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ASSESSING PHYSICAL LITERACY OF PRE-SCHOOL CHILDREN – A SYSTEMATIC LITERATURE REVIEW

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Abstract. *In recent years, it has become topical to study the concept of physical literacy in early childhood, based on empirical evidence of how the formation of skills takes place at this stage. The question remains open for the researchers - how to standardize and simply assess the physical literacy given its broad framework. One of the definitions of physical literacy explains the essence and importance of this concept in a person's life as internal motivation, confidence, competence in physical activities, knowledge and the person's own responsibility for applying it in practice. The systematic literature review was conducted with the aim of identifying a safe, sustainable and easy-to-apply physical literacy assessment tool for preschool children aged 3 to 7 years.*

Methodology. The systematic literature review protocol includes sources from such databases as EBSCO host (MEDLINE, Eric), Google Scholar, Science Direct, ERIH PLUS, Scopus and Web of Science for the period 2018 – 2024, which title, summary and keywords meets the certain criteria and content includes information on physical literacy assessment tools for the age specified. The content analysis was performed for the identified tools to find out their relevance for the assessment of physical, affective, cognitive, and participatory domains of physical literacy.

Results. As a result of the content analysis, 26 different tools for assessing physical literacy in pre-school age were identified. The most commonly used instrument is the Test of Gross Motor Development by Ulrich. For the assessment of all four domains of physical literacy at preschool age, three tools were identified – Pre -PLAy, a set of tools based on the guidelines of Canadian Assessment of Physical Literacy, and the Nine-Step Assessment Approach based on Australian Physical Literacy Framework.

Conclusions. The content analysis led to the conclusion that there is a small number of unified universal tools that can be applied at preschool age and would include four domains of physical literacy. The research directions of physical literacy assessment tools at pre-school age are the following: development and validation of a universal tool or tool sets, application of smart technologies, virtual reality and remote assessment possibilities in the evaluation process.

Keywords: *physical literacy, physical competence, motor competence, assessment, preschool, early childhood education.*

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Introduction

The current research data on children's physical health and physical activity habits show that in 2019, only 18.8% of adolescents in Latvia were engaging in regular physical activities for one hour a day, but 22.8% of seven-year-old children are overweight (Latvijas Vēstnesis, 2022). The individual's internal motivation to engage in regular physical activity, follow healthy eating habits and reduce the sedentary lifestyle plays an important role in maintaining one's health. In this context, the research on physical literacy has become topical and is seen as a promising direction of how to promote healthy physical activity habits (Carl et al., 2023). Literacy as a concept is defined as an individual's ability or capacity to observe, understand and effectively interact with and respond to the environment within its context. Physical literacy forms the basis of an individual's participation in physical activities; it is an understanding of the value of physical activities and responsibility for engaging in them during the lifetime. The definition includes four interrelated, during-the-life-time changing, adaptive elements – efficiency, physical activity, cognitive ability, and behaviour (International Physical Literacy Association (IPLA), 2017). Physical literacy is not unique, it

is equivalent to other human skills such as reading and writing. Keeping in mind the individual's manifestations in the physical and material world, physical literacy is a fundamental competency in everyone's life (Durden-Myers, Bartle, Whitehead, & Dhillon, 2022).

Physical literacy is not limited to the performance of physical activities, it also encompasses the human interactions with the environment (Whitehead, 2010). The definition of physical literacy is trying to grasp the essence of a person's physical skills in its broader context; it is motivation, confidence, competence in physical activities, knowledge and understanding of physical activities and responsibility for involvement in them throughout the life span (Whitehead, 2019). The concept *physical literacy* is used in most English-speaking countries: in England, Australia, Canada, the USA, as well as in a large number of European countries – Austria, Belgium, the Czech Republic, Denmark, etc. In German research literature and policy documents, the concept *physical or motor competence* is predominantly employed. The available reviews and policy documents, published in English, do not identify any studies conducted in Latvia in the field of physical literacy (IPLA, 2017, Carl et al, 2023). In Latvian research studies, the concept *bodily awareness* is employed (Fernāte, 2008), while in national legislation and in the documents of the Latvian State Education Content Information Centre (VISIC) the concept *physical activity literacy* is used (Skola2030, 2019).

