

Effects of Traditional Games on Balance in Children and Adolescents: A Systematic Literature Review

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Submitted : 2026-09-15; Accepted : 2026-09-28; Published : 2026-10-01

ABSTRACT

Introduction: Traditional games are a form of culturally-based physical activity with the potential to support the development of motor skills, including balance, in children and adolescents. This study aims to analyse the scientific evidence regarding the effects of traditional games on balance ability, identify the characteristics of the interventions used, and examine the measurement methods and outcomes reported in previous research. **Methods:** This study employed a systematic literature review approach based on the PRISMA guidelines. A literature search was conducted using the Scopus, Web of Science, PubMed, Google Scholar, and other relevant scientific databases, employing keywords related to traditional games, balance, postural control, children, and adolescents. Priority was given to publications from 2021 to 2026 that discussed physical activity-based traditional games involving measurements of balance or related motor skills. A total of 14 articles met the inclusion criteria and were analysed narratively. **Results:** The results of the review indicate that traditional games involving movement patterns such as single-leg jumps, changes of direction, landings, shifts in centre of mass, and body control on a limited support surface are reported to have the potential to support balance, particularly dynamic balance. Games such as engklek, egrang, and traditional games based on plyometric activities showed relatively consistent results across several studies. However, variations in participant characteristics, game types, intervention duration, study design, and measurement instruments led to heterogeneity in the findings; therefore, the results must be interpreted with caution. **Conclusion:** Overall, traditional games have the potential to serve as a contextual, easily implementable and enjoyable physical activity strategy to support the development of postural control and motor skills in children and adolescents. Further experimental research with more standardised designs is still required to strengthen the evidence regarding their effectiveness on balance.

Keywords: *traditional games, balance, children, adolescents, postural control.*

ISSN 2722 – 9610
E –ISSN 2722 - 9629

INTRODUCTION

Traditional games are a form of intangible cultural heritage that reflect the values, patterns of social interaction, movement characteristics, and collective identity of the communities in which they have developed. Unlike modern sports, which have undergone standardisation, traditional games are generally passed down from generation to generation and have rules, equipment, and activity patterns adapted to the local cultural context (Adi et al., 2022). From an educational perspective, traditional games not only serve as a means of cultural preservation but can also be utilised as a medium for meaningful physical

activity for children and young people (Utami, 2021). Traditional games involve interaction with space, objects, peers, and dynamic movement situations, thereby having the potential to support the development of physical and motor skills in the younger age group (Luchoro-Parrilla et al., 2021). Furthermore, children's engagement in traditional games can also strengthen cultural identification and the transmission of social values through direct and contextual play experiences (García-Monge et al., 2021).

Play-based physical activity plays a vital role during childhood and adolescence, as this period is characterised by various changes in



neuromuscular control, physical competence and the maturation of motor skills. Play-based activities are considered relevant as they integrate physical demands with elements of enjoyment, social interaction and active engagement (Wulandini et al., 2022) . A systematic review and meta-analysis demonstrated that play-based physical education programmes can significantly increase levels of enjoyment among children and adolescents, which in turn has the potential to support sustained participation in physical activity (Mo et al., 2024) . Other findings also indicate that interventions using sports games can improve fundamental motor skills in children, particularly when implemented in a structured and repetitive manner over a specific period (Sun & Chen, 2024) . Therefore, games provide a learning context that allows children to practise basic movement patterns repeatedly without diminishing their engagement and motivation during the learning process.

One key component of motor competence is balance, defined as an individual's ability to maintain or regain control over the body's centre of mass in relation to the support surface (Malambo et al., 2022) . Generally, balance can be categorised into static balance and dynamic balance. Static balance relates to the ability to maintain a relatively stationary body position , whilst dynamic balance is the ability to maintain bodily stability whilst moving, changing position, or responding to changes in the environment (Meliniawati et al., 2023) . Stability, including static and dynamic balance, is a fundamental component that underpins the execution of various motor skills such as running, jumping, landing, catching and changing direction (Fitton Davies et al., 2024) . Consequently, limitations in balance ability during childhood may affect the effectiveness of mastering and performing more complex motor skills.

The importance of balance is also evident from its link to overall motor competence. The findings of the study ' report that postural balance under various sensory manipulation conditions is associated with both gross and fine motor skills in children aged five to six years. The findings of this study indicate that postural balance contributes to variations in gross motor skills; consequently, balance cannot be viewed merely

as a standalone physical ability, but rather as an integral part of a child's motor development. However, measuring balance in paediatric populations remains a methodological challenge. According to , in their systematic review, indicate that there is a wide variety of assessment instruments for postural control in children and, to date, no single instrument has been universally accepted as the primary standard. This diversity has the potential to cause variations in results across studies and underscores the importance of clearly distinguishing between static balance, dynamic balance, and functional postural control (Maulida et al., 2024) .

