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Development and Validation of a Physical Activity-Based Freedom of Movement in Kindergarten

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Abstract

Objectives. This study aimed to develop and validate a learning model of physical activity-based freedom of movement in kindergarten.

Materials and methods. This study used a design-based research (DBR) method, which involved twelve experts in early childhood education and physical activity education to help validate the learning model. The stages of development included research and information collecting, planning, development of a preliminary product form, and validation. A statistical analysis was carried out using Aiken's V value to test the model's validity.

Results. This study successfully developed a learning model of physical activity-based freedom of movement in kindergarten, consisting of four main elements: "I love the Earth", "I love Indonesia", "Playing and cooperating" / "We are all siblings", and "My imagination" / "Imagination and creativity". Based on the validity test conducted with twelve experts, the learning model of physical activity-based freedom of movement in kindergarten received an Aiken's V value of 0.82, which exceeds the minimum standard of 0.80.

Conclusions. The findings indicate that implementing the learning model of physical activity-based freedom of movement has been considered as an appropriate pedagogical approach for kindergarten learning. The analysis shows that the model is aligned with children's developmental needs and supports an interactive and creative learning approach consistent with the Merdeka Curriculum in Indonesia.

Keywords: development, validation, physical activity, freedom, kindergarten.

Introduction

The early years of a child's life are crucial for setting the foundation for lifelong health and well-being (Davis et al., 2017). Research suggests that the development of basic movement skills and the implementation of a structured physical activity program in kindergarten are essential (Abusleme-Allimant et al., 2023; Wang et al., 2022; Dapp et al., 2021). These initiatives not only support the physical development of young children but also contribute to their social, emotional, and cognitive growth (Kuzik et al., 2020a). Evidence indicates that engaging in diverse physical activities helps cultivate fundamental movement skills, key to children's overall development and their ability to participate in various physical and recreational activities. Physical activity in early childhood education has fostered holistic development (Aubert et al., 2018). These initiatives crucially promote physical competencies and encourage positive attitudes towards active lifestyles (Messing et al., 2019). Studies emphasize the importance of outdoor play in improving fundamental movement skills, highlighting the direct impact of physical activity on a child's health and development.

Despite the recognized importance of early physical development, a substantial gap exists in offering structured, high-quality physical activity programs in kindergartens (Cheung, 2020). This shortfall is significant because play is crucial for teaching children new social skills, rules, and movements, foundational for their overall growth and development (Giske et al., 2018; Wenz-Gross et al., 2018).

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The Covid-19 pandemic has exacerbated this situation, leading to reduced opportunities for children to engage in fundamental motor skills activities, further widening the gap in physical development support during critical early years (Abe et al., 2022; Moore et al., 2021; Pascal & Bertram, 2021). Regular physical activities are pivotal for improving cardiovascular fitness, enhancing motor skills, and fostering overall health. Research has demonstrated that the goal of play is effective goal play is effective in improving motor skills in early childhood, underlining the importance of such activities in the developmental phase to adapt to others and the environment (Tandon et al., 2020; Han, A. et al., 2018). These structured programs must improve children's ability to develop fundamental movement and motor skills effectively, essential for their physical, cognitive, and social development.

The link between regular physical activity and the cognitive as well as social development of children is well established (Zhao & Chen, 2018). Research has consistently shown that physical activity positively impacts mental function, offering a foundational base for improving academic performance and cognitive development in children (Jylänki et al., 2022; Biddle et al., 2019; Singh et al., 2019). In the context of early childhood education, especially within the innovative framework of the Independent Curriculum in Indonesia, movement-based learning emerges as a potent tool for fostering an environment conducive to creativity and improved learning outcomes (Simarmata & Mayuni, 2023; Mukminin et al., 2019). This curriculum's emphasis on freedom and flexibility in learning strategies aligns with the findings that physical engagement not only bolsters fundamental motor skills but also aids in the holistic development of children, encouraging active participation and engagement in the learning process. The absence of adequate physical activity has been linked to diminished academic performance and cognitive development, underscoring the necessity for structured physical activity programs integrated into the educational curriculum to support children's overall development (de Greeff et al., 2018). This backdrop creates a compelling argument for developing and validating the model of physical activity-based freedom of movement in kindergartens aimed at harnessing the benefits of physical activity for cognitive and social development in a structured and meaningful way.