Studies show a clear correlation between health literacy and physical activity literacy – individuals with a physically active lifestyle have a higher level of health literacy (Buja et al., 2020). Although physical literacy is a lifelong process, it is important to start engaging in it already from early childhood (Gallahue, 2012, Buckler, 2019). The age up to eight years is a very important time for child's cognitive, social, emotional and physical development. At this stage of development, as a result of interaction between heredity, surrounding environment and practical experience, the plasticity of the brain and the response to change account for billions of integrated neural connections (UNICEF Data, 2022).

Development of any skill requires a point of reference – an initial skill level or a certain skill performance. This also applies to physical literacy, especially at pre-school stage when transition takes place from pre-school to primary school. The current situation shows that the Latvian educational content does not contain persistent and validated diagnostic assessment tools in the field of physical literacy (Skola2030, 2019). The study of Dynamic University, in which one of the chapters is devoted to the topicality of diagnostic criteria during the transition period from pre-school to primary school, Grade 1, reveals shortcomings in the Latvian national regulatory framework for the assessment of child's achievements (Dynamic University, 2020). There are no unified and standardized diagnostic tools in the content of compulsory education that determine the child's individual development and learning needs in pre-school. Therefore, common tools are needed to match the new learning content in order to identify the learning needs at the start of the Grade 1. The latest publications put forward the idea of a holistic, objective and transparent approach to assessing the dynamics of individual development (Jurs, 2022). To ensure the identification of physical literacy learning needs for pre-school children, in its first stage, it is necessary to review and analyse the physical literacy assessment tools performing systematic analysis of scientific literature.

Physical literacy assessment

Evaluating physical literacy is a challenging task. The diverse components – motivation, confidence, physical competence, knowledge and understanding are difficult to measure with one universal assessment tool (Edwards et al., 2018). The reviews of research directions in the field of children's physical literacy show a tendency to put the assessment in

the perspective of a holistic and non-linear developmental approach, considering not only basic physical or motor skills, but also motivation, confidence, knowledge and understanding. Such an approach would contribute to the promotion of the child's centred physical activity, taking into account child's interests and involvement in physical activity (Carl et al., 2023).

In the research on the assessment of physical literacy the contradictions can be observed between the philosophy of the concept, in which physical literacy is described and explained as a lifelong process, and the quality of the assessment, for which the validity and persistence of the instrument must be taken into account (Edwards et al., 2018, Durden-Myers, Bartle, Whitehead, & Dhillon, 2022). Physical literacy is a set of several elements, so one of the objectives is to consider and identify the most important elements that would indicate the level of literacy. For example, in Canada, various physical literacy assessment tools are developed such as *Passport for Life*, *Physical Literacy Assessment for Youth*, which take into account the child's individual performance, usually within the framework of physical skills. However, researchers are still looking for solutions trying to find a holistic evaluation model that reveals the essence of physical literacy and is appropriate in the field of physical education (Caldwell, 2020). Although motion skills are considered as the most important criterion for physical literacy, alternative forms of motion assessment, which reveal child's ability to perform a task in interaction with the environment, deviating from the usual movement pattern in standard conditions, must be considered (Hulteen et al., 2022). The context of this approach reveals the importance of assessing physical literacy as a set of motor skills, cognitive processes and environmental interactions. The surrounding environment is the contextual factor that determines the child's interests and the need for particular skills, and it should definitely be assessed in the context of physical literacy. From the above mentioned it can be concluded that a holistic approach for assessing physical literacy should include physical skills, motivation to perform the movements, understanding of the use of the movements, and they real application in everyday life.