The development of balance does not cease in childhood but continues to change throughout adolescence. Adolescence is characterised by rapid physical growth, changes in body proportions, maturation of the sensory system, and neuromuscular adaptations that may influence postural control abilities. According to , postural control in early adolescence is influenced by gender, task difficulty, and the availability of visual information. When visual input is removed, postural instability increases, indicating that balance ability during adolescence remains highly dependent on the integration of sensory information and neuromuscular control (Purbasari et al., 2024) . These findings are significant because the majority of research on motor development still focuses predominantly on pre-school and primary school-aged children, whilst balance abilities continue to develop and adapt into adolescence. Therefore, a discussion encompassing both children and adolescents is necessary to gain a more comprehensive understanding of the influence of physical activity on the development of balance across various age stages.

Traditional games possess characteristics that are, in theory, highly relevant to stimulating balance skills. Various forms of traditional games involve activities such as standing on one leg, jumping, landing, changing direction rapidly, walking on a limited or unstable support surface, avoiding opponents, and manipulating objects whilst moving. These activities constantly require individuals to adjust the position of their centre of mass relative to their base of support. The internal structure of traditional games also frequently



exposes players to spatial conditions, motor interactions, and dynamically changing movement situations (Fitton Davies et al., 2024) . From a motor learning perspective, this variety of movement can provide repeated stimuli for children and adolescents to make postural adjustments in response to environmental demands. These characteristics distinguish traditional games from conventional exercises, which tend to be repetitive and isolated, as improvements in balance ability can occur within the context of activities that are more enjoyable, culturally meaningful and functional.

Recent empirical evidence also suggests that a play-based approach has the potential to enhance stability skills. Fitton Davies et al., (2024) , for example, found that a play-based stability skills intervention was able to improve stability and fundamental motor skills in young children. These findings indicate that the development of balance does not always have to be achieved through conventional exercises, but can be integrated into play activities. Furthermore, a meta-analysis conducted by Barnett et al., (2022) demonstrated a positive effect of play-based interventions on children's fundamental motor skills. The current literature still predominantly examines general outcomes, such as fundamental motor competence, locomotor ability, physical fitness, physical activity, and levels of enjoyment. Studies that specifically focus on balance as the primary outcome in traditional play interventions—particularly those distinguishing between static and dynamic balance and covering a population ranging from children to adolescents—remain relatively limited.

In addition to the limited number of studies, methodological heterogeneity is also a significant issue in research on traditional games and balance. Traditional games exhibit a wide variety of characteristics in terms of movement patterns, game rules, types of equipment, activity intensity, frequency of play, duration of intervention, and cultural background. On the other hand, balance measurement also utilises a variety of instruments and indicators that can represent static balance, dynamic balance, functional postural control , or a combination of several aspects of motor performance. This

diversity has meant that there are as yet no consistent conclusions regarding which types of traditional games are most effective in improving balance, nor whether these effects differ according to the participants' age. This is all the more important given that postural control abilities undergo changes throughout the process of growth and maturation (Manninen et al., 2025) , whilst each balance measurement instrument may represent different components of postural control (García-Monge et al., 2021) .

Based on the findings of previous studies outlined above, although evidence regarding the benefits of physical activity-based games on motor development is growing, the specific contribution of traditional games to balance ability remains unclear. Most previous studies have primarily evaluated general motor outcomes such as *fundamental movement skills*, locomotor ability, physical fitness, or overall motor competence, whilst balance—as a specific component of postural control—has not yet been analysed separately to any great extent. Furthermore, the available research still shows variation in game characteristics, age groups, intervention duration, and the measurement instruments used, making it difficult to determine which movement patterns in traditional games contribute most to the development of both static and dynamic balance. Given these gaps, a systematic review is required that specifically evaluates the relationship between traditional games and balance ability in children and adolescents. This review is designed to answer the following research questions: (1) how do traditional games influence balance ability in children and adolescents?; (2) which game characteristics and movement patterns are associated with changes in balance ability?; and (3) how do traditional games influence static balance compared to dynamic balance?

Given these circumstances, a scientific synthesis is required that specifically focuses on the effects of traditional games on balance. Although various traditional game activities and play-based approaches have been extensively studied in relation to cultural, educational, fitness and motor development benefits, evidence regarding their specific impact on static and dynamic balance in children and adolescents has



not yet been comprehensively integrated. Therefore, this study aims to analyse the influence of traditional games on balance in children and adolescents, identify the types and characteristics of the traditional games used, examine the balance measurement methods applied, and synthesise the effects of interventions on static and dynamic balance across various age groups. It is hoped that the findings of this study will provide a scientific basis regarding the potential of traditional games as a culturally contextual, enjoyable, easily implementable and relevant strategy to support the development of postural control and motor skills in children and adolescents.

METHODS

Research Design and Literature Search Strategy

This study employs a systematic literature review approach, structured in accordance with the 2020 PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Page et al., 2021). The aim of this review is to identify, evaluate and synthesise scientific evidence regarding the effects of traditional games on balance ability in children and adolescents. The review focuses on the characteristics of the traditional games used, the type of intervention, participant characteristics, methods of balance measurement, and findings relating to static balance, dynamic balance and postural control.

