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Diagnosis–Intervention–Development: construction and validation of the "DID" model for digital intelligence-empowered preschool physical education under the holistic physical education paradigm

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Abstract. Under the holistic physical education paradigm, which emphasizes systematicity, scientific rigor, and social integration, preschool physical education urgently needs to move beyond traditional extensive teaching approaches toward personalized, evidence-based, and systematic curricula. This study conceptualizes the closed-loop Diagnosis–Intervention–Development (DID) model and integrates digital intelligent technologies—including Artificial Intelligence (AI), the Internet of Things (IoT), and big data—to establish a precision teaching framework for kindergarten physical education. The proposed model consists of three core components: motor ability diagnosis, dynamic intervention pathways, and developmental assessment. By incorporating motor diagnosis, exercise prescription, exercise intervention, and motor evaluation, it enables individualized curriculum implementation tailored to children's developmental characteristics, ultimately promoting the coordinated development of motor skills, physical fitness, and social competence. Empirical findings demonstrate that the DID model significantly improves children's motor proficiency rates, participation levels, and physical fitness qualification rates, while also showing positive developmental trends across other domains. The intervention effects are particularly evident in individual cases, providing a valuable paradigm for personalized research and practice in preschool physical education.

Keywords: holistic physical education paradigm, preschool physical education, digital intelligence empowerment, motor diagnosis, exercise intervention

1. Introduction

Under the strategic background of "Healthy China 2030", the physical health of young children has become the cornerstone for enhancing national quality. Currently, the development of preschool physical education is facing a situation of insufficient policy promotion, making it difficult to align with the multi-dimensional goals of holistic development advocated by modern sports. In practice, there are issues such as fragmented goals, experiential intervention, and lagging evaluation, lacking guidance from a systematic model. Based on this,

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the "Diagnosis, Intervention, Development" (DID) model is proposed: relying on digital and intelligent technology to build a dynamic database of young children's physical fitness and exercise behavior to achieve precise diagnosis; generating personalized exercise prescriptions based on diagnostic results to implement scientific intervention; ultimately aiming at the sustainable development of young children's lifelong exercise habits and sound personality. This model aims to open up a logical closed loop of "evaluation-policy-development" through digital and intelligent empowerment, providing a verifiable practical path for the implementation of a broad sports perspective in preschool physical education and helping preschool physical education transition from "experience-driven" to "evidence-based optimization".

2. Developmental needs of preschool physical education under the holistic physical education paradigm

2.1. Implications of the holistic physical education paradigm

In numerous speeches on sports, President Xi Jinping has emphasized the people-centered philosophy, advocating that the public should serve as the principal force in developing sports and that satisfying people's fitness needs while promoting comprehensive human development should constitute both the starting point and ultimate objective of sports initiatives [1]. In *Some Thoughts Concerning Education*, John Locke proposed that "a sound mind resides in a sound body" [2]. The holistic physical education paradigm regards physical education as the core through which moral, intellectual, and aesthetic education are organically integrated, forming an educational philosophy centered on physical education as the principal thread connecting multiple dimensions of development [3]. It further views physical education as a comprehensive product of social civilization, scientific and technological progress, and improvements in national quality, as well as a cultural phenomenon through which individuals pursue health, well-being, longevity, and self-fulfillment. Consequently, it embodies the characteristics of systematicity, scientific rigor, and social integration [4].

This paradigm transcends the narrow conception of traditional physical education by emphasizing its universality, integrative nature, and lifelong significance. Universality implies that sports participation should encompass all members of society, enabling everyone to engage in physical activity and improve overall health and physical fitness. Integration refers to the deep convergence of physical education with education, healthcare, culture, and other sectors, thereby maximizing its multidimensional value through interdisciplinary collaboration. Lifelong participation underscores that physical activity should accompany individuals throughout the entire life course—from early childhood motor enlightenment to physical exercise in old age—serving consistently as an essential means of promoting physical and psychological well-being.

Despite these guiding principles, preschool physical education remains insufficiently integrated under the holistic physical education paradigm. Existing research directions—including integrated kinesiology education, embodied cognition, the integration of physical education and general education, and the integration of physical education and healthcare—provide valuable references for future development. As the starting point of lifelong physical education, preschool physical education bears the critical responsibility of establishing a solid foundation for children's physical fitness while fostering sustained interest in physical activity and healthy exercise habits. Nevertheless, substantial gaps remain between current practice and the requirements advocated by the holistic physical education paradigm.

