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ADAPTED PHYSICAL EDUCATION

Physical Education Skill Development of Individuals With Visual Impairments: A Preliminary Study

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Abstract

Evidence suggests that youth with visual impairments often experience exclusion from participation in physical education (PE). This study examined the frequency that individuals with visual impairments reported having learned fundamental motor skills and commonly taught PE sports skills, the importance that they ascribed to learning such skills, and their confidence that youth with visual impairments could master them. Adults with visual impairments completed an online questionnaire regarding their experiences with common PE skills. Data were analyzed through frequency analysis and repeated-measures analysis of covariance. Participants engaged most frequently in fundamental motor skills and least in team sports. Participants' mean ratings of confidence and importance were highest for fundamental motor skills compared with other skill categories. Results regarding nonparticipation in some skills align with previous findings that youth with visual impairments often do not participate in all aspects of PE.

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Maintaining a physically active lifestyle may decrease a person's chances of developing ongoing health concerns such as coronary and metabolic diseases, stroke, and cancer (e.g., Piercy et al., 2018). Though many factors contribute to physical activity engagement, a person's perceptions regarding their own motor competence, fundamental motor skill development, and physical activity engagement are interrelated, beginning in childhood and lasting through adolescence and beyond (Robinson et al., 2015; Stodden et al., 2008). Some empirical inquiries support the link between participating in physical activity and higher levels of motor competence (Barnett et al., 2022; De Meester et al., 2018; Williams et al., 2008). For example, elementary children who have higher motor competence are more likely to meet Centers for Disease Control and Prevention's guidelines for physical activity than those who exhibit lower motor competence (De Meester et al., 2018). Though studies regarding this relationship have been cross-sectional examinations of youth populations, there has also been some evidence of a longitudinal relationship between physical activity engagement in K–12 years and health indicators, including physical activity engagement, throughout adulthood (Barnett et al., 2022; Robinson et al., 2015; Telama et al., 1997; Telama et al., 2005).

Research examining motor skill competence, and the role of motor competence in influencing physical activity, has extended to youth with visual impairments. Research indicates that youth with visual impairments typically have lower motor competence compared to their sighted contemporaries (Brian et al., 2021; Houwen et al., 2010; Wagner et al., 2013) and are more likely to be delayed in their motor skill development (Brambring, 2006; Sellers et al., 2001). In particular, youth with visual impairments tend to perform worse at object control skills such as dribbling and catching (Houwen et al., 2007; Wagner et al., 2013). In addition to difficulties with fundamental motor skills, across the lifespan individuals with visual impairments often do not accumulate sufficient physical activity to garner health-related benefits (Haegele, 2019; Haegele, Zhu, et al., 2021; Marmeleria et al., 2014).

Physical education (PE) in K–12 school is a key environment in which fundamental motor skills and sports skills are taught, developed, and assessed (Morgan et al., 2013; SHAPE America, 2013).

PE-based interventions designed to target fundamental motor skill acquisition are largely effective at improving motor competence in children (Morgan et al., 2013). Unfortunately, while many students with visual impairments are enrolled in integrated PE classes alongside their sighted peers, they are frequently excluded from many skill-building opportunities within those spaces (Haegele & Kirk, 2018; Haegele, Kirk, et al., 2021). Youth with visual impairments tend to feel excluded from PE activities for a variety of reasons, including a lack of appropriate modifications to the sport or equipment, inaccessibility of the PE environment, and lack of stakeholder belief that students have the ability to safely perform the skills needed to engage in the activity (Haegele & Kirk, 2018; Haegele & Zhu, 2017; Haegele, Kirk, et al., 2021). Further, exclusion from activity extends beyond traditional PE activities to activities for those who are visually impaired or blind such as goalball, five-a-side (blind) soccer, and beep baseball. For instance, a group of Paralympic goalball players from the United States were not introduced to adapted sports as a part of their PE curricula (Haegele et al., 2017). Instead, they relied on community-based outreach programs to learn and practice their adapted sport skills. Perhaps unsurprisingly, the participants considered these extracurricular programs more important to the development of their sport skills and athletic identity, when compared to their school-based PE experiences. Taken together, these findings indicate that students with visual impairments may not be given sufficient opportunity to improve the motor competence necessary for lifelong physical activity participation in sports and activities that are meaningful for this population.

