

An Assessment of Motor Skill Proficiency among Senior High School Students in Physical Education

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Abstract

This study investigates the efficacy of a folk dance intervention, Tinikling in enhancing motor skills, specifically agility, balance, and coordination, among senior high school students. Anchored in Motor Learning Theory and the Health-Related Physical Fitness Model, the research evaluates whether short-term, structured physical activity can produce measurable improvements in skill-related fitness. A quasi-experimental one-group pre-test–post-test design was employed involving 30 students from a private senior high school in Tacloban City, Philippines. The intervention consisted of six one-hour folk dance sessions conducted over two weeks, incorporating dynamic footwork and timed stepping patterns. Standardized field tests were used to assess motor performance: the 10-meter shuttle run (agility), Stork Stand (balance), and Alternate Hand Wall Toss (coordination). A pilot test with 10 students confirmed the reliability of the instruments, with high internal consistency scores ($\alpha = 0.84$ to 0.88). Results from paired samples t-tests indicated statistically significant improvements across all motor domains ($p < .001$), supported by large to very large effect sizes (agility: $d = 1.32$; balance: $d = 1.93$; coordination: $d = 2.78$). These findings provide strong empirical evidence of the intervention's efficacy in improving motor skill performance over a short duration. The results affirm that targeted, rhythmic movement activities can effectively enhance motor control, spatial awareness, and movement precision in adolescents. This study reinforces the importance of implementing structured motor skill interventions in physical education to support foundational movement competence essential for both functional performance and athletic development.

Keywords: Motor skills; agility; balance; coordination; physical education

1. Introduction

Motor skill proficiency, which includes agility, balance, coordination, strength, and reaction time, is fundamental to the physical, cognitive, and social development of children and adolescents (Cadenas-Sanchez, Martinez-Tellez, & Ortega, 2023; Lubans et al., 2021; Shi & Feng, 2022). These skills are essential not only for sports but also for safe, effective daily functioning. Over the years, international and local studies have underscored the role of motor competence in promoting long-term engagement in physical activity and enhancing overall quality of life (Robinson et al., 2015; Del Rosario & Ramos, 2021). Yet, motor skill development is often undervalued in formal education systems, particularly in developing countries where academic performance tends to take precedence over physical literacy (WHO, 2022; Hardman, 2019).

Globally, this issue is acknowledged in Sustainable Development Goal 3 of the United Nations, which promotes good health and well-being by encouraging physical activity, especially among youth (United Nations, 2020). In the Philippines, Republic Act No. 10533, known as the Enhanced Basic Education Act of 2013, mandates the inclusion of physical education in the K to 12 curriculum, highlighting the importance of physical literacy for holistic development (Republic of the Philippines, 2013). In addition, the Department of Education (DepEd) has issued policies that aim to strengthen physical education through differentiated and skill-based programs (DepEd, 2020). However, a gap remains between policy and practice, especially in assessing the measurable impact of physical activities on student motor performance (UNESCO, 2021; Del Rosario & Ramos, 2021).

This study is grounded in Motor Learning Theory and the Health-Related Physical Fitness Model. According to Motor Learning Theory (Schmidt & Lee, 2019), motor skill acquisition follows a cognitive-to-autonomous progression through repeated, structured practice with appropriate feedback. This aligns with the Health-Related Fitness Model American College of Sports Medicine (American College of Sports Medicine, 2020), which positions agility, balance, and coordination as key fitness components influencing an individual's ability to function effectively and avoid injury. These theories support the structured and progressive nature of physical activity programs designed to enhance specific motor competencies.

Despite these theoretical and policy foundations, the specific impact of structured physical activity programs on motor proficiency among Filipino senior high school students remains underexplored. There is a lack of localized, empirical evidence evaluating whether such interventions produce statistically significant improvements in agility, balance, and coordination. This study aims to address this gap by evaluating the impact of a short-term, structured physical activity program on the motor skill performance of senior high school students.

Several challenges hinder the development of motor skills in school settings. One major issue is the limited instructional time and integration of physical education in the curriculum. Although mandated, PE is often minimized in

favor of academic subjects, reducing students' exposure to regular motor training (WHO, 2022; Del Rosario & Ramos, 2021). In addition, teacher preparedness poses a critical challenge. Many PE teachers, both globally and locally, lack professional development in evidence-based strategies that target specific motor skills (Smith et al., 2020). Another recurring challenge is the lack of adequate facilities and equipment—particularly in low-resource schools—which constrains opportunities for sustained, varied practice of fundamental and skill-related movements necessary for motor competence (De Guzman & Florentino, 2020; UNESCO, 2021; WHO, 2022).