A systematic literature search was conducted across several scientific databases, namely Scopus, Web of Science, PubMed, and Google Scholar. The search was carried out on [insert date of last search], limiting the articles to those published primarily between 2021 and 2026. The search strategy was developed using a combination of keywords covering three main components: type of intervention, population, and research outcomes. The keywords used included (*traditional games OR traditional sporting games OR folk games OR indigenous games OR cultural games*) AND (*children OR adolescents*) AND (*balance OR static balance OR dynamic balance OR postural balance OR postural control OR postural stability*). In addition to English terms, supplementary searches were also conducted using Indonesian terms such as ‘permainan

tradisional’, ‘permainan rakyat’, ‘anak’, ‘remaja’, ‘keseimbangan statis’, ‘keseimbangan dinamis’ and ‘kontrol postural’ to identify relevant national articles.

Article Selection Criteria

Article selection was based on inclusion and exclusion criteria established prior to the literature search. Articles were included in the review if they met several criteria, namely: (1) the study involved a population of children and/or adolescents; (2) the intervention consisted of traditional games or culturally-based games involving physical activity; (3) the study evaluated balance ability, body stability, postural control, or motor skills related to balance; (4) the study utilised an experimental, quasi-experimental, randomised controlled trial, or intervention study design; and (5) the article was available in English or Indonesian.

Meanwhile, articles were excluded if they met the exclusion criteria, namely: (1) studies involving adult or elderly populations; (2) studies that only discuss cultural, social, psychological, or cognitive aspects without linking them to motor skills and balance; (3) studies on digital games, exergames, or modern gaming activities that do not possess the characteristics of traditional games; and (4) articles in the form of editorials, commentaries, case reports, or literature reviews.

Article Selection and Screening Process

The process of identifying and selecting articles followed the PRISMA flowchart as shown in Figure 1. All articles retrieved from the databases were merged and subjected to an initial check to eliminate duplicates. Subsequently, articles were selected through two stages: the first stage involved screening based on the title and abstract (title and abstract screening), followed by a full-text evaluation (full-text screening) based on compliance with the inclusion and exclusion criteria.

The article selection process was carried out independently by two reviewers. Each reviewer assessed the eligibility of the articles based on the established criteria. Where discrepancies arose between the two reviewers’ decisions, these were resolved through discussion



until a consensus was reached. If the discrepancy remained unresolved, the final decision was determined with the involvement of a third reviewer. Articles that met all the criteria were

then included in the data extraction and synthesis of research findings stage.

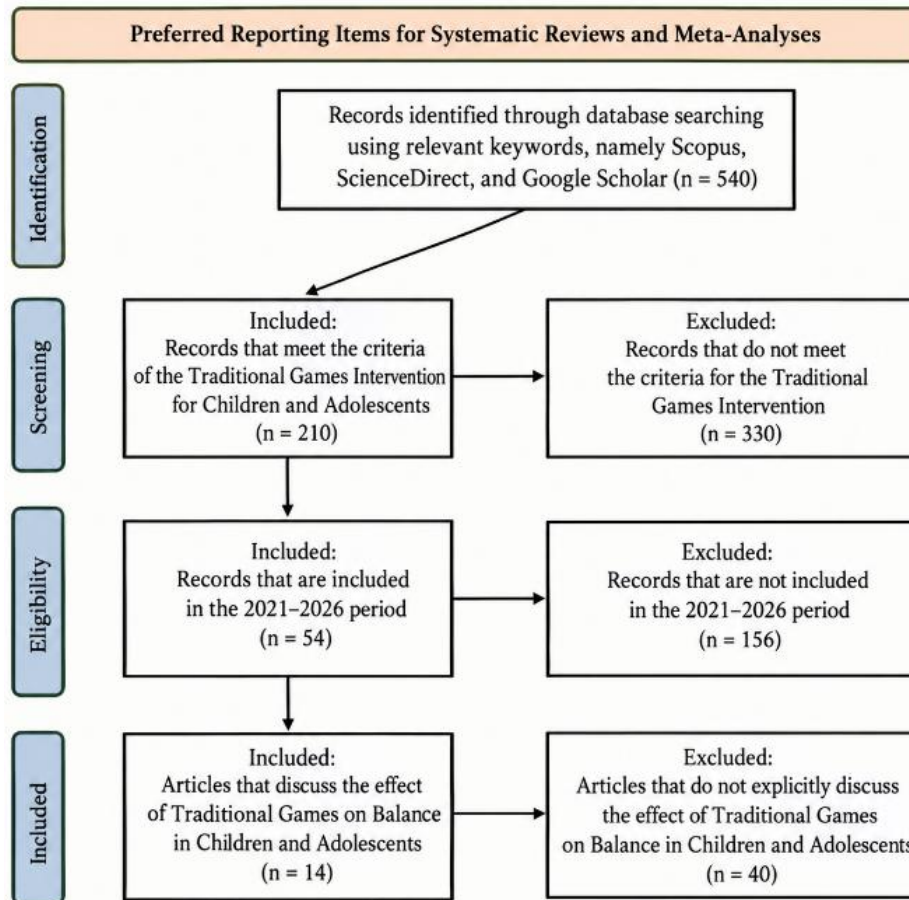


Figure 1. PRISMA Analysis

Assessment of Methodological Quality and Risk of Bias

An assessment of methodological quality is carried out on articles that have passed the final selection stage to evaluate the strengths and limitations of the research evidence. The assessment takes several aspects into account, including the clarity of the study design, the characteristics and number of participants, the methods used to implement the intervention, the duration and frequency of traditional games, the validity of the balance measurement instruments, the clarity of the research procedures, and the consistency of the reported results.

