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Assessment of Basic Motor Competencies in Children with Visual Impairments

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Abstract

The aim of the current study was to compare the basic motor competencies of adolescents with visual impairments (VI) with those of their sighted peers. To identify high-risk groups that are particularly threatened by social exclusion, we used the MOBAK-5-6 test. We compared a total of 29 students with visual impairments (age: M = 13.08) with sighted children, randomly pair-matched according to age and gender, by conducting a t-test and calculating the effect size using Cohen's d. The MOBAK test demonstrated that the basic motor competencies of children with VI differed significantly from those of sighted children. From the perspective of social inclusion theory, these findings support the assumption that students with visual impairments may be at particular risk of being excluded in the context of exercise, play, and sports.

Keywords: inclusion, visual impairment, physical education, assessment of motor skills.

Erfassung von motorischen Basiskompetenzen von Kindern mit Sehbehinderung

Zusammenfassung

Ziel der Studie ist es, motorische Basiskompetenzen von Kindern und Jugendlichen mit Sehbehinderung mit denen ihrer sehenden Altersgenossen zu vergleichen. Um Risikogruppen zu identifizieren, die besonders von sozialer Exklusion bedroht sind, wurde das Testinstrument MOBAK-5-6 verwendet. Insgesamt 29 Schülerinnen und Schüler mit Sehbehinderung (Alter: M = 13,08) wurden mit sehenden Kindern verglichen. Paare wurden zufällig nach Alter und Geschlecht gebildet, indem ein t-Test durchgeführt und die Effektgröße mit Cohen's d berechnet wurde. Der MOBAK-Test zeigt, dass sich die motorischen Basiskompetenzen von blinden und sehbehinderten Kindern und Jugendlichen signifikant von denen sehender Kinder und Jugendlicher unterschieden. In Bezug auf die Frage nach sozialer Teilhabe stützen diese Ergebnisse die Annahme, dass blinde und sehbehinderte Kinder und Jugendliche einem besonders hohen Risiko ausgesetzt sind, im Zusammenhang mit Bewegung, Spiel und Sport ausgeschlossen zu werden.

Schlüsselwörter: Inklusion, Sehbehinderung und Blindheit, Sportunterricht, Motorische Diagnostik

Introduction

A core task of physical education in school is to teach students the competencies they need to participate actively in the culture of sport and exercise (Kurz, Fritz, & Tscherpel, 2008; Prohl, 2010). Therefore, equipping children with basic motor competencies (Herrmann, 2018), in addition to a basic level of physical fitness and knowledge about sports, is an internationally recognized objective of physical education (e.g., NASPE, 2004; Whitehead, 2010). Basic motor competencies enhance the participation of all students, including those who are disabled, thus contributing to the basic capacity to engage in sports (Giese & Ruin, 2018).

The acquisition of basic motor competencies is linked closely to socialization processes outside of school (Herrmann, Heim, & Seelig, 2017; Wirszing, 2015). Therefore, the levels of basic motor competencies can differ very widely. Since having a visual impairment increases the probability of developmental delays in fundamental movement skills (Haibach, Wagner, & Lieberman, 2014; Wagner, Haibach, & Lieberman, 2013), it may be assumed that children with visual impairments (CWVI) are either excluded or in danger of being excluded from these socialization processes (Giese, Gießing, & Eichmann, 2013).[1] Accordingly, not all students, and especially not those with visual impairments, possess the level of basic motor competencies necessary for participation in sports and exercise. Especially in the context of visual impairment, physical education lessons need to serve educational functions to balance out these differences in socialization and build up and secure a minimum of basic motor competencies in children. Placing emphasis on basic motor competencies thus constitutes an attempt to ensure that both students with and those without disabilities are capable of participating in the culture of sport and exercise (Herrmann, Heim, & Seelig, 2017; Kurz et al., 2008). These efforts serve as a building block (with inclusion certainly influenced by many other processes) to ensure the full inclusion of people regardless of any disabilities.

