is necessary given the eventual decline in children's relative motor skills and the future use of body-powered or powered prostheses (Meurs et al., 2016; Mano et al., 2018).

In a study of children with physical disabilities aged 6-12 years, they determined the relationship between motor skills and six dimensions of participation in leisure activities, including variety, intensity, context, preferences, enjoyment and quality of participation. Motor function was found to have a weak to moderate association with participation in specific types and dimensions of leisure activities. Evidence suggests that limitations in motor skills moderately restrict the frequency of leisure time participation in active physical activity and recreational activities. Increasing the frequency of leisure time activities, especially physical activities, may be beneficial for health and fitness (Law et al., 2006; Orlin et al., 2010; Kanagasabai et al., 2014).

There were significant differences in motor skills between diagnoses in children with pervasive developmental disability, cerebral palsy and intellectual disability. The cerebral palsy group showed poorer motor skills than the pervasive developmental disability and intellectual disability groups. It was concluded that the findings have clinical implications for rehabilitation strategies for children with developmental disabilities (Park, 2015). Similarly, Kottorp et al. (2003) reported that motor skills showed significant differences between children with cerebral palsy, intellectual disability and autism. This is because motor skills are related to gross and fine motor functions, including postural control, muscle tone, body alignment and movement coordination. Furthermore, children with cerebral palsy have specific features related to motor functions, such as abnormal postural tone and movement patterns due to damage to the cerebral cortex, compared to other groups. However, children with cerebral palsy, pervasive developmental disorders and intellectual disabilities showed similar process skills (Park, 2015).

Emami-Kashfi et al. (2019) applied a motor skills program involving sequential coordination station exercises to forty-five male primary school students with Learning Disabilities aged 7-9 years old over 24 sessions scheduled three times a week for eight weeks. Both experimental groups, those who received only motor skills and those who continued regular training alongside motor skills, showed significantly improved motor skills and most measures of executive functioning, although there was no significant improvement for the control group. The improvements in some measures of executive functioning in the group that received regular training alongside motor skills were better than those who received only motor skills. Westendorp et al. (2014) found that the ball skills of children with learning disabilities improved by 54% by participating in an exercise program and that motor skills improved by 54% in a psychomotor training group, a regular physical training group and a body image training group.

When the results of the study were examined, it was found that motor development was related to cognitive development in the first three years of the development process in individuals with disabilities. It was found that children without visual impairment outperformed their peers with visual impairment in terms of locomotor and ball skills. According to the results of the study, those who received physiotherapy training in addition to gross motor activity training positively affected the physical fitness of children with CP. It was found that motor skill limitations negatively affected participation in leisure time activities in children with physical disabilities aged 6-12 years. Significant differences were found in motor skills between diagnoses in children with pervasive developmental disorder, cerebral palsy and

mental disorders. The cerebral palsy group was found to have weaker motor skills than the pervasive developmental disability and intellectual disability groups. It was concluded that there were improvements in the physical parameters and motor skills of the students as a result of the application of a motor skills program planned three times a week for eight weeks including coordination station exercises to primary school students with Learning Disabilities between the ages of 7-9. As a result of motor performance measurement in hearing impaired primary school children who participated and did not participate in sports, it was found that children who participated in sports showed better motor performance compared to children who did not participate. As a result of the literature review, it can be suggested that early diagnosis of motor skill development in individuals with disabilities and early education and exercise interventions in individuals with disabilities who are found to have retardation in motor skills are important.