In addition, the risk of research bias was also considered based on potential weaknesses in the study design, such as the sampling method, the presence of a control group, the outcome measurement process, and the completeness of the results reporting. The results of the methodological quality assessment were used as a basis for interpreting the strength of the findings from each analysed article.

Data Extraction and Synthesis of Results

Articles meeting the selection criteria were subsequently analysed through a systematic data extraction process. The information collected included authors and year of publication, study

location, participant characteristics, type of traditional game, form of intervention, duration and frequency of implementation, balance measurement instruments, and the main study outcomes.

The research data were then organised into a table of study characteristics to facilitate the synthesis process. Given the considerable variation between studies—in terms of game type, participant age, study design, intervention duration and measurement instruments—the findings were analysed using a narrative synthesis approach. The analysis focused on identifying patterns of findings regarding the potential of traditional games for static balance, dynamic balance and postural control, as well as evaluating factors that may influence intervention outcomes, such as the movement characteristics of the games, participants' age, frequency of practice, duration of the intervention and methods of balance measurement.

RESULTS

Based on the analysis in Table 1, of the identified studies, only a few evaluated balance as *the primary outcome* using specific measurement instruments (*direct balance outcome*), whilst the others assessed general motor skills (*general motor outcome*) which are related to the development of postural control. Studies that measured balance directly showed a positive trend towards improved balance ability, particularly dynamic balance. Racil et al. (2026), using a *randomised controlled trial* design, reported that an 8-week intervention involving traditional plyometric-based games improved *static balance* and several components of *dynamic balance*, as measured using *the Stork Balance Test* and *the Y-Balance Test*. Similar findings were reported in studies by Charles et al. (2017), Pradani et al. (2026) and Kurniawan et al. (2026), which demonstrated that games involving movements such as single-leg jumps, shifts in centre of mass and maintaining body stability whilst moving have the potential to improve *dynamic balance*, as measured by *the Modified*

Bass Test of Dynamic Balance and *the Balance Beam Test*.

The analysis also found that the majority of studies in this review evaluated broader motor outcomes, such as *fundamental motor skills*, *gross motor competence*, *physical competence*, coordination, and locomotor ability; consequently, these cannot be interpreted as direct evidence of improved balance. Studies by Hussain and Cheong (2022), Akbari et al. (2021), and Çınar and Hassani (2026) indicate that traditional games can improve basic motor skills, such as *hopping*, *leaping*, *jumping*, *locomotor skills*, and physical competence. Although these outcomes have a biomechanical relationship with postural control, their effect on balance remains indirect as they do not utilise specific balance instruments. Conversely, research by Fernández-Sánchez et al. (2025) suggests that traditional games programmes combined with HIIT do not always result in significant improvements in *gross motor competence*, indicating that the effectiveness of the intervention may be influenced by the characteristics of the games, the structure of the training, and the suitability of the motor stimuli for the targeted outcomes.

The findings of the review indicate that traditional games have the potential to serve as physical activities that support the development of balance skills, particularly when the games involve postural control demands such as standing on one leg, jumping, landing, changing direction, and stabilising the body whilst moving. However, the strength of the evidence remains limited as only four studies directly measured balance, whilst the majority of studies focused on general motor skills. Furthermore, variations in study design, participant characteristics, types of games, duration of intervention, and measurement instruments have led to heterogeneity across studies. Therefore, experimental research with a more standardised design and the use of valid balance instruments is required to clarify the effectiveness of traditional games on both static and dynamic balance in children and adolescents.