2.2. Practical challenges facing preschool physical education

At present, preschool physical education in China encounters multiple practical challenges, including homogeneous instruction, inadequate assessment systems, and delayed intervention. First, homogeneous teaching practices remain widespread. Instructional content is generally determined according to children's interests, developmental characteristics, available equipment, and teaching objectives. In practice, however, curricular activities are often assembled in an arbitrary manner through imitation and replication of existing materials. Teachers frequently adopt a "one-size-fits-all" instructional approach, overlooking individual differences in children's developmental trajectories. Such practices fail to accommodate diverse motor needs and developmental levels, causing some children to perceive physical activities as monotonous and reducing their enthusiasm and initiative for participation [5, 6].

Second, the assessment system for preschool physical education remains underdeveloped. Current evaluation practices rely predominantly on summative assessment while lacking formative assessment mechanisms [6]. Interviews conducted in this study indicate that conventional evaluation focuses primarily on changes in children's motor skills and physical fitness indicators, with limited attention to broader developmental dimensions such as exercise interest, physical activity habits, and social development. Consequently, this single-dimensional evaluation framework fails to comprehensively capture children's growth and progress in physical education and provides insufficient evidence to support teachers in making individualized instructional adjustments.

Finally, intervention in preschool physical education is often delayed. A review of the literature reveals that existing exercise intervention studies mainly concentrate on the effects of specific exercise programs on physical fitness or interventions targeting children with obesity and those with special educational needs. In routine preschool physical education, teachers generally lack mechanisms for real-time monitoring of children's motor competence and dynamic intervention. As a result, when motor deficiencies are eventually identified, the optimal intervention window has often passed, limiting the effectiveness of subsequent improvement efforts.

2.3. The necessity of digital intelligence empowerment in preschool physical education

Digital intelligence empowerment for children's scientific physical activity refers to the application of digital intelligent technologies to enhance the scientificity, intelligence, and safety of preschool physical education, thereby comprehensively improving children's capacity for evidence-based physical activity and promoting their physical and mental health. With the rapid advancement of technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), and big data, digital intelligence has been increasingly integrated across diverse sectors. Its application has become an essential requirement for the high-quality development of preschool physical education within the broader national strategy of building China into a leading sporting nation. Digital intelligent technologies offer new solutions to the practical challenges confronting preschool physical education by enabling precise assessment of children's motor competence, dynamic intervention, and continuous developmental tracking. These technologies facilitate the transition from experience-driven instruction to data-driven decision-making, while real-time data collection and analysis provide a scientific foundation for educational practice [7, 8].

For example, artificial intelligence can accurately recognize and analyze children's movement patterns to identify deficiencies during physical activity. Internet of Things devices can continuously monitor physiological indicators such as heart rate and exercise intensity, providing teachers with dynamic exercise data in real time. Meanwhile, big data analytics can generate individualized motor profiles based on children's activity records, offering evidence-based support for designing personalized instructional programs.

2.4. Constructing the Diagnosis–Intervention–Development (DID) closed-loop model

This study aims to develop a precision teaching framework based on the closed-loop logic of Diagnosis–Intervention–Development (DID). The model realizes personalized, scientific, and systematic preschool physical education through three interconnected components: motor ability diagnosis, dynamic intervention pathways, and developmental assessment. Specifically, the motor ability diagnosis stage employs scientifically validated assessment tools and procedures to accurately evaluate children's motor competence. Based on the diagnostic results, the dynamic intervention stage formulates individualized exercise intervention programs and implements them through diversified physical activity formats. Finally, the developmental assessment stage conducts comprehensive and dynamic evaluations of children's growth and progress throughout participation in physical education, providing continuous feedback that enables teachers to refine instructional strategies and optimize educational outcomes.