Educators and institutions face multifaceted challenges in implementing effective physical activity programs (Blewitt et al., 2020). This model of physical activity-based freedom of movement must be suitable for kindergarten learning and promote cognitive, affective, and psychomotor development in young learners. Designing a learning model that balances the educational objectives with the physical development needs of children requires a nuanced understanding of how physical activity influences learning and development across different domains (DiPietro et al., 2020). Evaluating these models' effectiveness poses challenges, including identifying appropriate metrics and assessment tools that accurately measure outcomes in cognitive, affective, and psychomotor domains (Han, J. et al., 2023; Gilic et al., 2022). Integration into existing curricula is another significant hurdle, as it necessitates reevaluating traditional teaching methods and incorporating physical activities to complement and enhance the educational experience without disrupting the learning flow (Mavilidi et al., 2018). These challenges underscore the need for comprehensive model design criteria that consider the diverse benefits of physical activity and strategies for overcoming obstacles related to unclear aims, inappropriate delivery methods, and the harmonious blending of physical activities into educational frameworks.

Materials and Methods

Study Participants

The study's participants comprised a carefully selected group of experts and practitioners in early childhood education and physical activity for young children. Specifically, the expert group consisted of twelve individuals renowned in their respective domains: one academic expert in early childhood education and one in physical activity from Higher Education Institutions, alongside four seasoned early childhood education experts who serve as senior kindergarten principals in Yogyakarta. This diverse assembly of experts was chosen based on their extensive experience, scholarly contributions, and practical insights into developing and implementing physical activity in early childhood settings. This study also involved six expert practitioners and senior early childhood educators from various kindergartens in Yogyakarta. These expert practitioners were selected due to their direct involvement and firsthand experience in facilitating young children's learning and physical development within the kindergarten environment.

Study Organisation

The research method in this study is Design-Based Research (DBR). This methodology systematically designs interventions to improve educational practices through a collaborative approach involving educators, researchers, and other stakeholders. Within this framework, the study seeks to address real-world problems in kindergarten by developing and validating a model of physical activity-based freedom of movement. This methodology supports the continuous refinement of educational strategies based on feedback and findings from each implementation phase, allowing for the adaptation and improvement of the model to meet specific needs effectively (Tinoca et al., 2022). Through DBR, this study aims to create a practical, evidence-based program that can enhance young learners' engagement in kindergarten students' physical activity, thereby promoting their overall well-being and laying a solid foundation for a lifelong active lifestyle.

The research procedures in this study are divided into four main stages: research and information collecting, planning, development of the preliminary form of a product, and validation. This structured approach ensures a systematic approach to developing and validating the product (Komaini et al., 2021). The initial stage, research and information collecting, encompasses a comprehensive range of activities, including literature review, observation, documentation, expert interviews, surveys, needs analysis, focus group discussions, and conceptual framework development. This stage is crucial for gathering relevant data and insights that will inform the subsequent phases of the study, ensuring that the

development of the model physical activity is grounded in solid research and meets the identified needs and interests of kindergarten students, as well as the requirements of their teachers and parents.

In the planning stage, the collected data from the research and information collecting phase is analyzed and synthesized to gain a deeper understanding of kindergarten students' specific needs and interests in physical activity, incorporating the concept of freedom of movement. This understanding is critical for designing an effective physical activity that aligns with the developmental stages and interests of the target group. Following the planning phase, the development of the preliminary form of a product phase involves designing, developing, and drafting an initial model of the planned physical activity-based freedom of movement in kindergarten. This preliminary model is crafted carefully considering the insights gained from the earlier stages, aiming to create an engaging, developmentally appropriate, and pedagogically sound program that promotes a model of physical activity-based freedom of movement in kindergartens.

Twelve experts were tasked with the evaluation process in the pedagogical experiment designed to assess the quality model of physical activity-based freedom of movement in kindergartens. These evaluators are selected based on stringent criteria to ensure a comprehensive and informed assessment. First, each expert and practitioner must possess at least five years of experience in their respective fields. This experience is crucial for providing a depth of understanding and insight into the model's effectiveness and applicability. Second, the evaluators must be active practitioners, lecturers, or teachers in early childhood education and physical activity. This ensures they have current and relevant experience with the age group and subject matter. Finally, a deep understanding of key topics is mandatory: early childhood education, physical activity, freedom of movement, and the independent curriculum. This multidimensional expertise is essential for assessing the model's potential to enhance physical education in kindergartens, fostering a holistic approach to developing young children within the framework of the modern educational landscape.