The concept of basic motor competencies

In German-speaking educational science in sport and exercise, motor performances are discussed in the context of the availability of basic motor competencies. These are related to the concept of fundamental movement skills discussed mainly in English-speaking sport and exercise science. According to this cultural line of research on competencies, adolescents must have basic motor competencies in order to take part in a culture of sport and exercise and to reflect on sports and exercise as something valuable in life (Herrmann, Gerlach, & Seelig, 2015).

Basic motor competencies …

- can be learned and retained in the long term and take into account previous experiences.
- are explicitly context-independent and refer to situation-specific demands in the culture of sport and exercise (e.g., handling a ball in ball sport).
- are functional performance dispositions that manifest themselves in behavior that is oriented toward mastery (Herrmann & Seelig, 2017).

[1] According to the German social law the criteria for visual impairment include three degrees of visual impairment (VI, severe VI & blindness). Nevertheless, there is no uniform German translation for the term „visual impairment". Usually, the term "Sehschädigung" is used as an umbrella term for all three degrees of visual impairment. In this article, we use the acronym CWVI (children with visual impairments) to refer to all children with a visual impairment (umbrella term) and the term CWVI (aGL [according to the German law]) or VI (aGL) to refer explicitly to children with a visual acuity between 0.3 and 0.05 (cf. chapter sample).

The performance behavior, consisting of the observable performances of sport- and exercise-related activity, is what we refer to as basic motor qualifications. They form the basis for basic motor competencies, which are not directly observable. Through the combination of these basic qualifications, it is possible to identify the underlying latent structures of basic motor competencies. Basic motor competencies are distinguished from context-independent physical fitness (Herrmann & Seelig, 2017; Stodden, Langendorfer, & Roberton, 2009) and from specific motor skills that pertain to individual movements (e.g., handstands, the butterfly stroke).

Motor skills tests are based on a process- or product-oriented perspective. The Test of Gross Motor Development (TGMD, Ulrich & Sanford, 2000), which is most often used for CWVI, is composed of process-oriented test items. These tests focus on assessing the quality or execution of movement in specific sport-related activities. The result of the execution of movement or the successful mastery of a motor demand, on the other hand, are not core elements of the assessment (Scheuer, Herrmann, & Bund, 2019). Motor ability tests (e.g., Deutscher Motorik Test [DMT]; Bös et al., 2009) measure the expression of physical fitness. The abilities are assessed on the basis of the subject's performances on individual test items. The most important characteristic of this form of measurement is that the assessment of individual ability remains task- and thus context-independent (for an overview, cf. Scheuer, Herrmann, & Bund, 2019).

The basic motor competencies fulfill a control function for motor abilities (How much strength does the child have?) and motor skills (Is the child's throwing technique good enough?) with regard to concrete motor tasks (Can the child hit the target with a ball?). From a theoretical perspective, the construct of basic motor competencies may thus be regarded as a complement to motor abilities and motor skills. The distinction between these constructs is dissolved when one focuses exclusively on the successful execution of motor tasks. Accordingly, the measurement of basic motor competencies focuses solely on the successful performance of motor tasks (Herrmann, 2018).

Since basic motor competencies refer explicitly to the context of physical education at selected grade levels, they must be connected to the objectives formulated in the curricula for the various age and grade levels, which also apply to CWVI. The test MOBAK (in German: Motorische Basiskompetenzen [MOBAK]) provides an approach for diagnosing and evaluating context-dependent performance dispositions that enables grade-specific measurement of competencies in physical education classes. The instrument focuses on functional mastery of motor demands and achievement of the movement goal by means of basic motor competencies (for an overview, cf. Herrmann, 2018).

Physical activity, fitness, and basic motor competencies in CWVI

Research on sports with CWVI has a long tradition in Germany but is also limited (Brian, Haibach-Beach, Lieberman, & Giese, 2017). The focus is mainly on fundamental theoretical and didactic questions concerning how to promote motor skills, enabling CWVI to participate as independently as possible in the culture of sport and exercise (Block, Giese, & Ruin, 2017). It has repeatedly been shown that CWVI can essentially learn all types of sports (adapted, if necessary) and achieve high levels of motor activity if the basic didactic framework addresses their specific needs (Giese, Teigland, & Giessing, 2017; 2019).