3. The three-dimensional framework supporting the DID model

3.1. Guidance from the holistic physical education paradigm

The holistic physical education paradigm emphasizes the universality, integration, and lifelong nature of physical activity, providing broad developmental opportunities and abundant resources for preschool physical education. Within school-based physical education, kindergartens should design scientifically grounded curricula that accommodate children's age characteristics, motor development needs, exercise interests, and emerging physical activity habits. At the same time, close collaboration with families and communities should be strengthened to make full use of community-based sports resources and expand children's opportunities for physical activity. Furthermore, integrating physical education with other learning domains can enrich instructional content while simultaneously fostering healthy habits, social competence, and positive character development.

For example, kindergartens may collaborate with local communities to organize community sports festivals and parent–child sports events, encouraging joint participation by children and their families to enhance children's sense of engagement and belonging. Community sports professionals and volunteers may also be invited to conduct physical activity sessions within kindergartens, thereby broadening children's knowledge and skills in sports. Moreover, preschool physical education should be effectively integrated with other curricular domains—including social studies, language, science, and the arts. Examples include orienteering activities linked to community-based social practice and community sports programs designed to cultivate healthy habits. Through coordinated home–school partnerships and interdisciplinary integration, children can be provided with a comprehensive, multi-level physical activity environment that supports the holistic and sustained development of preschool physical education.

3.2. Developmentally Appropriate Practice (DAP)

Huo [9] pointed out that Developmentally Appropriate Practice (DAP) emphasizes that educational experiences should be aligned with children's developmental characteristics and learning needs. In designing preschool physical education activities, educators should fully consider children's physiological and psychological developmental characteristics and develop age-appropriate physical activities and exercise programs. For instance, children aged 3–4 years are generally in a sensitive period for balance development. Accordingly, balance-oriented activities such as walking on balance beams and standing on one foot should be emphasized. As children reach 4–5 years of age, their coordination develops substantially, making activities

requiring hand–eye and whole-body coordination, such as rope skipping and ball bouncing, increasingly appropriate. By 5–6 years of age, children's physical fitness and motor competence have further improved, allowing the incorporation of more competitive and cooperative activities, including football and basketball.

In addition, DAP advocates respecting individual differences and addressing children's diverse developmental needs. In preschool physical education, teachers should classify children into different ability groups according to their motor competence and implement differentiated instruction. For children with varying levels of motor ability, exercise difficulty and intensity should be appropriately adjusted to accommodate individual developmental needs and maximize learning outcomes.

3.3. Empowerment through digital intelligence technologies

Digital intelligent technologies provide the technological foundation for precision teaching in preschool physical education, primarily through support at the diagnostic, intervention, and evaluation levels.

(1) Diagnostic Level: AI-Based Motion Recognition

The application of artificial intelligence in preschool physical education is primarily reflected in motion recognition. AI-based vision systems can analyze children's posture and movement trajectories, enabling educators to identify potential deficiencies in physical development and movement performance through automated assessment.

(2) Intervention Level: Real-Time Feedback via Internet of Things Devices

The Internet of Things (IoT) facilitates dynamic exercise intervention through continuous real-time feedback. When integrated with individualized exercise intervention programs, IoT technologies provide personalized guidance throughout children's physical activities. Wearable devices, such as smart wristbands (e.g., Huawei Band 2), can continuously monitor physiological indicators including heart rate and exercise intensity, while transmitting these data to teachers in real time to support timely instructional adjustments.

(3) Evaluation Level: Big Data-Driven Motor Profiles

Big data technologies contribute primarily to developmental evaluation by generating comprehensive motor profiles. Through the continuous collection and analysis of children's exercise data, dynamic developmental records can be established, documenting multiple aspects of children's physical development, including motor competence, exercise habits, and interests in physical activity. These individualized developmental profiles provide an evidence-based foundation for monitoring children's long-term progress and continuously optimizing instructional strategies.

4. Construction of the DID model

Building upon the closed-loop logic of Diagnosis–Intervention–Development (DID), this study integrates digital intelligent technologies—including Artificial Intelligence (AI), the Internet of Things (IoT), and big data—to establish a precision teaching model for preschool physical education. The model operationalizes precision instruction through four interconnected components: motor diagnosis, exercise prescription, exercise intervention, and motor evaluation. The overall framework is illustrated in Figure 1.