Table 1. Analysis Results

No.	Author & Year	Research Design	Type of Game/ Intervention	Subjects	Outcomes Assessed	Outcome Categories	Key Findings	Analysis of Balance	Study Quality
1	(Racil et al., 2026)	Randomised Controlled Trial	<i>Traditional game-based plyometric and flexibility exercises</i>	42 female rhythmic gymnasts, average age 13.7 years	Stork Balance Test and Y-Balance Test	Direct balance outcome	An 8-week intervention improved <i>static balance</i> and several components of the Y-Balance Test, particularly in the plyometric games group.	Provides direct evidence that traditional games incorporating plyometric elements (jumping, landing, body control) have the potential to improve static and dynamic balance in adolescents.	High (RCT with specific balance instruments)
2	(Charles et al., 2017)	Intervention study	Traditional Malaysian games: <i>Galah Panjang</i> , <i>Buat Rumah Batu</i> , <i>Tok Harimau</i> , and <i>Tor Duduk</i>	40 children aged 12–13 years	Modified Bass Test for Dynamic Balance, agility, speed, reaction time	Direct balance outcome	A 60-minute programme, three times a week for eight weeks, improved motor performance, including balance. ' <i>Buat Rumah Batu</i> ', with its single-leg jumping activities, made a significant contribution.	Directly supports the impact of traditional games on dynamic balance as it utilises a specific balance instrument.	Moderate (intervention, but limited design information)
3	(Hussain & Cheong, 2022)	Intervention study	<i>Traditional Cultural Games/Pittu-Garam</i>	103 Pakistani children aged 7–10 years	TGMD-2 (<i>locomotor and object-control skills</i>)	General motor outcome	Traditional games incorporating <i>contextual interference</i> enhance gross motor skills. Hopping, leaping and jumping movements are the main components.	Balance is not measured directly. However, the movement patterns place demands on postural control, making an indirect supporting indicator.	Moderate
4	(Hussain & Cheong, 2022)	Intervention study	Chindro and Pittu-Garam	102 children aged 7–10 years	TGMD-2: hop, leap, jump, catch, throw, roll	General motor outcome	Eighteen sessions over 6 weeks significantly improved gross motor skills.	Improvements in hopping and jumping support the development of body control, but cannot be interpreted as an improvement in balance as no balance instruments were used.	Moderate
5	(Çinar & Hassani, 2026)	Intervention study	Culturally-based traditional games programme	60 pupils aged 11–12 years	Physical competence within <i>physical literacy</i>	General motor outcome	An 8-week intervention improved all	Provides evidence of improved physical competence, but the	Moderate



No.	Author & Year	Research Design	Type of Game/ Intervention	Subjects	Outcomes Assessed	Outcome Categories	Key Findings	Analysis of Balance	Study Quality
6	(Fernández-Sánchez et al., 2025)	Cluster-randomised trial	<i>Traditional/playground games</i> adapted into HIIT	562 pupils aged 9–11 years	MABC-2 and <i>gross motor competence</i>	General motor outcome	dimensions of <i>physical literacy</i> ($p < 0.001$). The programme did not show a significant improvement in <i>gross motor competence</i> after adjusting for covariates.	relationship with balance is indirect. This suggests that traditional-based games do not always result in motor changes if the exercise characteristics do not specifically target balance.	High (large sample size and controlled design)
7	(Martínez-Vizcaino et al., 2022)	Cluster-randomised trial	MOVI-daFit!: HIIT based on <i>playground/traditional games</i>	562 children aged 9–11 years	Physical fitness, jumping performance, cardiometabolic fitness	General motor outcome	Effects on fitness varied; there was an improvement in the <i>standing long jump</i> among boys.	The outcome relates to explosive ability, not balance. The relevance to balance is only through the relationship between lower-body strength and movement control.	Height
8	(Hawani et al., 2023)	Comparative intervention study	<i>Traditional motor games</i> compared with football and shot put	28 overweight boys, average age 12.11 years	Motor activity and enjoyment	General motor outcome	The children demonstrated a positive affective response to traditional games.	No balance measurements were taken. The study supports the aspect of engagement in physical activity that can facilitate the implementation of motor skills training.	Moderate
9	(Akbari et al., 2021)	Intervention study	Traditional Iranian games programme	40 boys aged 7–9 years	TGMD-2: locomotor, object control, total FMS	General motor outcome	After 24 sessions, the traditional games group showed improvements in total FMS ($p < 0.001$), locomotor skills ($p = 0.002$) and object control ($p = 0.002$).	Improvements in motor skills support motor development, but do not provide direct evidence of improved balance.	Moderate
10	(Trajkovik et al., 2021)	Intervention study	Six traditional games, including <i>hopscotch</i>	102 pupils from 5 primary schools	Learning performance and movement-based engagement	General outcome	The integration of traditional games improves <i>learning outcomes</i> , interest and pupil interaction.	It does not specifically measure balance or motor skills, so its contribution to balance is limited.	Moderate
11	(Sunanto, 2024)	Literature review	Pittu Garam, Gobak Sodor, Engklek, sack race, stilts	Primary school-aged children	Gross/fine motor development	General motor outcome	The review indicates that traditional games support motor development; engklek	The evidence is secondary and does not provide direct measurements of balance.	Low to moderate



No.	Author & Year	Research Design	Type of Game/ Intervention	Subjects	Outcomes Assessed	Outcome Categories	Key Findings	Analysis of Balance	Study Quality
12	(Sari et al., 2025)	Intervention study	Traditional game 'Bentengan'	Pre-school children	Gross and fine motor coordination and concepts of force, motion and balance	General motor outcome	supports both gross and fine motor skills. Bentengan supports motor coordination and the learning of concepts of movement and balance.	Balance is not measured using a specific instrument and therefore serves only as conceptual evidence.	Moderate
13	(Pradani et al., 2026)	Quasi-experimental study	Engklek and coconut shell stilts	41 children aged 9–10	Balance Beam Test (<i>dynamic balance</i>)	Direct balance outcome	Both games significantly improved dynamic balance ($p < 0.05$). There was no difference in effectiveness between the games ($p = 0.416$).	This provides direct evidence that games involving single-leg jumps and body control support dynamic balance.	Moderate
14	(Kurniawan et al., 2026)	Quasi-experimental study	Bamboo stilts	32 Year 5 primary school pupils	Modified Bass Test of Dynamic Balance	Direct balance outcome	The dynamic balance score increased from 20.13 ± 4.16 to 25.84 ± 5.31 ($p < 0.001$).	This provides direct evidence that activities involving the use of egrang improve dynamic postural control through the demands placed on body stabilisation.	Moderate