To date, there is no national research on the basic motor competencies of CWVI in Germany, and there is only one pilot study on the physical activity of CWVI (Giese et al., 2017; 2019). Current international research pertaining to CWVI has already produced some findings. Many studies have reported that CWVI have lower levels of physical activity (Brian et al., 2018; Haegele, Brian, & Goodway, 2015; Haegele & Porretta, 2015; Lieberman et al., 2010). Augestad and Jiang (2015) presented a systematic literature review of articles published between 1984 and 2014 that are related to physical activity, physical fitness, and body composition among CWVI. Their general findings revealed and confirmed lower levels of physical activity, physical fitness, and body composition than in children and youths without visual impairment. Their results are consistent with those of Haegele and Porretta (2015), who also reviewed published articles related to physical activity of school-aged individuals with VI. Nevertheless, studies have shown that CWVI can improve their physical health condition and obtain levels comparable to those of sighted children if they are given equal opportunities for participation in regular physical activity (Cervantes & Porretta, 2013; Giese et al., 2017; 2019; Stuart, Lieberman, & Hand, 2006). Shapiro, Moffett, Lieberman, and Dummer (2005) as well as Stuart, Lieberman, and Hand (2006) stated that CWVI generally have fewer incentives and opportunities to participate in activities that provide the amounts and types of physical stimulation needed and that are common for sighted children.

In relation to motor skills, the probability of motor development delays occurring in CWVI is increased (e.g., Haibach et al., 2014; Haegele et al., 2015; Wagner et al., 2013). CWVI show motor deficits in gross motor skills as well as in static and dynamic balance (Bouchard & Tetreault, 2000; Haibach & Lieberman, 2013; Haibach, Lieberman, & Pritchett, 2011). Houwen and colleagues (2008) investigated numerous motor abilities in children with and without visual impairments and found out that CWVI show the greatest developmental delays in unimanual speed, eye-hand coordination, catching, static balance, and dynamic balance tasks. As a means of diagnosing motor deficits in CWVI, Wagner and colleagues (2013) compared children with and without visual impairments with the help of the Test of Gross Motor Development, second edition (TGMD-2; Ulrich & Sanford, 2000). According to the results, CWVI show significantly poorer results than sighted children in all twelve skills included in the study. Current research with the help of the Test of Gross Motor Development, 3rd edition underlines these results (Brian, Taunton, Lieberman, Haibach-Beach, Foley, & Santarossa, 2018; Giese, Greiner, & Wagner, 2020).

While comparisons between children with and without visual impairments show a broad spectrum of differences in gross motor skills on the whole, a study considering the degree of visual impairment enabled a further differentiation of the results (Haibach et al., 2014). As usual in this field of research, the authors followed the three-level classification of the United States Association for Blind Athletes (USABA). The USABA distinguishes between the groups B3 (vision between 20/200 and 20/599 after best correction), B2 (vision 20/200 and less after best correction), and B1 (blind). Within the scope of this classification, blind children (B1) achieved lower average levels of motor development than visually impaired children (B2, B3). The two groups B2 and B3 showed higher levels of performance, with exceptions in running, catching, and throwing.

Much as with sighted children and youths (Hume et al., 2008), boys and girls did not show any significant differences in skill levels for locomotor skills (running, leaping, jumping, etc.) or for most object control skills (catching, kicking, and rolling). Surprisingly, no age-related differences between younger (6–9 years) and older (10–12 years) CWVI were found for the locomotor skills or for the object control skills. This merits special mention because children who are older should naturally have a higher score on gross motor skill assessments.

Against this backdrop, we aim to pursue the questions of whether

1. visually impaired and non-visually impaired children differ in their basic motor competencies and whether
2. the basic motor competencies of visually impaired children differ depending on the degree of visual impairment.

To investigate basic motor competencies of youths with VI, we used the MOBAK-5-6 test (Herrmann & Seelig, 2017) whose particular strength lies in its ability to measure context- and age-specific basic motor competencies that are explicitly specified in the curriculum. In line with the inclusion discourse, these basic motor competencies also have a particularly strong connection to social participation in the cultural field of exercise, play, and sports (Herrmann, Seiler, Pühse, & Gerlach, 2017).