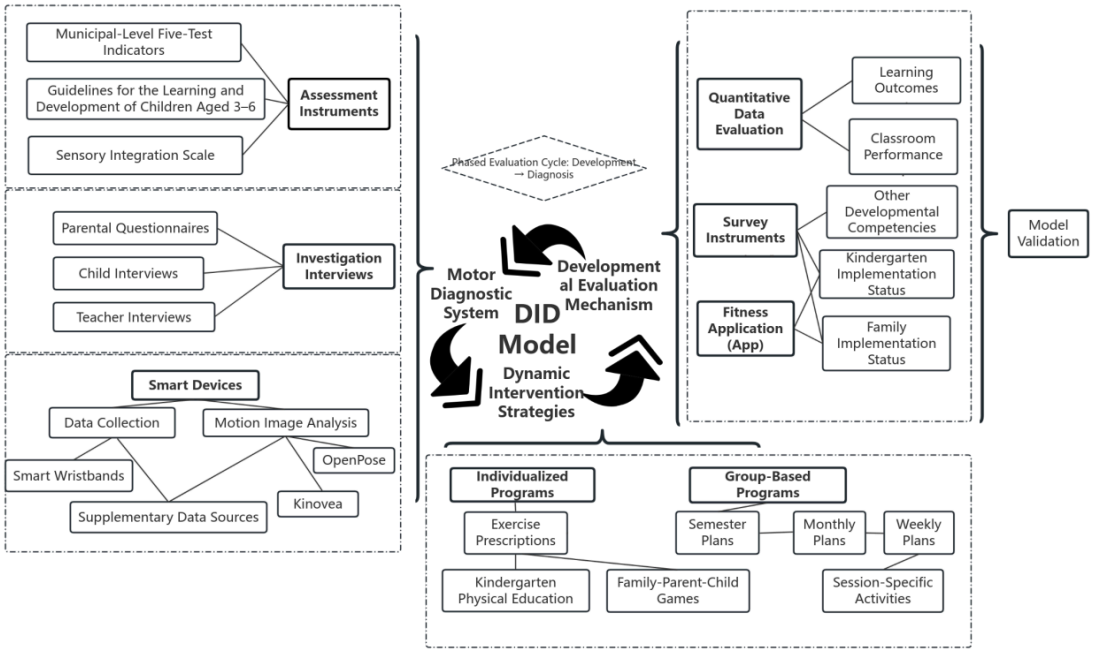

Figure 1. The Diagnosis–Intervention–Development (DID) model

4.1. Motor diagnosis system

The proposed motor diagnosis system comprises two principal components: a preschool motor competence assessment scale and data collected through intelligent devices. The motor competence assessment scale is primarily developed based on the developmental objectives outlined in *the Guidelines for Learning and Development of Children Aged 3–6 Years* (hereafter referred to as the *Guidelines*), together with the five physical fitness assessment indicators adopted in the local jurisdiction of the study. In addition, the Preschool Sensory Integration Scale is incorporated to assess multiple developmental dimensions, including motor development, language development, social development, physical fitness, and sensory integration. These assessment instruments provide a comprehensive understanding of children's motor competence and developmental levels. Specifically, the *Guidelines* assess children's attainment of fundamental developmental objectives across domains such as social interaction, language, and motor development. When children fail to meet the expected developmental benchmarks specified in the *Guidelines*, further assessment using the Preschool Sensory Integration Scale is conducted to identify underlying developmental needs. For example, children demonstrating weaknesses in social development may subsequently participate in physical activities specifically designed to enhance social interaction skills. Intelligent devices provide an additional source of objective diagnostic data. Motion analysis software such as Kinovea, pose estimation systems such as OpenPose, and wearable activity trackers are employed to collect children's movement data in real time. Video analysis technologies enable precise identification and analysis of movement patterns, while wearable sensors continuously monitor physiological indicators such as heart rate and exercise intensity. These objective data not only improve the accuracy of motor diagnosis but also provide continuous feedback to support subsequent dynamic intervention.

For example, a child who consistently throws a ball toward the ground with limited throwing distance can be assessed using the Kinovea motion analysis system. By analyzing the trajectory of the throwing movement,

the system may identify insufficient upper-limb strength and an inappropriate release angle, thereby providing an evidence-based diagnosis to guide subsequent intervention planning.