In addition, some important explanations can be made within the scope of the study:

1. Providing opportunities for physical activities and sports that are tailored to the individual needs and abilities of children with physical disabilities can help improve their motor skills and overall physical functioning.
2. For children with developmental disabilities such as cerebral palsy and intellectual disability, specialized motor skill training and therapy programs can be effective in improving their motor skills and increasing their participation in physical activities.
3. It is important to recognize that children with different types of disabilities may have unique challenges and strengths when it comes to motor skills and physical activity. Tailoring interventions and programs to meet the individual needs of each child is essential for optimizing their outcomes.
4. Educating parents, caregivers, and educators on the benefits of physical activity and motor skill development for children with disabilities can help increase their support and involvement in these activities.
5. In addition to structured physical activities and therapies, providing opportunities for unstructured play and leisure activities can also be important for promoting physical activity and motor skill development in children with disabilities.
6. Collaboration between healthcare professionals, educators, and community organizations can help create a comprehensive approach to promoting physical activity

and motor skill development for children with disabilities. This can include developing inclusive programs and adapting existing programs to better meet the needs of children with disabilities.

GENİŞLETİLMİŞ ÖZET

GİRİŞ

Motor beceri müdahalesine katılım, engelli ve engelsiz çocuklarda motor becerileri teşvik etmenin umut verici yollarından biridir. Motor beceri müdahalesi, çocuklara motor becerileri öğrenmek için organize ve yapılandırılmış fırsatlar sağlar. Çocukların motor becerileri güçlendirilir ve araştırmacılar, öğretmenler, koçlar veya ebeveynler tarafından yapılan müdahalelerde uygulanır. Motor beceri müdahalesi türleri, fiziksel aktiviteye dayalı, teknoloji tabanlı, aile dahil ve grup tabanlı müdahaleleri içerir, ancak bunlarla sınırlı değildir. Logan ve arkadaşları, engelli olmayan çocuklarda motor beceriler üzerinde motor beceri müdahalesinin ılımlı bir etkinliğini bulmuşlardır. Spesifik olarak, çalışma, nesne kontrolü ve lokomotor becerilerinin müdahale öncesinden sonrasına kadar önemli ölçüde geliştiğini göstermiştir (Logan ve ark., 2012; Case & Yun, 2019; Ku ve ark., 2020).

Günümüze kadar yapılan çalışmalar incelendiğinde engelli bireylerde motor beceri üzerine çalışma sayısı yeterli düzeyde olmadığı görülmektedir. Bu nedenle engelli bireylerde motor beceri üzerindeki etkileri bilimsel olarak açıklanamamıştır. Engelli bireylerde motor beceri üzerine yapılmış çalışmalar incelendiğinde sistematik bir derlemeye rastlanmamıştır. Bu çalışma, engelli bireylerde motor becerinin etkisi ve önemini konusu üzerine yayınlanmış bilimsel çalışmaların sistematik derlemesidir.

YÖNTEM

Bu çalışma bir sistematik derlemedir. Bu çalışmada yöntem olarak PRISMA (Preferred Reporting Items for Systematic review and Meta-Analysis) bildirgesi kullanılmıştır. PRISMA bildirgesi York Üniversitesi Ulusal Sağlık Araştırmaları Enstitüsü tarafında 2009 yılında geliştirilmiştir. Literatür taraması PubMed ve Google Scholar veri tabanlarında son 5 yıldan günümüze kadar olacak çalışmaları kapsayacak şekilde İngilizce ve Türkçe dillerinde 6 anahtar sözcük kullanılarak yapılmıştır. Taramada; Motor Beceri, Engeliler, Bedensel Engelliler, Görme Engelliler, Zihinsel Engelliler ve İşitme Engelliler anahtar sözcükleri kullanılmıştır. Bedensel, Görme, Zihinsel ve İşitme Engelliler grupları incelenmiştir. İncelenen çalışmaları derlemeye katma ölçütleri; randomize ve kontrollü, deneysel ve klinik araştırmalar ve çalışmanın tam metnine ulaşılmak olarak belirlenmiştir. Bedensel, Görme, Zihinsel ve İşitme Engelliler Gruplarının dışında kalan engel grupları çalışmaya dahil edilmemiştir.