One obvious advantage of the TGMD test is that accommodations for CWVI are nearly always unnecessary because it only assesses the quality of movement (Giese, Brian, Haibach-Beach, Lieberman, & Wagner, 2019). However, it sheds insufficient light on the issue of functional mastery of motor demands in the culture of sport and exercise. The MOBAK items, by contrast, measure whether a goal of motor activity has been achieved. Since the mastery of motor demands is of particular relevance for social participation in sports (Herrmann et al., 2017; Kurz et al., 2008; Schierz & Thiele, 2013), the MOBAK items seem particularly suitable for enabling valid statements concerning the opportunities of CWVI to participate in inclusive sports and physical education lessons.

This would make it possible to more reliably identify "high-risk groups" that are particularly threatened by social exclusion in the context of exercise, play, and sports. The task would then be to identify groups for which it seems appropriate to provide additional support to compensate for their diagnosed motor developmental deficits in the interest of encouraging their participation.[2]

Method

Sample

The data were collected in June 2017 at one school in Marburg (Germany). CWVI who participated in the study attended a specialized school, an accredited private special school for the visually impaired. It is combined with a boarding school where students can, but need not, board. However, this is often necessary because the catchment area of this specialized school encompasses the entire German-speaking world. The school is the only academic-track secondary school in the German-speaking world for students with CWVI and also includes a counseling center for students from mainstream schools.

A total of 29 students with visual impairments (17 boys, 12 girls; age: M = 13.08 years, SD = 1.14, age range: 11.08–15.25 years) from fifth (n = 8), sixth (n = 12), and seventh (n = 9) grade classes participated. All participants had a visual impairment as defined by German social law and did not have other impairments. The criteria for visual impairment according to German law include three degrees of visual impairment: VI (aGL) is defined as a visual acuity between 0.3 and 0.05 in the better eye with the best possible correction (ICD-10-GM Categories 1 and 2; German Institute of Medical Documentation and Information, 2018): 12 students; 41.4%. Severe VI is defined as a visual acuity between 0.05 and 0.002 in the better eye with best possible correction (ICD-10-GM Category 3): 7 stu-

[2] Whereas 39.3% of all pupils needing special education in Germany during school year 2016 were schooled inclusively in their local schools with able bodied peers, in the category of VI it was as high as 43.6% (Kultusministerkonferenz, 2018). It should be noted, however, that this value varies greatly depending on the state and age of the child. In Schleswig-Holstein, for example, 100% of all students with VI are schooled inclusively, in the state of Hesse, it is only 19.9%.

dents; 21.1%. Blindness is defined as best-corrected visual acuity of 0.02 or less in the better eye or a visual field restriction to no more than the central 5 (ICD-10-GM Category 4): 10 students; 34.5%. All children who participated in the study and their parents gave informed consent. The written consent of the parents is available.

In addition, we randomly pair-matched the 20 fifth and sixth grade students with visual impairments (12 boys, 8 girls; age: *M* = 12.61 years, *SD* = 1.01, age range: 11.08–14.00 years) with a sample of students without visual impairments according to their age and gender. The sample of students without visual impairments was taken from a previously conducted study by Herrmann and Seelig (2017). The sample included 20 students (12 boys, 8 girls; age: *M* = 12.65 years, *SD* = 1.05, age range: 11.08–14.33 years), which completed the MOBAK test items without accommodations.

Instruments

In this article we focus on the MOBAK-5-6 test for the fifth and sixth grade (Herrmann & Seelig, 2017). It includes a total of eight MOBAK test items. Four of these items (balancing, rolling, jumping, running) measure the basic motor competency self-movement, and the other four (throwing, catching, bouncing, dribbling) measure the basic motor competency object movement. Each of these test items consists of standardized tasks and evaluation criteria.