There are various studies on the framework of physical literacy. In addition to the physical, sensory and perceptual, cognitive, psychological, and behavioural spheres, the contextual factor also must be considered – the dynamic environment in which the individual is functioning (Li et al, 2022). In systematic reviews on frameworks for assessing physical literacy, various groups of researchers have identified four dimensions: physical, affective (motivation and confidence), cognitive and participatory dimension (Edwards et al., 2018, Grauduszus et al., 2023). Thirty different elements of physical literacy are identified in the Australian Physical Literacy Framework (Australian Physical Literacy Framework (APLF), 2020), which are systematized into four basic domains – physical, psychological, social and cognitive. Thus, it can be assumed that it is necessary to evaluate mainly four different areas in order to get a full picture about an individual's level of physical literacy.

Therefore, as a result of this review, an assessment tool corresponding to each of the four areas will be identified. According to the Australian concept of physical literacy, the physical area includes all assessment tools that assess motor skills, coordination, stability, balance, agility, strength, muscular endurance, endurance of the cardiovascular system, reaction time and speed. The psychological assessment area may include tools that assess engagement, confidence, motivation, self-perception, awareness of emotions and self-regulation, physical self-regulation. The social sphere encompasses relationships, collaboration, ethics, society, and culture. The cognitive evaluation sphere can include all tools that assess knowledge content, safety and risk awareness, compliance, judgment, strategy and planning, tactics, perception awareness (APLF, 2020). Such a system of concepts can be used in cases where the study does not clearly describe to which sphere the evaluation tool is attributed.

In turn, the analysis of the child-centred evaluation process and the recommendations of teachers show that the assessment must be effective, convenient to use and practical. When engaging in the assessment process, the balance between the objective of the assessment and the ability to assess must be taken into account (Shearer, 2020, Goss, 2020). Factors characterizing the assessment, which determine the quality of the results of the study, indicate that the information and data collected during the assessment process must be repeatable and available to the participant and the person administering the data (Hay & Penney, 2013). The quality of the assessment tool is characterized by its persistence and validity. The persistence is explained by the stability of the test results if it is repeated more than once or if it is performed by more than one assessor. Validity determines the compliance of the measurement with the intended purpose (Cole et al., 1994). Therefore, the compliance of the instruments used in the assessment process with the criteria of standardized assessment tools should be clarified taking into account also the factor of convenience – testing time, necessary skills and equipment.

Methodology

The systematic literature review was conducted with the objective to identify a safe, persistent and easy-applicable physical literacy assessment tool for preschool children aged 3 to 7 years. In order to achieve this goal, the following research tasks were put forward: 1. To explore the application of the assessment tools described in scientific literature for assessing physical literacy in preschool children. 2. To explore which physical literacy components or domains are assessed and which components are assessed most often based on the definition of the concept. 3. To assess the validity, persistence and applicability of the physical literacy assessment tools used in the framework of the systematic literature review. The research questions raised in this study are the following: 1. Which are the most commonly used physical literacy assessment tools for preschool children? 2. To what extent these assessment tools embrace the physical literacy domains?

Search strategy: The systematic literature review model is adapted from the protocol registered in PROSPERO database, which corresponds to the scope and population of the selected report (Goss et al., 2017).

Selection procedure: This systematic literature review includes different research studies, publications, dissertations, published in databases in the period from 2018 to 2024. *Types of research to be included and reviewed:* both qualitative, quantitative and mixed research designs that use physical literacy assessment tools for preschool children. *Systematic review eligibility criteria by content*: 1. Population: research studies that involve healthy preschool children from 3 to 7 years of age. 2. In the description of the findings, a physical literacy or its domain assessment tool can be identified. 3. Research area: studies in which the research object is physical literacy and any of its domains: motor skills, affective factors (motivation, confidence), cognitive skills (movement competence, knowledge, understanding) and participation in physical activities. 4. *Search keywords*: physical literacy, physical competence, motor competence, assessment, assessment tools/ instruments, evaluation tools/ instruments, preschool, children, early childhood education.