PubMed veri tabanında ‘(motor skill) AND (disabled)’ anahtar kelimeleri ile yapılan aramada toplam 3,116 yayın tespit edildi. “Ücretsiz tam metin” sınırlaması yapıldığında sayı 2100’e düştü. “Randomize-Kontrollü çalışma” ve ‘’Deneysel Araştırma’’ “Review” çalışma sınırlamalarından sonra yapılan aramada toplam 256 araştırmaya ulaşıldı. İnsan üzerinde yapılan çalışmalar ve yaş kriteri de

dahil edildiğinde sayı 110'a düştü. Bunlardan 90 tane bilimsel çalışma konu dışı olması sebebiyle dışarıda bırakıldı. Arama sonrası 10 bilimsel çalışma bu araştırmaya dahil edildi. Sistematik derleme çalışmalarında etik yönden bir sakınca bulunmamasının yanında araştırmacılara da herhangi bir maddi ya da manevi olarak zarar riski bulunmamaktadır.

BULGULAR

Malak ve arkadaşlarının (2013) yaptıkları çalışmada Down sendromlu çocukların motor gelişimi, özellikle yaşamın ilk üç yılında motor gelişim bilişsel gelişim ile ilişkili olduğu bulunmuştur. Ayrıca bu çocuklarda denge fonksiyonları, motor becerilerle yakından ilişkilidir. Pediatrik Denge Ölçümü ve Çocuklar Kaba Motor Fonksiyon Ölçüsü-88 gibi uygun motor ve denge ölçekleri sayesinde DS'li çocuklar için tedavi planlamak ve günlük yaşamda ihtiyaç duyulan fonksiyonel yetenekleri değerlendirmek mümkündür.

Brian ve arkadaşlarının (2021) yaptıkları çalışmada görme bozukluğu olmayan çocuklar, lokomotor ve top becerileri açısından görme bozukluğu olan akranlarından anlamlı derecede daha yüksek performans gösterdiği bulunmuştur. Park (2015) çalışmasında tanılar arasında motor becerilerde anlamlı farklılıklar bulunmuştur. Serebral palsi grubu, yaygın gelişimsel engellilik ve zihinsel engellilik gruplarından daha zayıf motor becerilere sahip olduğunu çalışma bulgularında ortaya çıkarmıştır.

TARTIŞMA ve SONUÇ

Engelli bireylerde gelişim sürecinin ilk üç yılında motor gelişimin bilişsel gelişim ile ilişki içinde olduğu bulunmuştur. Görme bozukluğu olmayan çocuklar, lokomotor ve top becerileri açısından görme bozukluğu olan akranlarından daha yüksek performans gösterdiğini bulunmuştur. Çalışma sonuçlarına göre kaba motor aktivite eğitimine ek olarak fizyoterapi eğitimi alanlarda SP'li çocukların fiziksel uygunluklarını pozitif yönde etkilemiştir. 6-12 yaş arası fiziksel engelli çocuklarda motor beceri sınırlıklarının boş zaman etkinliklerine katılımı olumsuz yönde etkilediği bulunmuştur. Yaygın gelişimsel bozukluk, serebral palsi ve zihinsel bozukluğu olan çocuklarda tanılar arasında motor becerilerde anlamlı farklılıklar bulunmuştur. Serebral palsili grup, yaygın gelişimsel engellilik ve zihinsel engellilik gruplarından daha zayıf motor beceriler ortaya çıktığı bulunmuştur. 7-9 yaşları arasında Öğrenme Güçlüğü ilkokul öğrencilerine koordinasyon istasyon egzersizlerini içeren sekiz hafta boyunca haftada üç kez planlanan motor beceri programı uygulama sonucunda öğrencilerin fiziksel parametrelerinde ve motor becerilerinde gelişimler olduğu sonucuna varıldı. Spora katılan ve katılmayan İşitme engelli ilkokul çocuklarında motor performans ölçümü sonucunda ve spora katılan çocukların, katılmayan çocuklara kıyasla daha iyi motor performansı gösterdikleri bulundu. Engelli bireylerde motor beceri gelişiminin erken tanısının konulması ve motor becerilerde geriliği tespit edilen engelli bireylerde erken eğitim ve egzersiz müdahalelerinin önemli olduğu literatür taraması sonucunda önerilebilir.