The validation study by Herrmann and Seelig (2017) confirmed the two-factor structure of the MOBAK 5-6 test by using confirmatory factor analysis (CFI = .95; *RMSEA* = .041). Furthermore, the correlations with external criteria provided initial evidence for the construct and criterion validity. Since the MOBAK test items explicitly assess the ability to successfully execute a motor task, and since reduced vision generally has a direct impact on this ability, testing CWVI involves specific challenges with regard to content and methodology. In view of these challenges, we initially limited the scope of this pilot study to three items from the competency domain "self-movement" that we expected to be highly accessible for CWVI (Table 1). In the future we will also choose items that are presumed to correlate more closely with the basic motor skills needed for common blind sports, such as goalball or blind soccer.

The goal in doing so was to use test items that are comparable to the original items and require only minor accommodations to become suitable for use with the visually impaired. We therefore selected the three items balancing, rolling, and rope skipping (Herrmann, 2018). The test subjects were given the opportunity in advance to experience the test setup through haptic means. The testers supported the children by using physical guidance and tactile modeling (Brian et al., 2017, p. 292). The tests were performed by two independent testers who evaluated directly in the field. The children received two attempts each to com-

Table 1: MOBAK-5 test items (for the full test manual, cf. Herrmann & Seelig, 2018)

Test item	Description
Balancing	The child walks back and forth over an overturned long bench placed on a springboard, passing two obstacles taped to the bench (L: 17 cm, B: 10 cm, H: 12 cm) without touching them (2 attempts).
Rolling	The child performs a forward roll, starting with a jump over a set up banana box (2 attempts).
Rope skipping	The child skips rope in place for 20 sec, changing rhythm after 10 sec (2 attempts).

Table 2: Spearman rank correlations between the MOBAK-5 test items, gender, and age in CWVI

Test item	1	2	3	4
1. Balancing	1			
2. Rolling	.52**	1		
3. Rope skipping	.66**	.61**	1	
4. Self-movement	.83**	.85**	.83**	1
Gender[a]	.11	-.15	-.10	.00
Age	-.25	.14	.03	-.01

Note: *$p < .05$. **$p < .01$., [a] boys = 0; girls = 1

plete the test items. Each individual attempt was assessed on a dichotomous scale. There was no trial run because the test items should be familiar as they are based on the prescribed curriculum.

Balancing: We omitted the condition from the original version of the test that the obstacles on the bench may not be touched, as CWVI might only be able to perceive the obstacles by touching them. Touching the obstacles therefore contributes to the process of perception and is indispensable for completing the task. We therefore taped the obstacles to the bank so that they would not fall over when touched. The criterion of walking forward and backward over the bench fluently without any readjustment steps was retained.

Rolling: It was very important on this task, especially for the blind students, to give the test subjects an opportunity to experience the test setup through haptic means. This is compounded by the fact that the flight phase of the task is an informationless phase, as it is not possible during the flight phase to obtain any environmental information. To close this "information gap," we provided the students an acoustic marking of the area behind the box where they were supposed to place their hands by beating on the mat if they so requested.

Rope skipping: The procedure of the test item rope skipping was left unchanged. However, we adjusted the cue to change rhythm by having the tester illustrate the change in rhythm acoustically before conducting the test.

The MOBAK-5 test items showed moderate correlations. The high Cronbach's alpha value of α = .81 showed a good internal consistency of the cumulative value of the three MOBAK test items representing the competency domain "self-movement." The discriminatory powers of the three test items were high, at .64 > rit > .73. Neither the MOBAK test items nor the overall MOBAK score was correlated with the gender or age of the visually impaired children (Table 2).

Procedure

The data was collected in classes during a regular 90-minute lesson. The classes were split up into small groups of two children each. The groups were guided and assessed by trained testers who are experienced with CWVI. After a brief explanation and a one-off demonstration of the individual test items by the tester (using tactile modeling), the children received two attempts each (no trial run) to complete the test items. Each individual attempt was assessed live on a dichotomous scale (0 = failed, 1 = successful). For the final score, we added up the number of successful attempts per test item (0 points = no successful attempts, 1 point = one successful attempt, 2 points = two successful attempts). The MOBAK competency domain "self-movement" is calculated as the sum of the three MOBAK test items. A maximum of 6 points (3 test items x 2 points) can be achieved.