Despite these obstacles, schools and educators have adopted pragmatic coping mechanisms to promote motor development. Many implement low-cost, space-efficient activity formats—such as bodyweight agility circuits, balance challenges, and brief classroom movement breaks—that have been shown to improve fundamental motor skills in school settings (Wang, Chen, & Ma, 2020). In resource-limited Philippine contexts, teachers adapt skill objectives through simplified rhythmic movement sequences and structured folk dance elements (e.g., culturally embedded stepping and timing tasks) to cultivate coordination, balance, and agility within constrained spaces (Adolfo et al., 2023; Ripalda & Ripalda, 2022). These adaptive, culturally grounded strategies reflect professional ingenuity in bridging policy–practice gaps while maintaining developmental relevance (UNESCO, 2021; DepEd, 2020).

International and national authorities underscore the importance of strengthening motor skill development in schools. (The World Health Organization, 2022; UNESCO, 2021) emphasizes inclusive, developmentally appropriate, and skill-focused physical education that incorporates culturally relevant, evidence-based practices. In the Philippine context, the K to 12 Physical Education curriculum highlights movement and skill-related fitness competencies and encourages varied, engaging, movement-based tasks (DepEd, 2020). Local empirical work documenting motor proficiency gaps reinforces the need for structured interventions (Del Rosario & Ramos, 2021).

In light of these considerations, this study is both timely and necessary. It responds to the need for localized evidence on how structured, short-term physical activity interventions affect motor performance in adolescents (Del Rosario & Ramos, 2021; Robinson et al., 2015). With minimal cost and logistical requirements, such programs offer scalable solutions to bridge policy–practice gaps in physical education (UNESCO, 2021; WHO, 2022). The findings will inform curriculum design, guide teacher practice, and support policy implementation, especially in contexts with limited resources.

The significance of this study extends to multiple stakeholders. Students stand to benefit through improved physical competence, which is linked to greater confidence, academic performance, and lifelong physical activity (Robinson et al., 2015; Lubans et al., 2021). Teachers will gain access to an evidence-based model for enhancing motor fitness even in constrained environments (Smith et al., 2020). Curriculum developers and school administrators can draw from the findings to inform PE program planning, while policymakers may use the results to reinforce physical literacy as a critical component of youth development (UNESCO, 2021; DepEd, 2020).

This study, therefore, seeks to examine the impact of a short-term Tinikling dance intervention on the motor skill proficiency of senior high school students, focusing on agility, balance, and coordination. The specific objectives are:

1. to assess the baseline levels of agility, balance, and coordination among senior high school students prior to the intervention;
2. to measure the levels of agility, balance, and coordination after the implementation of the program;
3. to determine whether a statistically significant difference exists between pre- and post-intervention scores in agility, balance, and coordination.

2. Methodology

2.1 Research Design

This study employed a quasi-experimental one-group pre-test–post-test design to evaluate the effectiveness of a structured physical activity program in enhancing students' agility, balance, and coordination. Such a design is appropriate in authentic school settings where random assignment or a concurrent control group is impractical due to administrative or ethical constraints (White & Sabarwal, 2014). Measuring the same participants before and after the intervention permits estimation of change associated with program exposure, a common repeated-measures approach in educational and physical activity intervention research (Gay, Mills, & Airasian, 2012; Thomas, Silverman, & Nelson, 2015). A baseline (pre-test) established initial motor performance, and a follow-up (post-test) captured change after the standardized program. Although single-group pre–post designs are susceptible to threats such as maturation and testing effects (Shadish, Cook, & Campbell, 2002), the relatively brief intervention period and uniform administration protocols were employed to minimize these risks and support an objective, data-driven assessment of program impact.

2.2 Research Locale

The study was conducted in a private senior high school located in Tacloban City, Leyte, Philippines. The site was selected due to its accessibility, willingness to collaborate with the researcher, and its commitment to incorporating physical education as part of its holistic curriculum. Tacloban, situated in the Eastern Visayas region, offers a contextually

appropriate setting for implementing school-based physical activity programs and studying their effects within a structured academic environment. The school's existing physical education facilities and administrative support also contributed to its suitability as a research locale.