In the first-round, the literature was searched from the electronic databases in the field of pedagogy, health and sports: EBSCO host (MEDLINE, Eric), Google Scholar, Science Direct, ERIH PLUS, Scopus, Web of Science. In the second or additional round, the literature from the sources gathered in the first round was selected by evaluating the compliance of the research content with the criteria of systematic literature review. In order to assess compliance with the topic and purpose of the systematic literature review, the title, summary and keywords of the publication were examined in the context of the inclusion criteria.

Description of the search methodology in the EBSCO host database: the first round of search was conducted using the terms and phrases and Boolean operators: Physical literacy AND assessment tools OR assessment method OR assessment AND preschool OR kindergarten OR early childhood. In the second round, the compliance of publications with the inclusion and exclusion criteria was assessed. The selected inclusion criteria determined that the publication is in English, the full text is available, the publication includes a physical literacy assessment tool that is applicable to healthy children from 3 to 7 years of age.

Exclusion criteria: 1) the publication contains the relevant keywords, but the content of the publication does not relate to physical literacy; 2) the methodological section of the publication does not describe the instrument and/or procedure for assessing physical literacy; 3) the assessment tools are not intended for assessing the physical literacy of preschool children; 4) the assessment tool was intended for children with special needs or developmental disabilities. The publication search was conducted from July 2023 to February 2024.

Data collection: 1) In the first round of data collection, two independent researchers were involved, the collected data were assessed against the eligibility and inclusion criteria. The compliance of the title and summary of the publication was assessed in relation to the population (preschool age children) and the topic (evaluation of the elements of physical literacy). After evaluating the suitability of the title, summary and keywords, all selected publications were compiled including information about the author, the year of publication, the country, the age of the research participants, the purpose of the study, and the assessment tools employed. 2) In the second phase of the compilation, the assessment tools identified in the in-depth analysis of sources were divided into domains – physical skills (competence and physical ability tests), psychological sphere or affective factors (motivation and confidence), cognitive skills (knowledge and understanding) and participation in physical activities. The suitability of the tool for the domain was evaluated considering the purpose of the study and the description of the research instrument in the given source. If no indications were found in the source of literature, then a match was sought based on the concepts included in the Australian Physical Literacy Framework (see Table 1) (APLF, 2019). In the next step of the content analysis of the systematic literature review, the following was clarified: the research tools used, the country in which the study was conducted and the assessment coverage of domains. For standardized evaluation tools, the author and the year of the test were mentioned. In cases where the methodology of the study had employed a collection of separate tests for the assessment of one specific area, it was defined as a *set of tools*, specifying the framework for assessment, for example, tests 'sit and reach', 'vertical leap', 'Y balance test'. Also a palm dynamometry was defined as a set of tools for assessing physical abilities and were attributed to the domain of physical skills (Sugimoto et al., 2023).

Table 1 ***Characteristics of the content of physical literacy domains***

Domain	Physical Skills/ Movement Competency (PS/MK)	Psycho-emotional/ Affective (PE/A) sphere	Cognitive domain (C)	Participation/ Social sphere (P/S)
Concepts characterizing domain	Motor skills, coordination, stability, balance, agility, strength, muscular endurance, cardiovascular endurance, reaction time and speed	Level of involvement, confidence, motivation, self-perception, awareness and self-regulation of emotions, self-regulation of physical activity.	Awareness of knowledge content, safety and risks, adherence to rules, judgment, strategy and planning, tactics, perception and awareness	Participation and cooperation in physical activities, amount of physical activity

If the instrument for assessing physical literacy was developed during the particular research study, then a reference to the authors of the publication was used in the authors' section. Based on the research methodology description, stated in the source analysed, the information on the validity, persistence and applicability of the research tool used for assessing physical literacy of children aged 3-7 years was noted.

Results

According to the selected search strategy and inclusion criteria, 345 literature sources were reviewed, 36 of which met the criteria included in the systematic literature review by title, key words and summary. 26 assessment tools used to assess physical literacy were identified. The tools were appropriate for evaluating one, two, three or four physical literacy domains for children aged 3 to 7 years. The results were summarized in a Table 2 , that included the assessment tool and its relevance to one or more domains. Information on the validity, persistence and applicability of the test referred to in the description of the publication methodology was noted.