To date, the literature surrounding pedagogical practices within PE for students with visual impairments has consisted principally of non-empirical works aimed at sharing best teaching practices with practitioner audiences (e.g., Lieberman et al., 2014). While the body of research around lived experiences of learners with visual impairments in PE has expanded in recent years, less emphasis has been placed upon acquisition of specific fundamental motor and sports skills and their relevance to learners with visual impairments. Therefore, this study aimed to examine the frequency with which individuals with visual impairments report having learned fundamental motor skills and commonly taught K–12 sports skills, the

importance that they ascribe to possessing such skills, and how confident they are that other youth with visual impairments can master them.

Method

Participant Recruitment

Participants were recruited via research-oriented, online directories for individuals who have visual impairments. To be included in the study, potential participants needed to (a) be 18 or older at the time of data collection, (b) have had a visual impairment (ranging from low vision to no light perception) during their K–12 education, (c) have spent the majority of their K–12 education within the United States, and (d) be able to access and complete the electronic survey. Recruitment materials were distributed by the coordinators of the registries and included a cover letter explaining the study aims, criteria for participants, an estimation of the time needed to complete the survey, and a link to complete the Qualtrics-hosted survey. If the policy of the directory allowed, one reminder email was sent to subscribers approximately 2 weeks after the initial invitation for participation was sent. When potential participants followed the link for the accessible online survey, they were brought to a welcome screen that included the informed consent for the study. Participants could only access the survey items after they had consented to participation. Procedures were accepted by the institutional review board (IRB) before data collection.

Participants

In total, 161 persons accessed the survey from the research announcements. Of those, 108 (67%) successfully completed the questionnaires in their entirety and were included in data analyses. Participants ranged from age 19 to 72 years old (M_{age} = 42.8; *SD* = 15.8). The majority of participants were female (71.3%) and identified as White or Caucasian (86.1%). Over half of the participants (56.5%) reported vision within the U.S. Association of Blind Athletes (USABA) B1 class (i.e., minimal light perception or less with the best possible correction), whereas 11.1%, 20.4%, and 12.0% reported B2 (i.e., 20/200–20/600 and/or a visual field of five degrees or less), B3 (i.e., 20/200–20/70 and/or a visual field between 20 and

five degrees), and B4 (i.e., low vision), respectively (USABA, 2013). Most participants reported attending integrated public schools for the majority of their education (85%), whereas the remainder reported attending schools for the blind (13.0%), integrated private schools (4.6%), or being homeschooled (0.9%). Fifty-five participants (50.9%) reported attending school in a suburban area. Detailed participant characteristics appear in Table 1.

Instruments

Two questionnaires served as the primary sources of data for this inquiry. First, perceptions and experiences regarding PE skills were measured through a novel questionnaire. The instrument was developed first through determination of the most commonly taught team and individual sports and activities in PE classes within the United States, as reported by Lee et al. (2007). Skills that were related to team or individual sports as well as lifetime fitness and were taught in 30% or more of public schools were included in the instrument. Infrequently taught skills (e.g., lacrosse, golf, hiking) and childhood games (e.g., duck, duck, goose; tag games) were not included in the instrument. In addition to the PE skills from Lee et al., the instrument also contained items derived from the locomotor skills included in the Test of Gross Motor Development (Ulrich, 2013). These accounted for early elementary experiences. In total, 30 skills were included in the instrument.