Before conducting the MOBAK assessments, the testers surveyed the children's physical activity outside of physical education class on the basis of a dichotomous scale (no = 0; yes = 1) with three items (1. “Are you a member of a sport club?” 2. “Do you participate in extracurricular sports offered by your educational institution?” 3. “Do you engage in sports in your free time?”).[3]

Data analysis

We prepared the data and performed the analyses of frequency, correlation, and variance with SPSS Version 25 (IBM Corp., Armomk, NY, USA). To assess the sport engagement of the CWVI, we conducted a descriptive comparison of participation in extracurricular sport offerings by means of a frequency distribution according to degree of vision. The correlations of the MOBAK test performances with age and gender were investigated by means of Spearman rank correlations. To test the differences in MOBAK test performances depending on the degree of visual impairment, we calculated univariate analyses of variance (ANOVA) with the visually impaired children in fifth, sixth, and seventh grade ($N = 29$). To obtain a differentiated description as well as comparisons between the groups, we reported the 95% confidence intervals in addition to the means (*M*) and standard deviations (*SD*).

For the comparison between visually impaired and non-visually impaired children, we only used the test performances of the visually impaired children in the fifth and sixth grades ($N = 20$). We compared them with the non-visually impaired children, randomly pair-matched according to age and gender, by conducting a t-test and calculating the effect size using Cohen’s d. For an in-depth analysis, we compared the performances of the visually impaired children depending on their degree of visual impairment with the non-visually impaired children separately. On account of the small sample sizes, we refrained from calculating significance values here, only calculating the effect size using Cohen’s d.

Results

The sport engagement of the CWVI is represented in Table 3. A total of 31% of the CWVI (aGL) participated in club sports, the proportion being lowest for the blind children, at 20%. A total of 62% of the CWVI stated that they engaged in sports in their free time. Here too, the blind children were the least active, at 50%. A total of 35% of the children participated in extracurricular sports offered by their educational institution. The differences between children with various degrees of vision were lower on this point.

However, it also turned out that only 10% of the children did not engage in any sports outside of school at all, while 83% of

Table 3: Sport engagement of CWVI (N = 29)

	Degree of Vision			
Engagement in ...	**VI (aGL) (*n* = 12)**	**Severe VI (*n* = 7)**	**Blindness (*n* = 10)**	**Total**
Sport club	33%	43%	20%	31%
Recreational sports	75%	57%	50%	62%
Blista sport offerings	42%	29%	30%	35%

[3] As the CWVI are enrolled at a boarding school, they have the option of engaging in numerous extracurricular sports organized by the educational institution that are separate from their physical education classes.

them participated in one to two sport offerings per week. Seven percent of the children were even members of a sports club, engaged in recreational sports in their free time, and participated in extracurricular sports offered by their educational institution.

Table 4 illustrates the number of points the students achieved on the three MOBAK test items (possible range: 0–2 points) as well as in the entire competency domain "self-movement" (possible range: 0–6 points). The performances on "self-movement" differ significantly depending on the degree of visual impairment (F [2, 26] = 4.82, p = .017, eta² = .271). Bidirectional comparisons reveal that there are no differences between CWVI (aGL) and children with severe VI but clear differences between CWVI (aGL) and blind children. The obvious difference in means between children with severe VI and blind children is of low significance in view of the confidence intervals. Differences in performance were evident primarily on the two MOBAK test items "rolling" and "rope skipping."

Table 5 shows the values of visually impaired and non-visually impaired fifth and sixth graders. On the overall value for "self-movement," there was a significant difference between visually impaired and non-visually impaired children (t [38] = 2.23, p = .03, d = .72) that achieved a high effect size. The differences were greatest on the MOBAK test item "balancing" (t [38] = 2.92, p = .01, d = .95).

