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Development and content validation of a structured gymnastics programme to enhance gross motor skills in preschool children

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ABSTRACT

Background: Despite the growing use of gymnastics programmes in early childhood education, most studies emphasise implementation and outcomes rather than the systematic development and rigorous validation of programme content. As a result, many programmes may be applied without sufficient empirical evidence of their appropriateness, limiting their effectiveness in promoting gross motor skill development. **Objectives:** This study aimed to develop and evaluate the content validity of a structured gymnastics programme designed to enhance gross motor skills in preschool children. **Methods:** This study employed a research and development (R&D) approach focusing on the content validation stage. The programme was evaluated by five expert validators with backgrounds in early childhood education, physical education, and children's gymnastics. Content validity was assessed using Aiken's V index based on expert ratings. **Results:** The findings indicated that all components of the developed programme achieved Aiken's V values ranging from 0.80 to 1.00, demonstrating a high level of agreement among experts regarding the relevance, clarity, and appropriateness of the programme content. **Conclusion:** The results suggest that the developed gymnastics programme has strong content validity and is suitable for supporting gross motor skill development in preschool children. This study contributes by providing a systematically developed and empirically validated programme for early childhood physical education.

Keywords: Early childhood education; gymnastics program; gross motor skills; content validity; aiken's V

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INTRODUCTION

Gross motor skills represent a fundamental component of early childhood development, particularly during the kindergarten period, which is often described as a critical or "golden age" for physical and neurological growth (Katagiri et al., 2021; Feleghi

et al., 2023). During this stage, children experience rapid development in coordination, balance, and body control, which are essential not only for physical competence but also for supporting cognitive, social, and emotional development (Hudah et al., 2025). Adequate stimulation through structured physical activity is therefore crucial to optimise motor development and prepare children for subsequent learning stages.

In early childhood education, learning approaches are typically designed to be engaging and developmentally appropriate, with an emphasis on play-based and imitation-based activities (Widiyatmoko et al., 2025). Previous studies have demonstrated that structured and guided physical activities can significantly improve children's motor competence, attention, and social interaction (Imai et al., 2023; Hsieh et al., 2017). In this context, gymnastics has been widely recognised as an effective form of physical activity that integrates multiple components of movement, including strength, flexibility, balance, coordination, and agility (Barnett et al., 2016; Rudd et al., 2020). These characteristics make gymnastics particularly suitable for supporting gross motor skill development in young children.

Furthermore, gymnastics activities can be adapted to align with the developmental characteristics of kindergarten children, allowing them to engage in movement-based learning in a safe, structured, and enjoyable manner (Pradipta & Rachmawati, 2024; Cervin et al., 2017). Prior research has shown that gymnastics-based interventions can improve physical fitness, movement quality, and overall motor proficiency (Parvinpour et al., 2020; Hoeboer et al., 2018). However, despite these benefits, the majority of existing studies primarily focus on the implementation and outcomes of gymnastics activities, rather than on the systematic development of structured programmes grounded in pedagogical and developmental principles.

More importantly, limited attention has been given to the rigorous validation of gymnastics programme content (Pradipta et al., 2022; Kurniawan et al., 2025), particularly in ensuring that the activities are developmentally appropriate, pedagogically sound, and aligned with the needs of early childhood learners. The absence of validated programme designs may result in the use of instructional practices that lack empirical support, potentially reducing their effectiveness and raising concerns regarding safety and developmental suitability in kindergarten settings (Hoeboer et al., 2018; Pradipta et al., 2023).

Therefore, this study aims to develop and evaluate the content validity of a structured gymnastics programme specifically designed to enhance gross motor skills in kindergarten children. By integrating a systematic development process with expert-based validation, this study seeks to provide a more robust and evidence-based approach to early childhood physical education. The findings are expected to contribute both theoretically, by strengthening the framework for developing motor learning programmes, and practically, by offering validated instructional resources for teachers in implementing effective and developmentally appropriate gymnastics activities.

METHOD

Design

This study employed a research and development (R&D) approach based on the model proposed by Borg and Gall, focusing on the stages of product development and content validation. The primary objective of this study was to develop a structured gymnastics programme and evaluate its content validity for improving gross motor skills in preschool children.