Three questions were associated with each of the listed skills. Participants gave their perceptions of the importance of the skill, whether they believed youth with visual impairments could master the skill, and if they themselves experienced the skill while in physical education. For each skill, participants were first asked to rate their agreement with the statements "This skill is important for a child with a visual impairment like me to learn in school PE" (perceived importance) and "I believe that children with visual impairments like me are likely to master this skill during K–12 PE" (ability to master) on a 5-point scale. Following, participants were asked whether they experienced each skill in their PE classes. Possible answers for these items were "yes," "no," or "my classmates did but I did not." Last, participant demographics such as (a) age, (b) gender identity (i.e., female, male, other), (c) vision level (i.e., USABA B1–B4), (d) racial or ethnic identity (i.e., African American/Black, Asian, Hispanic/

Table 1
Participant Characteristics

Characteristic	*N* (%)	*M* (*SD*)
Age	107 (100)	42.74 (15.83)
Gender		
Female	77 (72.0)	
Male	30 (28.0)	
Ethnicity/race		
African American/Black	3 (2.8)	
Asian	3 (2.8)	
Hispanic/Latino	5 (4.7)	
White	92 (86.0)	
Other	4 (3.7)	
Visual impairment level		
B1	60 (56.1)	
B2	12 (11.2)	
B3	22 (20.6)	
B4	13 (12.1)	
Additional disability		
Having other disabilities	14 (13.1)	
No other disability	93 (86.9)	
K–12 school type		
Public integrated school	88 (82)	
Private or homeschool	19 (17.8)	
Residential community type		
Rural	24 (22.4)	
Suburban	55 (51.4)	
Urban	28 (26.2)	

Latino, White, other), (e) school environment (i.e., public integrated, private integrated, homeschooled), and (f) community environment during schooling years (i.e., rural, suburban, urban) were collected with a seven-item demographic questionnaire. The accessibility of the survey for individuals with visual impairments was checked with

three screen reader users reviewing the survey and agreeing to its accessibility, prior to distribution.

Data Analysis

To analyze the data, we first conducted frequency analyses on the participation experiences for each of the skills and demographic characteristics and ran internal reliability for the perceived importance and confidence for each skill. Next, we grouped similar skills together into categories to compare overall ratings of perceived importance and competence for each type of skill. Skill categories included fundamental movement skills (e.g., galloping, hopping, running, skipping), individual sports and activities (e.g., aquatics, swimming, yoga), team sports (e.g., floor hockey, soccer, volleyball), and blind sports (i.e., beep baseball, five-a-side soccer, goalball, showdown). Then, we conducted the descriptive analyses on the composite average of the perceived importance and confidence by skill category. To examine the potential differences in perceived importance and confidence levels for different skill categories and whether they differed between individuals of different demographic characteristics, we ran analyses of co-variances with repeated measures (ANCOVA), in which participant age, gender, and visual impairment level were adjusted. The analyses were completed through SPSS (version 25) with an alpha of 0.05.

Table 2
Reported Skill Participation in Physical Education

Sport	Participated %	Did not participate %
Team sports		
Basketball	57.0	23.4
Baseball	70.1	13.1
Volleyball	54.2	28
Soccer	42.1	42.1
Football	38.3	43
Floor hockey	18.7	65.4
Ultimate frisbee	11.2	80.4
Lacrosse	10.3	83.2

Table 2(cont.)

Sport	Participated %	Did not participate %
Individual sports and activities		
Running	84.1	12.1
Jumping rope	79.4	14
Walking for fitness	78.5	20.6
Disc golf	2.8	93.5
Track and field	73.8	18.7
Yoga	17.8	81.3
Tennis	17.8	62.6
Other racquet sports	19.6	60.7
Bowling	48.6	51.4
Gymnastics	61.7	34.6
Resistance training	56.1	37.4
Cardio machines	54.2	43.9
Golf	18.7	76.6
Aquatics	41.1	57.9
Dance	51.4	43.9
Fundamental movement skills		
Hop/jump	86	13.1
Leap	74.8	24.3
Gallop	64.5	34.6
Slide	61.7	37.4
Skip	77.6	19.6
Blind sports		
Goalball	16.8	79.4
Five-a-side soccer	7.5	91.6
Beep baseball/kickball	20.6	79.4
Showdown	1.9	97.2