DISCUSSION

The Effect of Traditional Games on Static and Dynamic Balance in Children and Adolescents

Based on the analysis of the selected articles, traditional games generally demonstrate positive potential in improving balance in children and adolescents, particularly in games involving movements such as standing on one leg, jumping, landing, walking on a limited support surface, changing direction, and maintaining body position whilst moving. These findings were evident in plyometric-based traditional game interventions, which resulted in improvements in *static balance* and several components of *dynamic balance* among adolescents. Consistent results were also found in traditional Malaysian games, particularly those involving frequent single-leg jumps, which contributed to improved dynamic balance. Among primary school-aged children, the games ‘engklek’, ‘egrang batok kelapa’ and ‘egrang bambu’ also demonstrated positive effects on dynamic balance. In particular, ‘engklek’ and ‘egrang batok’ in children aged 9–10 years produced a significant improvement in *dynamic balance*, whilst the ‘egrang bambu’ intervention increased the *Modified Bass Test of Dynamic Balance* score from 20.13 ± 4.16 to 25.84 ± 5.31 . These findings suggest that the effect of traditional games on balance is likely not determined solely by the games’ status as cultural activities, but primarily by the characteristics of the motor demands inherent in the games themselves.

From a physiological and biomechanical perspective, games that reduce the base of support—such as standing or jumping on one leg—increase the demands placed on the body’s ability to maintain the centre of mass within the limits of *the base of support*. This condition requires continuous coordination between visual, vestibular and somatosensory information, as well as neuromuscular activity in the lower limbs. This interpretation is consistent with the study involving 112 children aged 5–6 years, which found that postural balance under conditions of sensory manipulation contributed approximately 10 per cent to the variation in gross motor ability and approximately 14 per cent to the overall motor score. Standing on a foam surface with

eyes open was even found to be a significant predictor of gross motor ability (Kurniawan et al., 2026). This suggests that as stability demands increase, children must integrate sensory information more effectively to maintain body control.

Although these biomechanical mechanisms can theoretically explain how traditional games may influence balance, it should be emphasised that the majority of studies in this review do not directly evaluate changes in physiological or neuromuscular adaptations. The primary evidence available stems mainly from changes in balance performance scores measured using instruments such as *the Stork Balance Test*, *the Y-Balance Test*, *the Modified Bass Test of Dynamic Balance*, and *the Balance Beam Test*. Therefore, the involvement of the proprioceptive, vestibular and neuromuscular systems in improving balance should be understood as mechanisms that enable adaptation based on movement characteristics, rather than as mechanisms that have been directly proven by all the studies analysed.

These findings are also consistent with those of Fitton Davies et al. (2024), who state that stability skills, including static and dynamic balance, are foundational abilities that underpin the development of other motor skills such as jumping and catching. In that study, a 12-week play-based intervention with children aged 4–5 years resulted in significant improvements in stability skills ($p < 0.001$), *fundamental movement skills*, perceived motor competence, and cognitive abilities compared to the control group. These findings reinforce the results of this study, which suggest that traditional games incorporating stability challenges can be used as stimuli for balance training, as the activities are performed repeatedly within a context of meaningful movement, rather than solely through static and isolated balance exercises (Lavega-Burgués et al., 2021).

It should be noted that supporting research findings on *active play*, stability skills and motor development provide a conceptual basis for understanding the relationship between play and motor control, but do not all share the same intervention characteristics as the traditional



games in this study. Consequently, this supporting literature is used to reinforce the interpretation of movement mechanisms, whilst conclusions regarding the influence of traditional play on balance are primarily based on studies employing direct balance measurements. This approach is important to avoid over-interpretation, as the majority of the analysed studies still evaluate motor outcomes more broadly rather than balance as the primary outcome.

The more pronounced effect on dynamic balance observed in the articles reviewed can also be explained by the characteristics of the majority of traditional games. Engklek, egrang, Pittu-Garam, Chindro, as well as chasing and jumping games, are predominantly played whilst the body is in motion. Children must re-adjust their centre of mass every time they jump, land, accelerate, decelerate or change direction. Therefore, the characteristics of traditional games involving continuous body movement are likely to provide more opportunities to train dynamic balance components than static balance. However, this interpretation must be made with caution, as the majority of studies do not directly compare changes in these two domains of balance. These findings are consistent with the results of a study by Hussain & Cheong (2022), which showed that traditional games involving *hopping*, *leaping* and *jumping* can improve children's gross motor skills, whilst Cheong and Hussain also reported improved motor abilities following an 18-session programme of Chindro and Pittu-Garam. Therefore, improvements in dynamic balance can be understood as a consequence of repeated exposure to motor tasks that require stabilisation before, during, and after body movement.