Table 4: Descriptive values of the MOBAK test items and differences by degree of visual impairment

5th/6th/7th grade	VI Total (*n* = 29)			VI (aGL) (*n* = 12)			Severe VI (*n* = 7)			Blindness (*n* = 10)			
	M	*SD*	CI 95%	*M*	*SD*	CI 95%	*M*	*SD*	CI 95%	*M*	*SD*	CI 95%	
Self-movement	1.86	2.12	[1.06; 2.67]	2.83	2.29	[1.38; 4.29]	2.29	2.14	[0.31; 4.26]	0.40	0.84	[-0.20; 1.00]	F (2, 26) = 4.82, p = .017, eta² = .271
Balancing	0.59	0.78	[0.29; 0.88]	0.83	0.83	[0.30; 1.36]	0.57	0.79	[-0.16; 1.30]	0.30	0.68	[-0.18; 0.78]	F (2, 26) = 1.31, p = .288, eta² = .091
Rolling	0.76	0.95	[0.40; 1.12]	1.33	0.89	[0.77; 1.90]	0.86	1.07	[-0.13; 1.85]	0.00	0.00	[ ]	F (2, 26) = 4.89, p = .002, eta² = .387
Rope skipping	0.52	0.74	[0.24; 0.80]	0.67	0.89	[0.10; 1.23]	0.86	0.69	[0.22; 1.50]	0.10	0.32	[-0.13; 0.33]	F (2, 26) = 2.95, p = .070, eta² = .185

Table 5: Descriptive values of the MOBAK test items and differences by degree of visual impairment

5th/6th grade	Without VI (*n* = 20)			VI Total (*n* = 20)				VI (aGL) (*n* = 8)				Severe VI (*n* = 5)				Blindness (*n* = 7)			
	M	*SD*	CI 95%	*M*	*SD*	CI 95%	d	*M*	*SD*	CI 95%	d[a]	*M*	*SD*	CI 95%	d[b]	*M*	*SD*	CI 95%	d[c]
Self-movement	3.05	1.82	[2.20; 3.90]	1.65	2.13	[0.65; 2.65]	.72	2.38	2.33	[0.43; 4.32]	.32	2.40	2.51	[-0.72; 5.52]	.28	0.29	0.76	[-0.41; 0.98]	1.55
Balancing	1.30	0.86	[0.90; 1.70]	0.55	0.76	[0.19; 0.91]	.95	0.63	0.74	[0.00; 1.25]	.76	0.80	0.84	[-0.24; 1.84]	.49	0.29	0.76	[-0.41; 0.98]	1.10
Rolling	0.90	0.85	[0.50; 1.30]	0.65	0.93	[0.21; 1.09]	.29	1.13	0.99	[0.30; 1.95]	.24	0.80	1.10	[-0.56; 2.16]	.09	0.00	0.00	[-]	1.10
Rope skipping	0.85	0.88	[0.44; 1.26]	0.45	0.76	[0.09; 0.81]	.50	0.63	0.92	[-0.14; 1.39]	.24	0.80	0.84	[-0.24; 1.84]	.05	0.00	0.00	[-]	1.02

Note. [a] Without VI vs. VI (aGL); [b] Without VI vs. Severe VI; [c] Without VI vs. Blindness

For a detailed analysis, we compared the performances of the children with visual impairments according to the degree of their visual impairment with the non-visually impaired children separately. The results revealed only small effect sizes in the differences between the non-visually impaired children and the CWVI (aGL) as well as the children with severe VI (d = .32 and d = .28, respectively). By contrast, the effect size of the difference between non-visually impaired children and blind children was very large (d = 1.55). These differences were also present across all of the individual test items, the results of which showed that the CWVI (aGL) and the children with severe VI achieved performances comparable to children without visual impairments on the MOBAK test items "rolling" and "rope skipping." However, the high standard deviations indicate that performances within the group of CWVI (aGL) and children with severe VI were very heterogeneous.

Discussion

Very little empirical research related to exercise and sports with individuals who are visually impaired, or blind has been conducted in Germany. To our knowledge, this is the world's first study to assess basic motor competencies on CWVI with the MOBAK test. The MOBAK test demonstrated that the basic motor competencies of CWVI differ significantly from those of sighted students. These results agree with the TGMD-findings from Haibach, Wagner, and Lieberman (2014) and from Giese, Greiner, and Wagner (2020). Depending on the degree of visual impairment, there were differences in the level of basic motor competencies. While CWVI (aGL) achieve motor performances that are quite similar to those of their sighted peers on the test items "rope skipping" and "rolling," blind students in particular achieve especially low values on these items. The level of basic motor competencies dropped with increasing levels of visual impairment. However, it should be emphasized that the performances within the group of CWVI were very heterogeneous.