Statistical Analysis

This study's data analysis techniques encompass quantitative and qualitative methodologies to thoroughly evaluate the effectiveness model of physical activity-based freedom of movement in kindergartens. The quantitative aspect of the analysis utilized an evaluation form featuring a five-point Likert rating scale, with scores ranging from 5 (highly appropriate) to 1 (highly inappropriate). This scale facilitated the structured data collection regarding the appropriateness and effectiveness of the model from the perspectives of experts and practitioners. The development of this instrument drew upon the foundational work of ensuring a grounded approach in relevant prior research (Boa et al., 2018). Subsequently, the collected data were analyzed using SPSS version 23, a statistical software package, to calculate the mean, standard deviation, and V Aiken values. These statistical measures provided insights into the validity of the quantitative model, offering a rigorous assessment of the model's efficacy. The choice of SPSS for data analysis underscores the study's commitment to employing robust statistical tools to derive meaningful conclusions from the data collected, thereby ensuring a comprehensive evaluation of the pedagogical intervention (Afifah et al., 2022).

The selection of quantitative and qualitative data analysis techniques comprehensively assessed the suitability model of the physical activity-based freedom of movement for integration into the kindergarten learning process. The quantitative analysis allowed for the numerical evaluation of responses obtained through the Likert rating scale, providing measurable insights into the appropriateness and effectiveness of the model. On the other hand, qualitative analysis provided a deeper understanding of the nuanced perspectives and experiences of experts and practitioners regarding the feasibility and potential impact of the model. Combining these two approaches, the study offered a holistic evaluation that would inform decision-making regarding incorporating the model into kindergarten curricula, ensuring a well-rounded assessment of its pedagogical efficacy and suitability for educational contexts.

Results

The first stage in developing a model of physical activity-based freedom of movement in kindergarten is research and information collection. In this study, the research and information collection stage consists of a literature review, observation, documentation, expert interviews, surveys, needs analysis, focus group discussions, and the formulation of a conceptual framework. This stage is crucial as it provides the foundational groundwork that significantly influences the success model of developing a physical activity-based freedom of movement in kindergarten. The following diagram explains the process of research and information collection in this study:

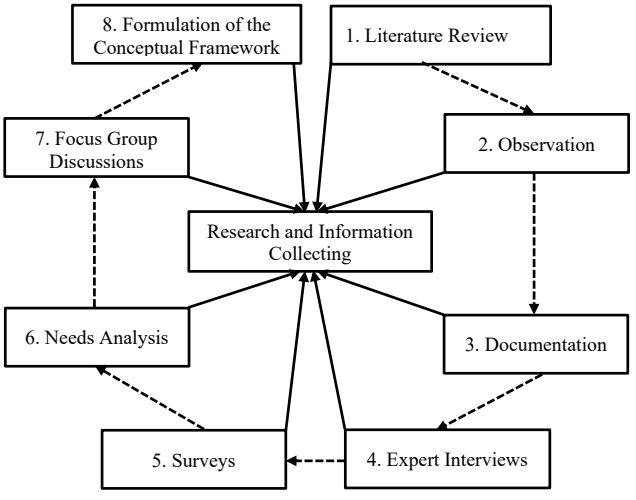

Fig. 1. Research and Information Collection Design

Planning is the next stage to be undertaken after the research and information collection process. During the planning stage, analysis and synthesis of the data collected during the research and information collection process are carried out. The main data in this context pertains to the needs and interests of kindergarten students and the

needs of teachers and parents regarding the learning process of physical activities based on freedom of movement in kindergarten. Based on the analysis and synthesis conducted, a model of physical activity for kindergarten students that is effective and suitable for the needs of the students and their surrounding environment is ultimately designed.

The designed physical activity model will include various activities based on freedom of play, which involves minimal teacher intervention and interpretations of fundamental movements. These basic movements consist of exploration, chasing, fleeing, dodging, volleying, dribbling, spatial awareness, kicking, directing, throwing, catching, dancing proficiency, understanding relationships, striking with a racket, striking with a long-handled implement, game skills, effort, perseverance, weight transfer, rolling, jumping, landing, and gymnastics skills.

In the Develop Preliminary Form of a Product stage, the researcher successfully integrated various concepts and elements obtained during the Planning stage into a cohesive activity model. This initial model includes all the aspects of the designed physical activity model, such as various physical activities, teaching methods and techniques, and implementation guidelines to support the successful application of the developed model. The following is the design of a physical activity-based freedom of movement program in kindergartens that has been created.

The next step after research and information collection and developing a preliminary form of a product is the validation of the model by twelve practitioners, including academic experts, senior kindergarten principals, and senior early childhood education educators. The validation is based on internal and external factors. The internal factors consist of five indicators: model quality, results alignment with objectives, model clarity, model novelty, and data source reliability. The external factors comprise five indicators: model relevance, policy implications, theoretical contribution, model generalization, and model user suitability. The following are the data analysis results of validating a physical activity-based freedom of movement in kindergarten, conducted using SPSS.