2.2 Research Respondents

The respondents consisted of 30 senior high school students enrolled in the selected private school. Purposive sampling was employed to identify individuals who met specific inclusion criteria aligned with the objectives of the study. This non-probability sampling technique was appropriate because it enabled the selection of respondents who were physically capable, available for the duration of the intervention, and willing to engage in the program (Etikan, Musa, & Alkassim, 2016). The inclusion criteria were as follows: students must (1) be currently enrolled in the school; (2) have no known medical conditions or physical limitations that could restrict participation in moderate physical activity; (3) have little to no prior experience in the specific physical activity program; (4) be available for all scheduled sessions; and (5) provide informed consent, co-signed by a parent or legal guardian. This careful selection ensured a consistent participant profile suitable for evaluating motor skill development outcomes in a controlled, school-based setting.

2.4 Research Instrument

This study employed standardized field tests to assess three skill-related fitness components: agility (10 m shuttle run), balance (Stork Stand), and coordination (Alternate Hand Wall Toss). A two-week Tinikling folk dance intervention was then implemented to examine pre-post changes in these components. Tinikling requires rapid in-and-out foot placements between moving bamboo poles, lateral and diagonal weight shifts, single-leg support phases, and precise synchronization with rhythmic timing and partner movement—demands that place repeated motor stress on agility, dynamic balance, and coordination (Sanchez et al., 2019). These task characteristics provided the biomechanical and rhythmic rationale for selecting Tinikling as the intervention context for practicing and potentially improving the targeted skill-related fitness components.

At post-intervention (and identically at baseline), three standardized field tests were administered to quantify the targeted skill-related fitness components: the 10-m shuttle run for agility, the Stork Stand test for static balance, and the Alternate Hand Wall Toss test for hand-eye / bilateral coordination. These tests were selected because they are widely used in school-based physical fitness batteries, have published normative data for adolescents, and demonstrate acceptable reliability and criterion or construct validity in youth populations (Council of Europe, 2014; Castro-Piñero et al., 2010; Ruiz et al., 2009; Meredith & Welk, 2019). Uniform protocols (standard verbal instructions, demonstration, surface, footwear, and rest intervals) were followed at both pre- and post-testing to enhance measurement consistency.

To ensure the reliability of the instruments, a pilot test was conducted involving 10 students with similar profiles to the study participants. The internal consistency of each test was measured using Cronbach's alpha, resulting in coefficients of 0.84 for agility, 0.88 for balance, and 0.81 for coordination, indicating high reliability.

This study's emphasis was placed on standardization and replicability. The physical tests were administered under controlled conditions, with uniform timing, clear instructions, and standardized scoring procedures applied during both the pre-test and post-test phases. Moreover, the duration, appropriateness, and clarity of test instructions were evaluated through participant feedback gathered during pilot implementation. To further strengthen content validity, two licensed physical education experts reviewed the test procedures, rubrics, and fitness objectives. Their input ensured that each instrument aligned with the specific motor skills the study aimed to assess.

Overall, a combination of pilot testing, content validation, and statistical reliability analysis confirmed that the selected instruments were suitable, consistent, and accurate for evaluating changes in motor skill performance among senior high school students.

2.5 Data Gathering Procedure

The data collection process was conducted in four main stages: orientation, pre-testing, intervention, and post-testing. Approval to conduct the study was first secured from the school administration, and informed consent was obtained from both the students and their parents or legal guardians. Participants were oriented on the study's purpose, procedures, and their rights as participants, including the right to withdraw at any time. To ensure safety during physical tasks, students were also briefed on warm-up protocols and health precautions.

Pre-testing involved administering three standardized motor skill assessments: the Shuttle Run Test for agility, the Stork Stand Test for balance, and the Alternate Hand Wall Toss Test for coordination. Each test was conducted twice under consistent conditions, with the best score recorded for data accuracy. To maintain confidentiality, participants were assigned numerical codes, and all data were recorded using these codes to protect personal identities.

The two-week intervention followed the pre-test, consisting of six Tinikling dance sessions—three per week, one hour each. Although the focus of the intervention was skill development, attendance and performance were tracked solely to support data integrity. No names were linked to individual results, and participation remained voluntary throughout.

After the final session, the same three physical fitness tests were re-administered under the same procedures used during the pre-test. All results were recorded, encoded, and checked for consistency before proceeding to data analysis. Throughout the entire process, ethical considerations such as participant safety, voluntary participation, informed consent, and confidentiality were strictly observed to ensure the integrity and ethical quality of the data gathered.