Results

The reported participation experiences for different skill categories varied (Table 2). On average, participants reported the highest rate of participation in fundamental movement skills (72.9%), followed by individual sports and activities (47.4%), then team sports (37.3%). Interestingly, participants reported the lowest rates of participation in visual impairment sports (11.7%) during PE classes. For example, only two participants (1.9%) had played showdown, a version of table hockey for players with visual impairments, whereas 97.2% had not played it in school.

The perceived importance and confidence items for team and individual sports, fundamental movement skills, and blind sports had good internal consistency, with Cronbach alpha values ranging from 0.85 to 0.94. As shown in Table 3, when adjusted for participant age, gender, and visual impairment level, repeated-measures ANCOVA showed that the perceived importance differed significantly among different skill categories, $F_{3,101} = 61.48$, Pillai's $\lambda = 0.65$, $\eta^2 = .65$, $p < 0.01$. Specifically, participants reported the highest perceived importance for fundamental movement skills ($M = 4.64$), which was higher than individual sports ($M = 4.17$), blind sports ($M = 3.89$), and team sports ($M = 3.34$). Similarly, the participant perceived confidence for different skill categories differed significantly, when adjusted for participant age, gender, and visual impairment, $F_{3, 101} = 81.45$, Pillai's $\lambda = 0.71$, $\eta^2 = .71$, $p < 0.01$. There was no difference in perceived importance or confidence in these skill categories between the types of schools (i.e., public or private) or those who participated in two or more skill categories compared with those who had participated in one or no skill categories (ps > 0.05).

Discussion

This study examined the frequency with which individuals with visual impairments reported having learned fundamental motor skills and commonly taught PE sports skills, the importance that they ascribed to learning such skills, and their confidence that youth with visual impairments could master them. Prior research concerning PE and motor skills among this population typically used qualitative interviewing to examine how this population experienced PE (e.g., Haegele & Kirk, 2018) or issues of motor competence and skill

Table 3
Perceived Confidence and Importance of Skill Categories among Participants

Dependent variable	$F_{3, 101}$	Pillai's λ	η^2	*p*	Sport	Cronbach's α	*M* †	95% CI
Perceived importance	61.48	0.65	0.65	< 0.01	Team	0.93	3.34	3.14–3.53
					Individual	0.87	4.17	4.06–4.27
					FMS	0.93	4.64	4.51–4.77
					VI	0.85	3.89	3.71–4.06
Perceived confidence	81.45	0.71	0.71	< 0.01	Team	0.94	2.85	2.64–3.06
					Individual	0.92	4.00	3.87–4.13
					FMS	0.94	4.57	4.42–4.73
					VI	0.91	3.86	3.64–4.09

Note. CI = confidence interval; FMS = fundamental movement skills; VI = visual impairment (blind) sport.

† adjusted for participant age, gender, and VI level.

acquisition (e.g., Brian et al., 2018). Further, the body of literature exploring suitable PE skills or modifications for individuals with visual impairments consisted largely of articles that were not empirical in nature (e.g., Lieberman et al., 2019). To our understanding, this study is unique in that examined the importance, confidence, and participation in common PE skills among this population.