From 26 different evaluation tools that were identified for assessing physical literacy of preschool children, the Test of Gross Motor Development (TGMD), authored by *Ulrich* (Webster & Ulrich, 2017b) is employed most often (Estevan et al., 2023; Eather et al., 2018; Buckler et al, 2023, O'Callaghan et al , 2024,. Caldwell et al , 2023, He et al, 2021, Carson, 2023, Wainwright et al., 2018, Gao Zan et al., 2018, Hwang et al., 2023). The test has a high persistence, it is validated for the assessment of motor skills in children aged 3 to 10 years. The test is easy to perform and can be completed in 20 minutes. In eight studies, the level of participation of children is measured by the objectively listed amount of physical activities. In research studies, the most commonly used method is recording the intensity and time of activities with an accelerometer, and most commonly accelerometer is carried on the hips (wGT3X-BT, ActiGraph, Pensacola, FL, USA). The methodological descriptions show the validity of this instrument and the persistence of the results for measuring the physical activity of preschool children (Caldwell et al., 2022, Schmutz et al, 2022, Gao Zan et al., 2018, Carson, 2023, Melby et al., 2021).

Table 2 ***Coverage of physical literacy assessment tools within two domains***

Reference to publication	Name of the tool	Author	Year	PS/ MK	PE/ A	C	P/ S	Validity	Persis-tence	Appli-cation
Estevan, (2023)	Perceived Movement Skill Competence (PMSC) – Spanish version	Barnett, Ridgers, Zask, & Salmon, 2015; Estevan, Molina-García, Abbott, et al., 2018	2018	x		x		x	x	
Essiet et al (2021), Zhang, et al (2022), Carson, (2023)	Movement Assessment Battery for Children-2 Checklist (MABC-2 Checklist)	Henderson, Sugden, & Barnett,	2007	x		x				
Schmutz et al (2022)	Zurich Neuromotor Assessment	Kakebeeke et al	2019	x		x		x		
Almeida et al (2023)	Accuracy of Perceived motor competence (PMC)	-	-	x		x				
Wainwright et al, (2018)	Leuven Early Age Child Engagement Scale	Leavers	1994		x		x			x

The summarised information revealed that the process of assessing physical literacy in most cases does not cover all four areas. Of the 26 different tools identified in the systematic review, 16 are used to evaluate one particular domain, of which 10 are used for assessing physical skills or movement competency. For the evaluation of two domains, five tools were identified (see Table 2), four of which are intended for the evaluation of physical skills and cognitive area – the Spanish version of the Perceived Movement Skill Competence (PMSC), the Movement Assessment Battery for Children-2, the Zurich Neuromotor Assessment and the Accuracy of Perceived Motor Competence (PMC). The information obtained in the descriptions of the research methodology shows that the validity and persistence have been confirmed for the Spanish version of the Perceived Movement Skill Competence (PMSC) test, while the Zurich Neuromotor Assessment test has been validated for use at preschool age. The Leuven Early Age Child Engagement Scale, designed to evaluate activity and participation domains, has been recognized as a convenient and easy applicable. Summarizing the domain coverage, it can be concluded that there is a possibility to use a combination of two tools for assessing physical literacy. This approach is already used in studies exploring physical literacy taking into account its broad framework (Whitehead, 2010, Wainwright et al., 2018).