2.6 Data Analysis

The analysis of data in this study aimed to determine whether participation in a structured two-week Tinikling dance intervention led to significant improvements in students' motor skill proficiency, specifically in the areas of agility, balance, and coordination. The analysis followed a quantitative approach, appropriate for examining measurable changes in physical performance scores across two time points.

Descriptive statistics were first computed to summarize the participants' performance during the pre-test and post-test phases. Measures of central tendency (mean) and dispersion (standard deviation) were used to describe the overall level and variability of student performance in each motor skill test. This provided a clear profile of the group's initial skill levels and the extent of improvement following the intervention.

To determine whether the changes in scores were statistically significant, a paired samples t-test was applied. This test is commonly used in experimental designs involving pre-test and post-test comparisons within the same group. It measures whether the average difference in scores before and after the intervention is greater than what might be expected by chance. The analysis revealed statistically significant improvements across all three components of motor skill proficiency, with p-values well below the 0.05 level of significance, indicating that the observed gains were unlikely to be due to random variation.

In addition to statistical significance, the practical significance of the improvements was assessed using Cohen's *d*, a measure of effect size. The results showed large effect sizes for agility ($d = 1.32$), balance ($d = 1.93$), and coordination ($d = 2.78$). These values suggest that the intervention produced strong, meaningful improvements in students' motor performance. The largest gains were observed in coordination, indicating that the rhythmic and patterned nature of Tinikling may have been particularly effective in developing this skill.

2.7 Ethical Considerations

This study strictly adhered to ethical standards set by the institution's Research Ethics Committee (REC) and followed the principles of respect for persons, beneficence, and justice. Before the conduct of the research, approval was secured from the school administration, and ethical clearance was sought from the appropriate REC.

All participants were informed of the study's purpose, procedures, benefits, and potential risks through an orientation session. Informed consent was obtained in writing from each student and co-signed by a parent or legal guardian, in accordance with ethical guidelines for research involving minors. Participants were assured that their involvement was voluntary and that they could withdraw from the study at any point without academic or personal repercussions.

To maintain privacy and confidentiality, each participant was assigned a numerical code. No identifying personal information appeared in any reports or presentations. Data were stored in a password-protected file accessible only to the researcher. Hard copies of documents were securely filed and will be destroyed upon completion of the study.

Physical safety was prioritized throughout the intervention. Only students who met health-related inclusion criteria were allowed to participate. A licensed physical education teacher supervised all activities, and warm-up exercises were conducted to reduce injury risk. The physical tests and intervention were designed to match the fitness level of the participants, and no activity was forced or excessive.

The study also underwent a review of its data collection tools by two physical education experts to ensure that the procedures were developmentally appropriate, inclusive, and non-discriminatory. The entire research process was carried out with fairness, transparency, and sensitivity to the participants' well-being and rights.

3. Results and Discussion

This section presents and interprets the pre-test and post-test data on motor skill proficiency, specifically, agility, balance, and coordination, among senior high school students who participated in a two-week Tinikling dance intervention. The findings are analyzed using two theoretical lenses: the Health-Related Fitness Model from the American College of Sports Medicine (American College of Sports Medicine, 2020) and the Motor Learning Theory (Schmidt & Lee, 2019).

Table 1: Pre-test of Motor Skill Proficiency Level of Senior High Students

Motor Skill Proficiency (Pretest)	Descriptive	Standard Deviation
Agility	15.50	0.68
Balance	14.56	0.82
Coordination	13.47	1.72

Table 1 presents the baseline motor skill proficiency scores before the implementation of the Tinikling dance intervention. Agility had the highest mean ($M = 15.50$, $SD = 0.68$), followed by balance ($M = 14.56$, $SD = 0.82$). Coordination recorded the lowest mean ($M = 13.47$) and the highest variability ($SD = 1.72$).

These results suggest that coordination was the least developed and most inconsistent skill among participants, which aligns with findings that coordination develops later and requires more in-depth practice (Gallahue, Ozmun, & Goodway, 2021). The Motor Learning Theory assumes that such foundational motor skills are strengthened through repetitive and feedback-driven movement patterns (Schmidt & Lee, 2019). From a health fitness perspective, the American College of Sports Medicine (2020) identifies agility, balance, and coordination as key components of skill-related fitness, which are critical for functional movement and physical literacy. The pre-test values establish a baseline that highlights the need for structured motor interventions such as folk dance.