Results of this study show that participation varies considerably across different PE skills. In general, participation in fundamental movement skills, such as jumping, skipping, galloping, is much higher than participation in any other skill category. Though the underlying reason for this discrepancy is unclear, possible explanations for the relatively high rates of participation in fundamental movement skills include the time in which these skills are focused on in one's education and physical educators' attitudes toward teaching students with disabilities at different educational levels. Typically, fundamental movements skills form the curricular focus of elementary PE, especially at the earlier grade levels (Kulinna, 2008). Additionally, it is well known that PE teachers generally report more positive beliefs about educating students with disabilities during the elementary years than middle or high school levels (Rizzo, 1984). This is reflected in research from the viewpoint of people with visual impairments, who report more favorable PE experiences coming during elementary school years in comparison to later educational experiences (Haegele & Zhu, 2017). As such, it is reasonable to suggest that the less structured activities and environments within elementary PE classes, which are generally highly rooted in fundamental motor skills, are more accessible and, perhaps inclusive, for youth with visual impairments than hypermasculine sport-focused activities that tend to permeate middle and high school PE classes.

Interestingly, the findings point to participants rarely participating in adapted sports and games for individuals with visual impairments, at least within the context of PE, with participants reporting beep baseball or beep kickball the most (20.6%) and showdown the least. This suggests that students with visual impairments have few opportunities to practice sports and games that are designed for them and may be well-suited to their interests and abilities. This is contrary to numerous calls in practitioner-based works that recommend infusing blind sports (e.g., goalball) into integrated PE class

curricula for students with visual impairments (Brian & Haegele, 2014; Laughlin & Happel, 2016). However, this may not be surprising given that earlier qualitative studies concerning PE experiences among this population suggest that, indeed, many individuals with visual impairments are not introduced to sports such as goalball, five-a-side soccer (blind soccer), or even beep baseball in school. Rather, in general, people with visual impairments who experience blind sports do so in extracurricular settings such as outreach centers for individuals with visual impairments or as students enrolled in schools for the blind, rather than in public schools (Haegele et al., 2017).

The findings show a difference in participants' perceptions of the importance of PE skills across categories; that is, fundamental movement skills are the most important, followed by individual sports and activities. Likewise, the participants' answers point to a higher confidence that students with visual impairments can master these PE skills within these categories. This finding may not seem surprising, as it generally reflects their participation rates; however, participants did report significantly higher confidence and importance values for blind sports, as compared with nonadapted team sports, which does not reflect their participation rates. This suggests that despite relatively little participation in blind sports during their own PE experiences, participants still value sports that are designed with students with visual impairments in mind. Research examining the role of activity choice on motivation in PE shows a link between perceived relevance and importance of PE activities (e.g., sports) and higher interest, autonomy, and participation among students in the PE classroom (Lonsdale et al., 2013; Vasconcellos et al., 2020). Though it is unknown whether the samples in these studies include individuals with visual impairments, they nonetheless underscore the need to include relevant activities in the PE curriculum. In the case of students with visual impairments, PE may be an important opportunity to introduce blind sports to support lifetime physical activity (Laughlin & Happel, 2016; Taunton et al., 2017).

This study's approach to understanding curricular histories of individuals with visual impairments and to evaluating this PE content is unique. However, it has a few limitations. For example, the sample skews toward women, Caucasians, and people within the

B1 classification. Second, while participant ages ranged from 19 to 72 years old, their average age is just under 43 years of age. This may be a limitation because it may not reflect the participation in PE for youth with visual impairments today. Finally, though only about 13% of participants report an additional disability, it is possible that co-occurring impairments such as mild hearing loss and mild cerebral palsy have some impact on the PE experiences of this subgroup.

This study extends the body of knowledge concerning the PE experiences of individuals with visual impairments. In particular, the results provide foundational knowledge about PE preferences of individuals with visual impairments and further illustrate experiences of exclusion and nonparticipation in many activities that are central to PE curricula. On the basis of these findings, practitioners such as PE teachers should seek to emphasize valued PE skills, such as fundamental motor skills, individual sports and games, and adapted sports, while decreasing the emphasis on team sports when teaching students with visual impairments. PE teachers should also incorporate sports and games designed for visually impaired populations, such as goalball and beep baseball or kickball. Further, PE teacher educators should introduce adapted sport content as a part of teacher training curricula, alongside other sports and games whose skills are considered essential content knowledge.

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