In the model validation stage conducted with twelve experts, the data obtained are presented in Table 1. Based on the model validation, it is found that the model of physical activity-based freedom of movement program in kindergartens has a mean of 4.29, a standard deviation of 0.44, and an achievement percentage of 85.83 %. Furthermore, Aiken's V analysis was conducted with five assessment categories to evaluate the feasibility of a model of physical activity-based freedom of movement program in kindergartens. According to the minimum standard for Aiken's V in validity testing, this model shows a value of 0.80 with a probability of 0.05. The Aiken's V test calculation for the validation process data by twelve experts indicates a score of 0.82, which signifies that the model is considered valid for use according to the experts' assessment.

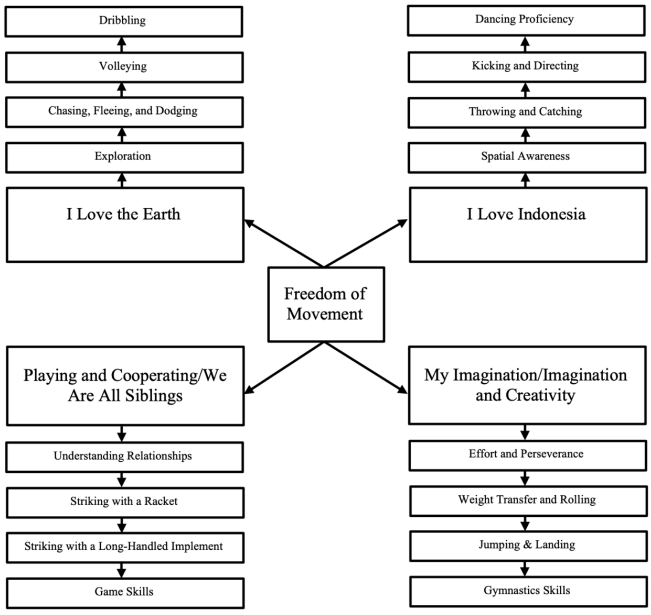

Fig. 2. Design of the Physical Activity-Based Freedom of Movement in Kindergarten

Discussion

This study aims to develop and validate a model of physical activity-based freedom of movement program in kindergartens. Based on the validation and evaluation results by experts and practitioners, this model has proven valid and suitable for application in early childhood education. The validation indicates that the model aligns with the ten established indicators: Alignment with research objectives, alignment of research results, clarity of conclusions, novelty of findings, reliability of data sources, relevance of the research theme, policy implications, contribution to theory, generalization of findings, and quality of findings. These aspects are crucial for the comprehensive development of early childhood education, as supported by studies from Smith et al., (2022) and Wyatt-Smith et al., (2024) which highlight the importance of aligning educational models with clear objectives and reliable data. The model is designed with various important aspects in mind, such as quality, clarity, novelty, and relevance to the educational goals for early childhood in Indonesia.

The results of this study align with various related publications discussed in the introduction. Based on the model validation stage conducted with twelve experts, data indicate that a model of physical activity-based freedom

Table 1. Validation Results of the Physical Activity-Based Freedom of Movement in Kindergarten

	E_1	E_2	E_3	E_4	E_5	E_6	E_7	E_8	E_9	E_{10}	E_{11}	E_{12}	Mean
Mean	4.40	3.50	4.25	4.10	4.80	3.50	4.25	4.85	4.75	4.15	4.25	4.70	4.29
Standard Deviaton	0.50	0.51	0.44	0.31	0.41	0.51	0.44	0.37	0.44	0.37	0.44	0.47	0.44
Achievement Percentage	88 %	70 %	85 %	82 %	96 %	70 %	85 %	97 %	95 %	83 %	85 %	94 %	85.83 %
V Aiken Values													0.82

of movement program in kindergartens has an Aiken V value of 0.82, surpassing the minimum standard of 0.80. This suggests that the developed model is considered valid by the experts. These findings support previous research, such as that by Wang et al. (2023) and Abusleme-Allimant et al. (2023) which emphasizes the importance of structured physical activity models in supporting children's physical and cognitive development. This study also reinforces the findings of Jeon & Jun (2021), Kuzik et al. (2020) and Jones et al. (2019) which show that engagement in diverse physical activities can enhance fundamental motor skills and holistic development in children. Consistency with research by Martín-Rodríguez et al. (2024) is also evident, highlighting that physical activity improves physical competence and fosters a positive attitude towards an active lifestyle. Furthermore, this study supports the findings of (Nordmo & Meland, 2023) and (Laxdal et al., 2020) regarding the significance of outdoor play in enhancing fundamental motor skills and children's health.