The Relationship between Balance and Motor Competence and the Developmental Stages of Children and Adolescents

Based on the results of the synthesis, the benefits of traditional games are demonstrated not only through direct improvements in balance scores but also through improvements in motor components related to the ability to maintain bodily stability. A number of studies in this review used *gross motor skills*, *locomotor skills*,

physical competence, *hopping*, *jumping* and *object control* as outcomes. This is important because balance is not a skill that functions in isolation, but rather forms one of the foundations for the execution of more complex motor skills. When a child *hops*, for example, the body must maintain balance on one leg before pushing off, control body position during the flight phase, and regain stability upon landing (Khodaverdi et al., 2022). Activities such as running, throwing, catching, and changing direction require the ability to continuously adjust the centre of mass in response to changes in the base of support.

This interpretation is consistent with the findings of Sun and Chen (2024) in *their systematic review* and meta-analysis of sports-based game interventions involving 1,701 children aged 3–12 years. The study demonstrated that game-based interventions have a positive effect on *fundamental motor skills*. These findings suggest that a game-based context facilitates repetitive practice of motor skills whilst providing a variety of movement tasks. Consistent results were found in *a systematic review* by Zhang et al., (2025) on *active play interventions*, which showed that play activities have the potential to improve fundamental motor skills in children. In that review, the characteristics of *active play*—being relatively easy to implement, providing freedom of movement, and allowing exploration of various movement patterns—were considered key factors supporting motor development.

The relationship between play, motor competence and balance. Previous research has found that motor competence interventions in children and adolescents have, for the most part, yielded positive effects both in the short term and in terms of retention (Khodaverdi et al., 2022). However, this research also highlights significant variation in the components of the interventions and the methods used to assess motor competence. This is relevant to current research on traditional games because activities such as engklek or egrang actually train more than one motor component. These games combine stability, lower limb strength, bilateral coordination, locomotor control, and the ability to adapt the body to environmental demands (Racil



et al., 2026) . Therefore, the improvement in balance found in some studies is likely part of a broader motor adaptation.

These findings are also consistent with Candra et al., (2023) , which identifies motor competence as a key component in the development of children's physical activity and fitness from a longitudinal perspective. This systematic review indicates that motor competence is interrelated with physical activity, fitness, and perceptions of motor ability throughout growth. Therefore, improving balance through traditional games has the potential to have broader implications than merely improving balance test scores. Children with better body control are likely to have a greater capacity to participate in physical activities requiring coordination and complex motor skills. Although this causal relationship still requires more specific longitudinal research, balance can be positioned as a key component of motor competence that supports participation in physical activity.

Stages of development also need to be taken into account when interpreting the study results. The majority of the studies identified involved children aged around 7–12 years, whilst research on adolescents remains relatively limited. Yet, adolescence is a period characterised by rapid changes in height, body segment proportions, body mass, and neuromuscular coordination. Paschaleri et al. (2022) demonstrated that postural control in early adolescence is influenced by maturation, gender, task difficulty, and the availability of visual information. Female adolescents demonstrated better postural control during single-leg tasks at a specific phase prior to *peak height velocity*, which was associated with a greater pattern of co-activation of the tibialis anterior and gastrocnemius muscles (Paschaleri et al., 2022) . Furthermore, the removal of visual information increased *centre-of-pressure* displacement, suggesting that the visual system still plays a crucial role in postural control during this developmental period. These findings explain why the effects of traditional games may differ between children and adolescents. Intervention programmes for adolescents are likely to require more complex balance demands than those for

young children in order to provide adequate adaptive stimuli.

Variations in Intervention Effectiveness, Dose Factors, and Measurement Limitations

Based on the results of the analysis, although the majority of studies show a positive trend, the effectiveness of traditional games is not uniform. One study involving 562 children aged 9–11 years showed that a combination of *traditional and playground games with high-intensity interval training* did not result in a significant improvement in *gross motor competence* after adjusting for covariates. This negative finding is significant as it demonstrates that providing activities labelled as 'games' does not necessarily result in motor changes if the task structure does not specifically direct participants towards the skills to be developed. In other words, the principle of specificity of practice must be taken into account. If the intervention target is balance, then the games must include a sufficient proportion of activities such as *single-leg stances*, stabilisation after landing, changes of direction, reduction of the base of support, or shifts in the centre of mass.

This interpretation aligns with the ' ', who, through a *systematic review and multilevel meta-analysis* of 28 studies involving approximately 1,600 participants, found that game-based approaches generally have a positive effect on motor skill performance in skill tests (*Hedges's g* = 0.36). However, these effects are heterogeneous. The experience of those delivering the intervention, the methodological quality of the studies, and the characteristics of the control conditions were found to contribute to the variation in results. Therefore, the effectiveness of traditional games cannot be assessed solely on the basis of the type of game, but must take into account how the game is organised, the intensity of participant engagement, the frequency of movement repetition, and the quality of the instruction provided.