Table 3 ***Three- and four-domain coverage of physical literacy assessment tools***

References	Name of the instrument	Author(s)	Year	PS/ MK	PE/ A	C	P/ S	Va-lidi -ty	Persis-tence	App lica-tion
Wainwright et al, (2018)	Pictorial Scale of Perceived Competence and Social Acceptance	Harter & Pike	1984	x		x	x			
Krenz et al. (2022)	6 point Likert scale	Krenz et al.	2022		x	x	x			
Gauduszus et al (2023) 2.Cairney et al (2018) 3. Carson, (2023)	The Preschool Physical Literacy Assessment Tool (Pre PLAy)	Cairney et al	2018	x	x	x	x	x	x	
Sugimoto et al., (2023)	Set of tools for assessing movement coordination and functions (Obstacle course; Overall function and coordination including lower and upper extremities; Upper extremity coordination: throwing a ball test; Lower extremity coordination: kicking a ball test; Upper extremity function with eye-hand, coordination: catching a ball test; Lower extremity coordination: kicking a ball test; Lower extremity unilateral, bilateral function and coordination: hop test	Sugimoto et al., based on Canadian Assessment of Physical Literacy (CAPL)	2023	x	x	x	x			
Barnett et al, (2019)	Guidelines for physical literacy assessment (9-step assessment concept)	Barnett et al	2019	x	x	x	x			

There were two instruments that covered three domains (see Table 3): the Pictorial Scale of Perceived Competence and Social Acceptance (Wainwright et al., 2018), which can be used to assess physical literacy, cognitive domain, and participation in preschool, and 6-point Likert Scale developed by Krenz et al (2022). No information on the validity and persistence of the instruments was mentioned in the description of the research methodologies. Three assessment tools were identified for assessing all physical literacy domains: Pre-PLAy (Cairney et al., 2018), a set of tools for assessing movement coordination and functions based on Canadian Assessment of Physical Literacy guidelines (Sugimoto et al, 2023), and physical literacy assessment guidelines using a nine-step algorithm (Barnett et al, 2019). The Pre-PLAy evaluation tool is currently being developed. Studies have found that this instrument shows high persistence in assessing the level of physical literacy in girls aged 18-49 months, but there are no sustained results about boys at this age. The toolkit (Sugimoto et al, 2023) and the assessment, based on the nine-step algorithm (Barnett et al, 2019), are rooted in the Canadian Assessment of Physical Literacy and the Australian Physical Literacy Framework. Thus, in the process of developing assessment tools, serious attention should be paid to the formation of the theoretical framework of physical literacy according to the region and the contextual factors in it.

Conclusions and Discussion

The results of the systematic literature review confirm that most often physical literacy is identified with physical skills or movement competency (Melby et al., 2021). The research results of the motor skills assessment of preschool children show that at this stage the experience of qualitative motor skills may be more important than the overall quantity or intensity of movements. This could mean that when perfecting the assessment tools for pre-school children, the diversity of movements should be taken into account – balance, movement, skills of mastering objects (Schmutz et al., 2020). Strength, endurance and coordination ratings confirm the correlation of results within the same domain (Krenz et al.,2022). Studies of the results on physical activity interventions of preschool children indicate an increase in the effectiveness of operational memory, manual dexterity, aiming and catching, as well as general motor competence. Thus, there is a possibility that there is a corelation between the effects of organized physical activity and cognitive ability levels of children (Zhang et al., 2022; Schmutz et al., 2020). However, in order to draw conclusions, an in-depth study should performed on the changes in the cognitive sphere including one of the characteristics stated in the APFL: the content of knowledge, awareness of safety and risks, compliance with rules, reasoning abilities, strategy and planning, tactics, perception awareness assessment (APLF, 2020). Several studies confirm that the domain of physical skills is only one of physical literacy components, therefore, if possible, other components of physical literacy for preschool children should also be assessed at the same time (Hwang et al., 2023, Esseiet, 2021).

Cognitive skills and affective domains in the context of physical literacy are assessed relatively less than physical skills and level of physical activity. This is consistent with the results of previous studies aimed at clarifying and analysing the use of physical literacy assessment tools (Edwards, 2018). This direction of assessing physical literacy should be explored in depth, taking into account its role in shaping attitudes and understanding. The affective domain in the field of child development characterizes the child's interest and motivation to participate. Frequently repeated and interesting physical movement patterns and skills at preschool age contribute to the formation of increasingly complex interest patterns and create the basis for specific motor skills (Gallahue, 2012). To determine the motivation and joy level of physical literacy, several groups of researchers have used the Likert scale