Considering the potential practical application of this research, it is important to emphasize that a model of physical activity-based freedom of movement program in kindergartens can be easily integrated into the Indonesian kindergarten curriculum. This model is designed with early childhood developmental needs in mind and can be adapted to suit each school's local context and specific needs. Implementing this model requires support from teachers, parents, and policymakers to ensure its success and optimal benefits for children's development. These findings align with previous studies by Kemble et al. (2024) and Belton et al. (2022) highlighting the importance of integrating physical activity into early childhood education to support holistic development. Additionally, the necessity of teacher training and support in implementing such models is supported by research from Barnett et al. (2019) which emphasizes that professional development for educators is crucial in achieving the desired outcomes in children's physical and cognitive growth. This study also resonates with the findings of Cassar et al. (2019) and Ward et al. (2018) underscoring the role of comprehensive school and community support in successfully adopting physical activity programs in early education settings.

The results of this study open opportunities for further research to examine the long-term effectiveness of this model and its impact on a broader population. Future research could explore various evaluation and measurement methods to understand better the model's effects on wider aspects of child development. These considerations are supported by studies such as those by Siraj et al. (2023) and Hofstee et al. (2022) which emphasize the importance of longitudinal research in assessing the sustained impact of early childhood interventions. Additionally, subsequent studies might investigate the factors influencing the successful implementation of this model, including the role of teachers, institutional support, and family participation. Thus, this research provides a solid foundation for practical application and offers clear directions for further research and development in early childhood education.

Conclusions

This study successfully developed and validated a physical activity model based on freedom of movement in kindergarten. It is suitable for kindergarten learning and aimed at enhancing children's physical, cognitive, and social development in their early years of education. Validation by twelve experts revealed that the developed physical activity model has an Aiken V value of 0.82, exceeding the minimum standard of 0.80, thus confirming that the model is valid and suitable for use. The analysis shows that the model aligns with children's developmental needs and supports an interactive and creative learning approach consistent with the Independent Curriculum in Indonesia. In addition to stimulating children's motor skills, the model also significantly contributes to the overall quality of education in kindergarten.

The results of this study are consistent with various previous studies that emphasize the importance of structured physical activity in supporting children's development. This model can be easily integrated into the kindergarten curriculum with support from teachers, parents, and policymakers. Training for teachers is also crucial to ensure the model's effectiveness. This research opens opportunities for further investigation into the model's long-term efficacy and impact on a broader population, as well as exploring factors influencing the successful implementation of the model, including the role of kindergarten teachers and support from Indonesian government institutions.

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Conflict of interest

All authors confirm that we have no conflicts of interest.

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Розробка та валідація моделі фізичної активності, що базується на забезпеченні вільного рухового режиму в дитячому садку

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Авторський вклад: A – дизайн дослідження; B – збір даних; C – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 8 с., 1 табл., 2 рис., 47 джерел.

Мета дослідження. Мета цього дослідження полягала в розробці та валідації навчальної моделі фізичної активності на основі вільного рухового режиму в дитячому садку.

Матеріали та методи. У роботі застосовано методику дизайн-орієнтованого дослідження (англ. design-based research, DBR), до якої було залучено дванадцять експертів у галузях дошкільної освіти та фізичного виховання з метою валідації навчальної моделі. Етапи розробки включали дослідження та збір інформації, планування, розробку попередньої форми продукту та валідацію. Для перевірки валідності моделі було проведено статистичний аналіз з використанням V-значення коефіцієнта Ейкена.

Результати. У рамках цього дослідження було успішно розроблено навчальну модель фізичної активності, що базується на забезпеченні вільного рухового режиму в дитячому садку, яка складається з чотирьох основних елементів: «Я люблю планету Земля», «Я люблю Індонезію», «Граємо і співпрацюємо» / «Ми всі брати і сестри» та «Моя уява» / «Уява і творчість». Відповідно до результатів тесту на валідність, проведеного за участю дванадцяти експертів, навчальна модель фізичної активності на основі вільного рухового режиму в дитячому садку отримала V-значення коефіцієнта Ейкена на рівні 0,82, що перевищує мінімальний стандарт у 0,80.

Висновки. Отримані результати свідчать про те, що застосування навчальної моделі фізичної активності на основі вільного рухового режиму розглядається в якості відповідного педагогічного підходу для навчання в дитячому садку. Аналіз показує, що зазначена модель відповідає потребам розвитку дітей і забезпечує інтерактивний і творчий підхід до навчання згідно з навчальною програмою «Мердека» в Індонезії.

Ключові слова: розвиток, валідація, фізична активність, свобода, дитячий садок.

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