The duration and frequency of the intervention also appear to be important factors. Articles demonstrating improvements in balance generally utilised programmes carried out



repeatedly over several weeks, for example 6–8 weeks. This suggests the possibility of a dose-response effect. This is consistent with the research by Mo et al. (2024) through a *systematic review* and meta-analysis on play-based physical education for children and adolescents. The study found that play-based interventions significantly increased *enjoyment*, with outcomes influenced by age, frequency, the duration of each session, and the length of the intervention period. Interventions lasting more than three weeks, with sessions of at least around 30 minutes, and a frequency of one to three times per week demonstrated benefits in terms of participants' positive experiences. Although the primary outcome of the study was not balance, these findings are important because the success of motor interventions requires consistent, participant engagement. Enjoyable activities can improve adherence and maintain the intensity of engagement, thereby providing more opportunities for repetitive movements (Ridho et al., 2026).

Another aspect requiring attention is the heterogeneity of the measurement instruments. In the studies reviewed, balance was measured using *the Stork Balance Test*, *the Y-Balance Test*, *the Balance Beam Test* and *the Modified Bass Test of Dynamic Balance*, whilst other studies utilised the TGMD-2, the MABC-2 or broader measures of motor competence. These differences mean that the research findings cannot be directly compared in their entirety. *The Stork Balance Test* better represents the ability to maintain a static position, whilst *the Y-Balance Test* and *the Modified Bass Test* require shifts in the centre of mass and dynamic postural control. Therefore, an improvement on one instrument cannot always be generalised as an improvement across the entire domain of balance.

In addition to differences in instruments, another limitation in interpreting the results is the variation in study design and the characteristics of the interventions used. Some studies demonstrating improvements in balance utilised games with movement components that are quite specific to body stability, such as single-leg jumps, landings, and the use of balance equipment. Conversely, studies assessing

traditional games more generally often employed broader motor outcomes. This suggests that the benefits of traditional games for balance likely depend not only on the type of game but also on the extent of the postural control demands inherent in the activity.

This issue is consistent with the findings of Johnson et al. (2023), who identified 70 studies and 26 types of postural control tests in paediatric populations. Although approximately 95 per cent of the tests demonstrated good reliability with ICC values >0.70 , evidence regarding inter-instrument validity remains inconsistent, whilst evidence on responsiveness is available for only a small proportion of the instruments. The researchers also emphasised that there is as yet no single instrument that can be considered *the gold standard* for measuring the entire postural control system in children. This explains why comparisons of the effectiveness of various traditional games must be conducted with caution. Consequently, any interpretation of the effectiveness of traditional games on balance must take into account the strength of the available evidence. Studies involving direct balance measurements provide more specific evidence, whilst research focusing on general motor outcomes is better regarded as supporting evidence regarding the potential mechanisms underlying the development of motor skills.

CONCLUSION

Based on the results of a *systematic literature review* of 14 articles, it can be concluded that traditional games show potential in supporting the development of balance skills in children and adolescents, particularly in the aspect of dynamic balance. More specific evidence comes from studies using direct balance measurements, such as *the Stork Balance Test*, *the Y-Balance Test*, *the Modified Bass Test of Dynamic Balance*, and *the Balance Beam Test*, which indicate a tendency towards improved postural control following traditional play interventions. Games characterised by movements such as hopping on one foot, landing, changing direction, maintaining body position, and controlling the centre of mass on a limited



support surface appear to have a stronger association with changes in balance ability.

In addition to their direct effects on balance, traditional games have also been reported to support various motor components related to postural control, such as locomotor ability, coordination, *hopping*, *jumping*, and physical competence. However, the interpretation of the effectiveness of traditional games must be approached with caution, as the majority of studies exhibit variations in research design, participant characteristics, game types, intervention duration, and the measurement instruments used. Consequently, traditional games may be considered a physical activity approach with the potential to support the development of balance and motor skills in children and adolescents; however, stronger evidence is still required through experimental research with more standardised designs and specific balance measurements.

The findings of this study suggest that traditional games may be considered as an alternative form of physical activity in physical education, motor skills development programmes, and promotional activities aimed at supporting the development of postural control in children and adolescents. In practice, the selection of games should take into account movement requirements relevant to balance, such as single-leg activities, changes of direction, landings, shifts in centre of mass, and the ability to maintain body stability whilst moving. From a practical perspective, traditional games have the advantage of being easy to implement, requiring relatively few complex facilities, and being able to integrate physical activity with elements of enjoyment and cultural context. However, programme implementation must take into account the participants' age, level of motor ability, activity intensity, and the developmental goals to be achieved. From a research perspective, further studies are required that specifically take balance as *the primary outcome*, compare various types of traditional games, distinguish between static and dynamic balance, and employ stronger research designs such as *randomised controlled trials* with standardised intervention durations and measurement instruments. Furthermore, research

on adolescent groups still needs to be expanded, as the majority of currently available evidence originates from school-aged children.

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