Table 2: Post-test of Motor Skill Proficiency Level of Senior High Students

Motor Skill Proficiency (Pretest)	Descriptive	Standard Deviation
Agility	14.56	0.73
Balance	12.41	0.66
Coordination	18.27	1.74

Table 2 illustrates the motor skill proficiency scores after the two-week Tinikling intervention. All three skills showed improvements. Agility scores decreased; however, for this study, lower times denote better performance-. Balance improved ($M = 12.41$), and coordination saw a substantial increase ($M = 18.27$), reflecting enhanced rhythmic and motor control.

These findings support the efficacy of the Tinikling program in enhancing skill-related fitness. Tinikling's rhythmic stepping patterns and dynamic movements directly stimulate motor learning, where practice leads to smoother, more accurate movements (Schmidt & Lee, 2019). The dance's emphasis on timing and coordination fosters integration in bodily processes, contributing to improvements in both balance and coordination. This is consistent with Tinikling's documented rhythmic, multidirectional stepping demands (Sanchez et al., 2019) and student-reported motor skill engagement in culturally grounded folk dance activities (Adolfo et al., 2023). The American College of Sports Medicine's Health-Related Fitness Model underscores that skill-related components are not only teachable but are subject to safe, competent movement throughout the lifespan (American College of Sports Medicine, 2020; Faigenbaum et al., 2020).

Table 3: Comparison of Pretest and Posttest of Motor Skill Proficiency Level of Senior High Students

Motor Skill Proficiency (Pretest)	P-Value	Cohen's d	Effect Size Interpretation
Agility	< .001	1.32	Large
Balance	< .001	1.93	Large
Coordination	< .001	2.78	Very Large

As shown in Table 3, paired-samples t-tests revealed statistically significant improvements across all three motor skills ($p < .001$). Effect size analysis using Cohen's d demonstrated large effects for agility (1.32) and balance (1.93), and a very large effect for coordination (2.78), indicating substantial practical impact. The large and very large effect sizes confirm that the intervention yielded not only statistical but meaningful improvements. These findings align with Motor

Learning Theory, which emphasizes the role of frequent, feedback-rich, and progressively complex movement practice in facilitating motor adaptation (Schmidt & Lee, 2019).

Moreover, the findings align with recent international evidence supporting dance as a means of enhancing physical performance. According to (Jouira et al. 2024), it is demonstrated that structured dance interventions significantly improved balance in children, while another study reported enhanced coordination following dance activities in adolescents (Stribling et al. 2021)

In conclusion, this study provides strong empirical evidence that the Tinikling folk dance program significantly enhances key motor fitness components—agility, balance, and coordination senior high school students. The large effect sizes observed across all measures confirm the physical value of integrating rhythmic, culturally-rooted movement into physical education curricula.

Grounded in Motor Learning Theory and the Health-Related Fitness Model, the findings support the use of Tinikling not only as a traditional dance but also as an evidence-based intervention that facilitates skill acquisition through repetitive, structured movement. The dance's progressive footwork patterns and rhythmic complexity offer functional benefits that go beyond performance art, directly improving motor efficiency.

Moreover, the study underscores the value of culturally responsive teaching in physical education. By aligning with Republic Act No. 10533 and the Sustainable Development Goals, particularly SDG 3 on Good Health and Well-being, Tinikling serves as both a fitness tool and a medium for cultural preservation and national identity building.

In summary, Tinikling represents a powerful, dual-purpose strategy for physical literacy and cultural education. Its structured integration into physical education programs can promote holistic development—supporting not only the physical growth of students but also their cultural appreciation and engagement with Filipino heritage.

Recommendations

Given the findings and conclusions of this study, the following recommendations are proposed:

Future studies on Tinikling should explore its long-term effects on physical fitness. While this study demonstrates positive results in a short-term program, further research is needed to examine how sustained practice over several months influences students' overall fitness, including strength and flexibility. Additionally, it would be beneficial to investigate the impact of Tinikling on diverse populations, including individuals with varying fitness levels, different age groups, or students with physical disabilities. Understanding how Tinikling can be adapted for these diverse groups would enhance its applicability as a fitness tool across different segments of the population. Another avenue for future research could involve comparing Tinikling to other Philippine folk dances to assess their relative benefits for physical fitness. Such a comparison could offer a broader understanding of the fitness potential inherent in traditional Filipino dances. Furthermore, it would be valuable to examine not only the physical fitness benefits but also the long-term cultural and social impacts of Tinikling. Investigating how this dance influences students' cultural identity, social interactions, and appreciation of Filipino traditions could shed light on its broader educational and cultural significance.

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