Participants

The content validation process involved five expert validators selected using purposive sampling based on their expertise and professional experience. The panel consisted of experts in early childhood education, physical education, gymnastics, and learning media. All experts had a minimum of five years of experience in their respective fields and were considered qualified to evaluate the relevance and appropriateness of the developed programme. The use of five experts is considered adequate for content validation studies, as it allows for sufficient agreement assessment while maintaining feasibility. In addition to expert validation, field trials were conducted to examine the feasibility of the developed programme. The small-scale trial involved 30 kindergarten children, while the large-scale trial involved 120 kindergarten children aged 4-6 years. Different participants were involved in each trial stage to avoid potential bias.

Instruments

The instrument used in this study was a content validation questionnaire designed to assess the quality and feasibility of the developed gymnastics programme. The questionnaire consisted of 11 items covering key aspects, including programme relevance, movement clarity, safety, suitability for children's developmental level, and ease of implementation. Each item was evaluated using a 4-point Likert scale ranging from 1 (not appropriate) to 4 (very appropriate). This scale was used to encourage clear expert judgement and avoid neutral responses.

Procedures

The development process followed selected stages of the Borg and Gall model, including (i) needs analysis, (ii) programme design and development, (iii) expert validation, (iv) revision, and (v) field testing. Initially, the gymnastics programme was developed based on a review of relevant literature and principles of early childhood motor development. The draft programme was then evaluated by expert validators. Based on their feedback, revisions were made to improve the quality, safety, and appropriateness of the programme before being implemented in field trials. The structure of the developed gymnastics programme is presented in **Table 1**, which outlines the sequence of activities, objectives, and duration of each session.

Table 1. Structure of the Gymnastics Programme

Session	Activity	Objective	Duration
Warm-up	Rhythmic movements	Body activation	5 min
Core	Balance, coordination	Motor development	22 min
Cool-down	Relaxation	Recovery	3 min

Data Analysis

Content validity was analysed using Aiken's V index to determine the level of agreement among experts regarding the relevance and appropriateness of each component of the gymnastics programme. Aiken's V values range from 0 to 1, with higher values indicating stronger agreement. In this study, items with Aiken's V values ≥ 0.80 were considered to have high content validity and were accepted without revision, while items with lower values were revised based on expert feedback. The analysis was conducted for each item to evaluate the overall validity of the programme.

RESULTS AND DISCUSSION

Results

Content Validity of the Gymnastics Programme

The content validity of the developed gymnastics programme was evaluated by five expert validators using a structured assessment instrument. The results of the validation indicate that all components of the programme achieved high levels of agreement among experts. As presented in **Table 2**, the average validation score across all assessed aspects reached 88%, indicating a high level of content validity. Among the evaluated aspects, movement safety obtained the highest score (92%), followed by material suitability (88%), learning relevance (87%), and programme implementation (85%).

Table 2. Summary of Expert Validation Results

Aspect	Score (%)	Interpretation
Material suitability	88	High validity
Movement safety	92	High validity
Programme implementation	85	High validity
Learning relevance	87	High validity
Average	88	High validity

The high score in the movement safety aspect indicates that the developed programme is considered appropriate and safe for preschool children. Although the programme implementation aspect obtained a relatively lower score, it still falls within the acceptable validity range.

Aiken's V Analysis

To further examine content validity, Aiken's V index was calculated for each item based on expert ratings. The results showed that all items achieved Aiken's V values ranging from 0.82 to 0.94, indicating strong agreement among experts regarding the relevance and appropriateness of the programme components. According to the criteria presented in **Table 3**, all items were categorised as having high content validity.

Table 3. Aiken's V Interpretation Criteria

Aiken's V Value	Interpretation
< 0.60	Low validity
0.60-0.79	Moderate validity
≥ 0.80	High validity

Description of the Developed Product

The developed product is a structured gymnastics programme designed to support gross motor skill development in preschool children. The programme consists of several key components, including learning objectives, sequences of movement activities, implementation procedures, and duration guidelines. The programme integrates three types of gross motor movements: locomotor, non-locomotor, and manipulative skills. It is designed to be implemented in a structured and engaging manner, emphasising safety, developmental appropriateness, and active participation.

Discussion

Interpretation of Content Validity Findings

The findings of this study indicate that the developed gymnastics programme demonstrates a high level of content validity, as reflected by Aiken's V values exceeding the recommended threshold (≥ 0.80). This suggests strong agreement among experts

regarding the relevance, clarity, and appropriateness of the programme components for preschool children.