REFERENCES

Altman, B. M. (2014). Definitions, concepts, and measures of disability. *Annals of Epidemiology*, (24), 2-7.

Barg, C.J., Armstrong, B., Hetz, S.P., & Latimer, A.E. (2010). Physical disability, stigma, and physical activity in children. *International Journal of Disability, Development and Education, 57*(4), 371-382.

Brault, M.W. (2011). *School-aged children with disabilities in U.S. metropolitan statistical areas: 2010. U.S. Department of Commerce Economics and Statistics Administration U.S.* https://www.census.gov/prod/2011pubs/acsbr1012.pdf

Brian, A., Miedema, S.T., Johnson, J.L., & Chica, I. (2021). A comparison of the fundamental motor skills of preschool-aged children with and without visual impairments. *Adapted Physical Activity Quarterly*, *38*(3), 349-358.

Brian, A., Pennell, A., Haibach-Beach, P., Foley, J., Taunton, S., & Lieberman, L.J. (2019a). Correlates of physical activity among children with visual impairments. *Disability and Health Journal*, *12*(2), 328–333.

Brian, A., Pennell, A., Taunton, S., Starrett, A., Howard-Shaughnessy, C., Goodway, J. D., … et al. (2019b). Motor competence levels and developmental delay in early childhood: A multicenter and cross-sectional study conducted in the USA. *Sports Medicine*, *49*(10), 1609–1618.

Case, L. & Yun, J. (2019). The Effect of different intervention approaches on gross motor outcomes of children with autism spectrum disorder: A meta-Analysis. *APAQ*, *36*(4), 501–526.

Ceylan, L., Bilen, E., Elliöz, M., & Küçük, H. (2022). Comparison of motivation levels of outdoor and ındoor athletes studying physical education and sports training. *Journal of Educational Issues*, *8*(1), 629–642.

Ceylan, T., Ermiş, E., Ceylan, L., & Erilli, N.A. (2020). Futbol Hakemlerinin sargınlık ve öz yeterlik düzeylerinin incelenmesi. *Uluslararası Sosyal Araştırmalar Dergisi*, *13*(75), 934–940.

Coakley, J., & Donnelly, P. (2009). *Sports in society: Issues and controversies*. McGraw Hill

Diedrichsen, J., Shadmehr, R., & Ivry, R.B. (2010). The coordination of movement: optimal feedback control and beyond. *Trends in Cognitive Sciences, 14*(1),31–39.

Emami-Kashfi, T., Sohrabi, M., Saberi Kakhki, A., Mashhadi, A., & Jabbari-Nooghabi, M. (2019). Effects of a motor intervention program on motor skills and executive functions in children with learning disabilities. *Perceptual and Motor Skills, 126*(3), 477-498.

Employment and Social Development Canada. (2006, July). *Disability in Canada: a 2006 profile*. http://www.esdc.gc.ca/eng/disability/arc/disability_2006.shtml

Clutterbuck, G., Auld, M., & Johnston, L. (2019). Active exercise interventions improve gross motor function of ambulant/semi-ambulant children with cerebral palsy: a systematic review. *Disability and Rehabilitation, 41*(10), 1131-1151.

Giacobbi, P.R., Stancil, M., Hardin, B., & Bryant, L. (2008). Physical activity and quality of life experienced by highly active individuals with physical disabilities. *Adapted Physical Activity Quarterly, 25*(3), 189-207.

Goodwin, D. (2016). Youth sport and disability. In K. Green & A. Smith (Eds.), *Routledge handbook of youth sport* (pp. 308-320). New York, NY: Routledge.