4.2. Dynamic intervention strategies

Dynamic intervention constitutes the core component of precision teaching. Based on the results of motor diagnosis, individualized exercise intervention programs are developed and implemented through multiple instructional approaches. The first step involves developing personalized exercise prescriptions. Guided by the principle that individualized intervention should accommodate children's diverse developmental needs, these prescriptions aim to enhance both participation and intervention effectiveness. For example, if diagnostic results indicate poor balance ability associated with underdeveloped vestibular function, balance-oriented and rotational games may be prescribed. Conversely, children demonstrating insufficient endurance may be assigned activities such as orienteering and hiking to improve aerobic capacity.

At the group level, developmental assessments are conducted by combining standardized scales with questionnaire surveys to identify the overall developmental characteristics of the class. Based on these findings, group instructional objectives and intervention plans are formulated. Consistent with the principles of Developmentally Appropriate Practice (DAP), differentiated instruction is implemented by categorizing children into high-, medium-, and low-ability groups according to their zones of proximal development. Children in the high-ability group participate in more challenging physical activities designed to further enhance their motor competence. Those in the medium-ability group engage in moderately difficult activities to consolidate and strengthen existing skills. Children in the low-ability group receive additional teacher guidance and participate in simplified activities that progressively improve their motor competence.

Home–school collaboration represents another essential component of dynamic intervention. As the family constitutes a primary developmental environment for young children, parental involvement plays a critical role in achieving precision teaching in preschool physical education. During weekends and holidays, teachers can distribute exercise manuals and deliver parent–child physical activity recommendations through mobile applications, thereby increasing parental awareness and support for children's physical education while creating additional opportunities for physical activity at home. For instance, the Tiantian Jump Rope application can recommend age-appropriate parent–child exercise games based on each child's motor competence, encouraging family participation while simultaneously strengthening parent–child relationships and promoting children's motor development.

4.3. Developmental evaluation mechanism

Developmental evaluation serves as the quality assurance component of precision teaching. Its primary objective is to comprehensively and dynamically assess children's growth throughout participation in physical education, thereby providing teachers with evidence to refine instructional practices.

Process-oriented evaluation emphasizes children's day-to-day performance during physical activities. Real-time data collected during exercise—including activity duration and the proportion of time spent at target exercise intensity—serve as key evaluation indicators. Smart wristbands and other wearable devices continuously monitor these parameters, enabling teachers to identify emerging problems during physical activities and make timely instructional adjustments.

Motivational evaluation focuses on children's developmental progress by comparing pre- and post-intervention physical fitness assessments. Such comparisons provide intuitive evidence of children's improvement, motivating them to participate more actively in physical activities while simultaneously offering teachers valuable feedback on instructional effectiveness. In addition, timely reinforcement may be provided

through virtual badges and other digital reward mechanisms. These positive incentives continuously strengthen children's motivation for physical activity and encourage sustained engagement in physical education.

5. Validation of the DID model in practice

5.1. Participants

To evaluate the effectiveness of the Diagnosis–Intervention–Development (DID) model in preschool physical education, this study employed both group-based and case-based intervention designs.

The group study involved 200 senior kindergarten children from a demonstration kindergarten participating in a pilot program. Participants were randomly assigned to an experimental group (n = 100) and a control group (n = 100). Pre-test results showed no statistically significant differences between the two groups in terms of Body Mass Index (BMI), physical fitness assessment outcomes, or developmental performance across curricular domains ($p > 0.05$). The experimental group received physical education based on the DID closed-loop model, whereas the control group continued to receive conventional physical education instruction.

The case study adopted a pre–post intervention design, comparing individual outcomes before and after the implementation of personalized intervention programs.

5.2. Implementation of the DID model

The intervention was conducted from March to May 2025, spanning a total of two months. The study consisted of two complete intervention cycles, each including three sequential stages: motor diagnosis, dynamic intervention, and developmental evaluation. Repeated implementation of the DID cycle not only facilitated children's continuous development but also enabled teachers to refine instructional strategies based on ongoing assessment results.