From the perspective of social inclusion theory, these findings support the assumption that blind students are at particular risk of being excluded in the context of exercise, play, and sports. More often than other groups, they lack the necessary basic motor competencies for successful participation in the culture of (extra)curricular sports and exercise. These results agree with the results obtained by Shields, Synnot, and Barr (2012), who identify a lack of skills as a personal barrier to physical activity for children with a disability.

On the other hand, it has been stressed repeatedly in the German-language research discourse and elsewhere that CWVI are capable of achieving levels of motor activity and motor skills similar to those of sighted students if their specific needs are taken into appropriate account (Giese et al., 2017). The necessary didactic, school organizational, and educational policy settings for this are well documented in international scholarship (e.g., Brian et al., 2017; Giese et al., 2017; Lieberman & Haibach-Beach, 2016). Against the backdrop of motor diagnostics, however, there is a discrepancy between the proclaimed motor capacities and the measured motor performance parameters of CWVI.

It is not possible here to provide an in-depth discussion of the reasons for a low level of motor skills. It may be assumed, however, that it is less visual impairment itself than a lack of prior experiences with motor activities that is responsible for the low MOBAK values achieved by visually impaired children. CWVI seem not to develop the necessary basic motor competencies on their own (e.g., through free play or as a result of their physical and motor development). Against this backdrop, it seems necessary to teach basic motor competencies specifically. Another good reason for doing so is that age and gender are evidently not relevant variables, as has already been shown in the TGMD studies. This is astounding in view of the fact that age is usually a highly relevant variable in the context of motor development.

Our results raise awareness for the assumption that even an educational institution designed specifically for the visually impaired with appropriately trained teachers will not necessarily be successful in providing CWVI with sufficient motor skills. This is compounded by the fact that general PE teachers generally do not see themselves as sufficiently qualified to provide specific support to CWVI in their lessons (Lieberman & Houston-Wilson, 2018; Lirgg et al., 2017). However, it is also worth mentioning that many of these children were also involved in some after-school sports and recreation. Further research activities on inclusive educational institutions would be particularly desirable in Germany, whose school system has a strong tradition of segregation (Block et al., 2017, p. 237), to investigate the influence of school type on the basic motor competencies of CWVI.

Nevertheless, it is necessary to bear in mind that our study methods bring only limited insight to the discussion. Not only did we limit this pilot study to the competency domain “self-movement”; we also only included three of the four test items within this competency domain. The study did not include the test item “running” in the competency domain “self-movement” or any of the test items in the competency domain “object movement” (throwing, catching, bouncing, dribbling).

We did not include these test items in this initial study because we assumed that the test subjects would have achieved poor results on them primarily due to their visual impairment and that these results would hence not reliably reflect their actual level of motor performance. It would of course have been possible to make extensive adaptations to the test items, but this would have led to the methodological problem of making it impossible to draw the desired comparisons with sighted peers. In addition, it must be discussed whether the accommodations of the test items for the CWVI have an influence on the difficulty of the MOBAK items. Therefore, an evaluation of the measurement invariance of the MOBAK test in relation to this target group is necessary in the future.

Perspectives

In view of the global inclusion discourse regarding the participation of persons with visual impairments in the culture of exercise and sports, this exploratory study proposes an alternative instrument for measuring motor skills in CWVI. With regard to issues concerning the pedagogy of inclusion, more research is required as to whether the MOBAK test is well suited to identifying high-risk groups that are particularly threatened by social exclusion in the context of exercise, play, and sports. It was ultimately unnecessary to make any adaptations to the test items used here to enable a comparison between visually impaired children and their sighted peers. Future researcher should be extended to the remaining test items of the MOBAK-5-6 test.

Declarations

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