Gül, M., Gül, O., & Uzun, R.N. (2021). Türk-İslâm medeniyetinde spor kültürü: Okçuluk, binicilik ve güreş özelinde olgular. *Türk İslâm Medeniyeti Akademik Araştırmalar Dergisi, 16*(31), 119-136.

Ilkım, M., Özoğlu, F., & Karadağ, H. (2021). Türkiye'de spor alanında yapılan otizm ile ilgili lisansüstü tezlerin içerik analizi (2013-2020). *ROL Spor Bilimleri Dergisi*, *2*(1), 40-49.

Kanagasabai, P.S., Mulligan, H., Mirfin-Veitch, B., & Hale, L.A. (2014). Association between motor functioning and leisure participation of children with physical disability: an integrative review. *Developmental Medicine & Child Neurology*, *56*(12), 1147-1162.

Kottorp, A., Bernspång, B., & Fisher, A.G. (2003). Validity of a performance assessment of activities of daily living for people with developmental disabilities. *Journal of Intellectual Disability Research, 47(8),* 597–605.

Ku, B., MacDonald, M., Hatfield, B., & Gunter, K.B. (2020). Parental influences on parent-reported motor skills in young children with developmental disabilities. *Disability and Health Journal*, *13*(3), 100910.

Law, M., King, G., King, S., Kertoy, M., Hurley, P., Rosenbaum, P., ... et al. (2006). Patterns of participation in recreational and leisure activities among children with complex physical disabilities. *Developmental Medicine & Child Neurology*, *48*(5), 337-342.

Lepage, P. (2018). *Development and acquisition of knowledge of youth sport coaches in disability sport* [Master's thesis, McGill University]. https://escholarship.mcgill.ca/concern/theses/x920fz942

Liu, T., Hamilton, M., Davis, L., & ElGarhy, S. (2014). Gross motor performance by children with autism spectrum disorder and typically developing children on TGMD-2. *Journal of Child and Adolescent Behaviour, 2*(1), 1-4.

Logan, S.W., Kipling Webster, E., Getchell, N., Pfeiffer, K.A., & Robinson, L.E. (2015). Relationship between fundamental motor skill competence and physical activity during childhood and adolescence: a systematic review. *Kinesiology Review*, *4*(4): 416-426.

Logan, S.W., Robinson, L.E., Wilson, A.E., & Lucas, W.A. (2012). Getting the fundamentals of movement: A meta-analysis of the effectiveness of motor skill interventions in children. *Child: Care, Health and Development*, *38*(3), 305-315.

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*(1), 40-53.

Lubans, D.R., Morgan, P.J., Cliff, D.P., Barnett, L.M., & Okely, A.D. (2010). Fundamental movement skills in children and adolescents. *Sports Medicine*, *40*(12), 1019-1035.

Malak, R., Kotwicka, M., Krawczyk-Wasielewska, A., Mojs, E., & Szamborski, W. (2013). Motor skills, cognitive development and balance functions of children with Down syndrome. *Annals of Agricultural and Environmental Medicine, 20*(4), 803-806.

Malone, L.A., Barfield, J.P., & Brasher, J.D. (2012). Perceived benefits and barriers to exercise among person with physical disabilities or chronic health conditions within action or maintenance stages of exercise. *Disability Health Journal, 5*(4), 254-260.

Mano, H., Fujiwara, S., & Haga, N. (2018). Adaptive behaviour and motor skills in children with upper limb deficiency. *Prosthetics and Orthotics International*, *42*(2), 236-240.

Martin-Ginis, K., Jetha, A., Mack, D.E., & Hetz, S. (2010). Physical activity and subjective well being among people with spinal cord injury: A meta-analysis. *Spinal Cord, 48*(1), 65-72.