5.2.1. Group-based comparative study

As preschool physical education primarily evaluates whether children achieve established developmental standards, statistical analyses were conducted using achievement rates rather than continuous scores. Following the intervention, the experimental group outperformed the control group across four outcome indicators: physical fitness qualification rate, motor skill proficiency rate, daily willingness to participate in physical activity, and development in other curricular domains. The findings indicate that the DID closed-loop model positively influenced all four indicators. Statistically significant improvements were observed in physical fitness qualification, motor skill proficiency, and daily participation willingness ($p < 0.05$). Although improvements were also observed in other developmental domains, these differences did not reach statistical significance ($p > 0.05$) (Table 1 and 2).

Table 1. Comparison of outcome indicators

Indicator	Experimental Group (Post-intervention)	Control Group (Conventional Teaching)	Difference
Physical fitness qualification rate	94%	84%	(+10%)
Motor skill proficiency rate	92%	81%	(+11%)
Daily willingness to participate in physical activity	95%	83%	(+12%)
Development in other domains	86%	78%	(+8%)

Table 2. Chi-square test results

Indicator		χ^2	df	p
Physical fitness qualification rate	Pearson χ^2	5.36	1	.0206*
	Valid cases	200		
Motor skill proficiency rate	Pearson χ^2	2.098	1	.0228*
	Valid cases	200		
Daily willingness to participate in physical activity	Pearson χ^2	7.48	1	.0062*
	Valid cases	200		
Development in other domains	Pearson χ^2	2.1680	1	0.1412
	Valid cases	200		

Note: Effective sample size = 200. $p < 0.05$.

5.2.2. Case studies

Case A. Improvement of Dynamic Balance

Motor assessment revealed that Child A exhibited poor dynamic balance. Based on the diagnostic results, an intervention program targeting vestibular function was prescribed, incorporating rotational games, balance-bike training, and stilt-walking games (Table 3). After three months of intervention, the child's single-leg standing time increased from 8 seconds to 27 seconds, indicating a substantial improvement in dynamic balance.

Table 3. Exercise intervention recommendations for Child A (balance enhancement)

Category	Exercise Intervention Recommendations	Preschool Physical Education Recommendations	Integrated Recommendations
Content	Vestibular-function training activities	Various balance-oriented activities	Emphasize vestibular-function development
Format	Kindergarten group games and family interactive games	Primarily game-based activities	Combination of kindergarten group activities and family interaction
Schedule	Any time during the day	Avoid within two hours before bedtime	Avoid within two hours before bedtime
Duration	30–60 minutes per session, three sessions per week	30-minute group instruction	30 minutes per day

Case B. Improvement of Sleep Quality

Child B presented with abnormal sleep characterized by frequent nocturnal awakenings. With all other conditions remaining unchanged, an individualized exercise intervention was implemented according to the recommendations shown in Table 4. After two months of intervention, the frequency of nighttime awakenings decreased significantly, deep sleep duration improved significantly ($p < 0.01$), and the overall sleep quality score showed an improving trend (Table 5).

Table 4. Exercise intervention recommendations for Child B (sleep improvement)

Category	Exercise Intervention Recommendations	Preschool Physical Education Recommendations	Integrated Recommendations
Content	Resistance exercise and moderate-intensity aerobic exercise	Resistance training is not recommended for preschool children	Moderate-intensity aerobic exercise
Format	Individual and group exercise	Primarily game-based activities	Individual and group exercise games
Schedule	Afternoon > Morning > Early morning	9:00–11:00 and 15:00–16:00	15:00–16:00
Duration	55–60 minutes per session, three sessions per week	Approximately 1 hour per day	Approximately 1 hour per day

Table 5. Comparison before and after intervention

Outcome Measure	Sum of Squares	Mean Square	F	p
Number of awakenings × Pre/Post intervention	19.732	19.732	6.346	.007*
Deep sleep × Pre/Post intervention	21757.502	21757.502	10.439	.001*
Sleep quality score × Pre/Post intervention	72.823	72.823	3.252	.064

These case studies further demonstrate the effectiveness of the Diagnosis–Intervention–Development (DID) closed-loop model in individualized intervention. By identifying children's specific developmental characteristics through systematic diagnosis and implementing evidence-based, personalized intervention strategies, the model effectively promotes improvements in children's motor competence and related developmental outcomes.