with emotions-reflecting drawings in five- and six-point rating systems (Carson, 2023, Krenz et al., 2022). These types of scales are successfully employed in paediatrics-related areas already from the age of 3 to determine the child's well-being (Carson, 2023). The experience of the researchers shows that such assessment method for children from 3 to 5 years of age can also be used when doing remote assessment during Zoom sessions (Carson, 2023). A similar approach to evaluation of motivation and engagement is provided when analysing the results of the Leuven Early Age Child Engagement Scale, in which the assessment is done by a specialist, not the child him/herself. (Wainwright, 2018). This could mean that the motivational domain can be assessed on the Likert scale rating from 1 to 5 using both the self-assessment principle and an external evaluation.

The amount of objectively measured physical activities covers the domain of participation as part of children's physical literacy. The most commonly used research method is recording the intensity of activities and the time spent doing them using accelerometer technologies. The amount of listed daily physical activities may not have a reliable correlation with the level of movement or motor competence at preschool age. Several studies have concluded that the diversity of physical activities is more important in pre-school age than the total amount of such activities (Melby et al., 2021). Looking at the long-term growth of a child's physical literacy, the acquisition of physical or motor skills and the diversity of physical activities play an important role in the formation of physically active lifestyle habits in middle childhood and adolescence (Schmutz et al., 2020, Melby et al., 2021). It can be concluded that accelerometery characterizes the domain of participation, but is not a universal method of assessing physical literacy in general.

A group of Spanish researchers brought up the contextual factor of the regions in a standardized evaluation test during the adaptation process. When adjusting any assessment tool, the proposed movement tasks and the experience of performing them should be taken into account in a particular country or region. For example, batting on a baseball, which is included in the Test of Gross Motor Development (Webster & Ulrich, 2017b), is not typical to sports and physical activity traditions of many European countries. Therefore, the choice of adaptation of this test for assessing physical literacy could affect its validity in some countries (Estevan et al., 2019). Some researchers recommend to combine physical literacy elements from existing scales or instruments after checking their validity and persistence indicators (Esseiet, 2021).

The results of the systematic literature review confirm that the number of universal assessment tools for all domains, which is related to physical literacy in preschool age, is very small – only three tools were identified from 26 instruments used. In some studies, the assessment tools for assessing physical literacy were elaborated by the groups of researchers, assessing both qualitative and quantitative aspects, for example, an obstacle course that assesses both time and quality of the performance. The development of assessment tools was based on the Canadian Assessment of Physical Literacy (CAPL), which includes the use of knowledge, motivation, everyday behaviour and physical competence (Sugimoto, 2023). This confirms that when designing a tool, consideration should be given to the possibility of integrating all four dimensions of physical literacy taking into account the age of the child. It reveals the further research directions in the field of physical literacy assessment at pre-school age – the interaction between the child's physical skills, motivating factors, daily habits and mechanisms of understanding the use of physical skills.

An interesting and new approach is the assessment of physical skills in a remote form as the result of COVID-19 pandemic, which created special problems when collecting children's data in person. The research results show that it is possible to assess basic movement skills remotely. However, it was also recognized that the assessment of specific elements requires additional training to ensure the reliability of the results, for example, in the

process of assessing a vertical jump (Hwang et al., 2023). The use of virtual environment is reflected in a study conducted in 2023 that describes the use of the Flanker test as virtual environment-based evaluation tool. The researchers admit that in the initial phase, the test has high costs and is available only in the laboratory conditions, and it is necessary to engage a broader group of participants and to conduct more studies in order introduce the test for a practical use (O'Callaghan, et al., 2024). Overall, it can be concluded that publications in English describe a small number of physical literacy assessment tools, which include four assessment domains and are applicable to preschool age. Taking into account the multidimensional framework of physical literacy, the future research should pay attention to the aspects characterizing the physical literacy of pre-school children, the evaluation experience and needs of the pre-school teachers and specialists in compliance with the needs of the country in which the study is conducted.

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