Martin, J.J. (2013). Benefits and barriers to physical activity for individuals with disabilities: A social-relational model of disability perspective. *Disability and Rehabilitation, 35*(24), 2030- 2037.

Meurs, M., Maathuis, C.G.B., Lucas, C., Hadders-Algra, M., & Van Der Sluis, C.K. (2006). Prescription of the first prosthesis and later use in children with congenital unilateral upper limb deficiency: A systematic review. *Prosthetics and Orthotics İnternational*, *30*(2), 165-173.

Orlin, M.N., Palisano, R.J., Chiarello, L.A., Kang, L.J., Polansky, M., Almasri, N., … et al. (2010). Participation in home, extracurricular, and community activities among children and young people with cerebral palsy. *Developmental Medicine & Child Neurology*, *52*(2), 160-166.

Pangalos, C., Avramopoulos, D., Blouin, J.L., Raoul, O., DeBlois, M.C., Prieur, M., ...et al. (1994). Understanding the mechanism (s) of mosaic trisomy 21 by using DNA polymorphism analysis. *American Journal of Human Genetics*, *54*(3), 473.

Park, M.O. (2015). Comparison of motor and process skills among children with different developmental disabilities. *Journal of Physical Therapy Science*, *27*(10), 3183-3184.

Pitchford, E. A., Leung, W., & Webster, E.K. (2021) Fundamental motor skill delays in preschool children with disabilities: 2012 national youth fitness survey. *Frontiers Public Health, 9*, 758321.

Shea A.M. (1991) *Motor attainments in Down syndrome. In: Contemporary Management of Motor Control Problems* [Conference presentation]. Proceedings of the II Step Conference, Foundation for Physical Therapy, Alexandria, VA, United States.

Uzun, R.N., Karakuş, K., Barut, Y., & Çebi, M. (2021). Sporda ahlaksal değerler: Fair play, *Rol Spor Bilimleri Dergisi, 2*(2), 93-102.

Wagner, M.O., Haibach, P.S., & Lieberman, L.J. (2013). Gross motor skill performance in children with and without visual impairments—Research to practice. *Research in Developmental Disabilities*, *34*(10), 3246-3252.

Westendorp, M., Houwen, S., Hartman, E., Mombarg, R., Smith, J., & Visscher, C. (2014). Effect of a ball skill intervention on children's ball skills and cognitive functions. *Medicine & Science in Sports & Exercise, 46*(2), 414–422.

Winders, P., Wolter-Warmerdam, K., & Hickey, F. (2019). A schedule of gross motor development for children with Down syndrome. *Journal of Intellectual Disability Research*, *63*(4), 346-356.

KATKI ORANI ***CONTRIBUTION RATE***	**AÇIKLAMA** ***EXPLANATION***	**KATKIDA BULUNANLAR** ***CONTRIBUTORS***
Fikir ve Kavramsal Örgü *Idea or Notion*	Araştırma hipotezini veya fikrini oluşturmak *Form the research hypothesis or idea*	Emre KARA Abdulkerim ÇEVİKER
Tasarım *Design*	Yöntem ve araştırma desenini tasarlamak *To design the method and research design.*	Emre KARA Abdulkerim ÇEVİKER
Literatür Tarama *Literature Review*	Çalışma için gerekli literatürü taramak *Review the literature required for the study*	Emre KARA Abdulkerim ÇEVİKER
Veri Toplama ve İşleme *Data Collecting and Processing*	Verileri toplamak, düzenlemek ve raporlaştırmak *Collecting, organizing and reporting data*	Emre KARA Abdulkerim ÇEVİKER
Tartışma ve Yorum *Discussion and Commentary*	Elde edilen bulguların değerlendirilmesi *Evaluation of the obtained finding*	Emre KARA Abdulkerim ÇEVİKER

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Etik Kurul Beyanı/ *Statement of Ethics Committee*

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Since this research was conducted with a qualitative method (traditional review), there is no need for an Ethics Committee.