6. Conclusion

6.1. Data protection and scalability

As digital intelligent technologies become increasingly integrated into preschool physical education, the protection of children's data privacy has emerged as a critical ethical consideration. Throughout data collection, storage, and application, rigorous anonymization procedures must be established to ensure that children's personal information remains secure and confidential.

The present study adopted a lightweight technological solution, incorporating readily available motion analysis software, free mobile applications, and standard wearable activity trackers. Nevertheless, disparities in the availability of intelligent devices between urban and rural areas may influence the large-scale implementation of the proposed model. Kindergartens and families in urban settings generally have greater access to digital technologies, whereas economic and resource constraints often limit the adoption of such devices in rural regions. Future research should therefore further optimize lightweight technological solutions to reduce equipment costs and enhance the scalability and accessibility of the DID model across diverse educational settings.

6.2. Toward a new ecosystem of digitally intelligent preschool physical education

Through its closed-loop process of precise diagnosis, dynamic intervention, and developmental tracking, the Diagnosis–Intervention–Development (DID) model successfully integrates the principles of individualized instruction and holistic child development advocated by the holistic physical education paradigm. Empirical evidence demonstrates that the model significantly improves children's physical fitness, motor competence, and participation in physical activity, thereby providing a practical paradigm for the digital transformation of preschool physical education. Within the emerging ecosystem of digitally intelligent preschool physical education, the advantages of digital technologies should be fully leveraged to optimize curriculum design and enhance instructional quality. Meanwhile, families should be encouraged to play a more active role in supporting children's physical development, while community sports resources should be systematically integrated to provide additional opportunities and platforms for physical activity in both kindergarten and home environments. Future research should further investigate the deep integration of digital intelligent technologies with preschool physical education and early childhood education, exploring innovative instructional approaches that enrich children's learning experiences. For example, Virtual Reality (VR) and Augmented Reality (AR) technologies have the potential to create more immersive physical activity environments that enhance children's engagement and learning. Through continuous innovation and interdisciplinary collaboration, digitally intelligent technologies can further advance preschool physical education within the holistic physical education paradigm, establishing a solid foundation for children's healthy growth and providing sustained support for lifelong participation in physical activity.

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References

[1] Li, B. (2013, September 1). Xi Jinping meets representatives of national advanced sports organizations and outstanding individuals. *People's Daily*, p. 1.

[2] Locke, J. (2006). *Some thoughts concerning education* (R. Fu, Trans.). People's Education Press. (Original work published 1693)

[3] Hu, C., & Xiong, L. (2021). Strategies for constructing the "broad concept of physical education" for young children based on Locke's philosophy of physical education. *Education Observation, 10*(4), 21–23.

[4] Yang, Y. (2021, April 28). Constructing a high-quality national fitness service system based on the "broad concept of physical education." *People's Political Consultative Conference Daily Online*. Retrieved August 20, 2024, from https://www.rmzxw.com.cn/c/2021-04-28/2842922.shtml

[5] Gegentuya. (2025). Current status, challenges, and countermeasures for conducting physical activities in kindergartens. In *Proceedings of the Fourth Academic Symposium on Innovation and Development in Educational Information Technology* (pp. 128–137). Lifelong Learning Committee of the China University School-Run Industry Association.

[6] Ren, F., & Yao, L. (2024). Examining issues and strategies in preschool physical education activities from a child-centered perspective. In China Sport Science Society (Ed.), *Proceedings of the Ninth China Sports Doctoral Forum* (pp. 293–294). Beijing Sport University.

[7] Xia, Q., & Pan, M. (2024). Digital intelligence technologies empowering scientific physical activity for young children: Conceptual connotations, value, challenges, and practical pathways. In China Sport Science Society & National Youth Sports Federation (Eds.), *Proceedings of the Second National Conference on Preschool Physical Education Research* (pp. 20–21). Shanghai University of Sport.

[8] Dai, H., & Gu, Y. (2024). High-quality development of preschool physical education in China under the strategy of building a leading sports nation. *Sports Culture Guide*, (3), 40–45.

[9] Huo, L. (2013). Major perspectives of developmentally appropriate practice and their implications. *Fujian Education*, (Special Issue 3), 46–49.