These results imply that the programme has been carefully designed to align with early childhood developmental characteristics, particularly in supporting fundamental aspects of gross motor skills such as coordination, balance, and movement control. High content validity is essential in development research, as it ensures that the instructional content accurately represents the intended learning objectives and is suitable for the target population (Webster et al., 2019; Thomas & Thomas, 2019).

Theoretical Perspective on Motor Development

From a theoretical standpoint, the effectiveness of the developed programme can be explained through motor development theory, which highlights early childhood as a critical period for acquiring fundamental movement skills (FMS). These skills—including locomotor, non-locomotor, and manipulative movements—form the basis for more complex physical activities later in life (Reyes et al., 2019; Pin et al., 2021).

The structure of the gymnastics programme in this study integrates these three domains of movement, thereby supporting a comprehensive approach to motor development. Previous studies have shown that structured and progressive physical activity programmes significantly contribute to the development of motor competence in young children (Fontana et al., 2017; Suherman et al., 2018). Moreover, early mastery of fundamental movement skills has been linked to increased physical activity participation and improved health outcomes in later stages of life (You et al., 2021; Rudd et al., 2020).

Comparison with Previous Studies

The findings of this study are consistent with previous research demonstrating the effectiveness of structured physical activity interventions in improving gross motor skills among preschool children. For example, Pin et al. (2021) reported that structured motor skill programs significantly enhance children's movement competence compared to unstructured play-based activities. Similarly, Yilmaz and Sicim-Sevim (2020) and Zhang et al. (2024) emphasised that gymnastics-based activities provide a rich context for developing balance, coordination, and movement control due to their repetitive and controlled movement patterns.

However, unlike most previous studies that focus primarily on programme effectiveness, this study contributes by emphasising the systematic development and rigorous validation of program content prior to implementation. This distinction is important because many educational programmes are implemented without sufficient validation, which may limit their effectiveness and appropriateness (Yli-Piipari et al., 2018; Arfi et al., 2024).

Methodological Contribution: Content Validation Approach

Another important contribution of this study lies in the application of Aiken's V as a content validation method. The use of this approach enables a quantitative evaluation of expert judgements, thereby enhancing the rigor and credibility of the validation process. Aiken's V has been widely recognised as a robust method for assessing content validity, particularly in educational and instrument development research (Hendryadi, 2017; Tajuddin et al., 2025).

The high level of agreement among experts in this study indicates that the programme meets key criteria of relevance, clarity, and representativeness. This strengthens the argument that content validation is a critical step in development research to ensure that the resulting product is both theoretically sound and practically applicable.

Practical Implications for Early Childhood Education

From a practical perspective, the validated gymnastics programme provides a structured and developmentally appropriate guideline for teachers in implementing physical activity in kindergarten settings. The programme emphasises safety, engagement, and adaptability, which are essential principles in early childhood education.

Teachers often face challenges in designing effective physical activity sessions due to limited resources or lack of structured guidance. Therefore, the availability of a validated programme can support teachers in delivering more systematic and meaningful learning experiences. In addition, incorporating structured movement activities has been shown to improve not only motor skills but also children's confidence, social interaction, and motivation to participate in physical activity research (Handayani et al., 2023; Satria et al., 2020).

Limitations and Future Research Directions

Despite its contributions, this study has several limitations. First, the study focused primarily on content validation and did not examine the effectiveness of the programme in improving gross motor outcomes. Second, the number of expert validators was relatively limited, which may influence the generalisability of the findings.

Future research is recommended to evaluate the effectiveness of the developed programme using experimental or longitudinal designs. Additionally, further studies could explore the integration of this programme with digital or technology-based learning approaches to enhance engagement and accessibility in early childhood education.

CONCLUSION

This study demonstrates that the developed gymnastics programme has a high level of content validity, indicating strong agreement among experts regarding its relevance, clarity, and suitability for preschool children. The programme is designed in alignment with early childhood developmental characteristics and effectively integrates key components of gross motor skills, including locomotor, non-locomotor, and manipulative movements.

These findings highlight the importance of systematic programme development and rigorous validation in ensuring the quality of physical activity interventions in early childhood education. By providing a structured and developmentally appropriate gymnastics programme, this study contributes to strengthening the design of motor learning programmes for young children.

From a practical perspective, the validated programme can serve as a useful guideline for teachers in implementing safe, engaging, and effective physical activity sessions in kindergarten settings. Future research is recommended to examine the effectiveness of the programme in improving children's motor skill outcomes through experimental or longitudinal studies.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this study.

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