

## ORIGINAL RESEARCH

### **Indayugan: A Culturally Grounded Dance Intervention for Improving Health-Related Physical Fitness in Female College Students**

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#### **Abstract**

*Optimal physical fitness is essential for the health and well-being of female college students. However, many have low engagement in Physical Education (PE) because the activities do not match their interests and identities. This quasi-experimental two-group design examined the effects of Indayugan. This culturally inspired dance exercise integrates Filipino folk and ethnic dances to examine the health-related fitness of female college students at a state university in Nueva Ecija, Philippines. The experimental group with 31 students participated in an eight-week Indayugan intervention, while the control group with 30 students took traditional PE classes. The study assessed health-related fitness components before and after the intervention using paired t-tests and independent-samples t-tests. Results showed no significant differences between groups at baseline (all p-values > .05). Between-group post-test comparisons indicated that the experimental group outperformed the control group in cardiorespiratory endurance ( $t = -5.64, p < .001$ ), sit-ups ( $t = 4.45, p < .001$ ), sit-and-reach ( $t = 3.07, p = .003$ ), and BMI ( $t = -3.64, p < .001$ ), while changes in push-ups remained non-significant ( $t = -0.81, p = .420$ ). These findings show that the Indayugan intervention can improve health-related fitness and cultural expression, highlighting the importance of culturally relevant practices in physical education to enhance student health-related fitness.*

#### **Keywords:**

*Indayugan, cultural dance, female, dance exercise, physical fitness, good health and well-being*

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#### **Introduction**

Sedentary behaviour among college women is a growing public health concern, particularly due to the increasing use of gadgets and prolonged screen time. Studies indicate that greater reliance on digital devices correlates with reduced physical activity, elevated obesity rates, poor posture, and negative cardiometabolic outcomes (Pengpid et al., 2015; Rogayan & Padre, 2025). The transition to college frequently intensifies these patterns, as academic pressures, social adaptation, and increased autonomy contribute to more sedentary lifestyles (Corder et al., 2019; Deforche et al., 2015). In the Philippines, female stu-

dents report lower levels of physical activity and higher engagement with social and digital media (Martin et al., 2016). In contrast, regular physical activity is closely linked to improved mental health, positive body image, and enhanced quality of life, underscoring the importance of interventions that encourage sustained physical activity (Beisecker, 2025; Ramos-Jiménez et al., 2017).

Motivation and personal interest significantly influence participation in physical activity. Female students are more likely to engage in activities that are enjoyable, socially interactive, or culturally meaningful (Martin et al., 2016; Raven &

Pels, 2021; Vasconcellos et al., 2020). Dance is frequently preferred because it combines physical exertion, self-expression, rhythmic movement, and opportunities for social interaction (Barranco-Ruiz et al., 2020; Ngo et al., 2024). Interventions that align with participants' cultural identities and interests demonstrate greater adherence and improved long-term outcomes than generic exercise programs (Du et al., 2025; Fong Yan et al., 2024; Yu et al., 2025). Therefore, dance offers both physical benefits and cultural relevance as a strategy to reduce sedentary behaviour among female students.

### Methods and Materials

A quasi-experimental two-group pretest–posttest design (Park et al., 2020) was utilised to examine the effects of *Indayugan*. This culturally inspired dance exercise incorporates Filipino folk and ethnic dances, focusing on the health-related physical fitness of female college students. Participants were assigned to the experimental group (n=31) or control group (n=30) using cluster assignment of intact class sections to minimise disruption to academic schedules and preserve the natural classroom setting. This approach improved feasibility and reduced interaction between groups that could affect outcomes. Bias was minimised through blind assessment of outcomes, statistical control for baseline differences, and steps to limit cross-group contamination.

The experimental group participated in an eight-week *Indayugan* intervention, conducted three times per week for approximately 45 minutes per session. In contrast, the control group continued with conventional Physical Education classes. Each *Indayugan* session comprised three phases: a 10-minute warm-up featuring low-intensity rhythmic movements and dynamic stretching based on fundamental folk dance steps; a 25-minute main exercise segment incorporating sequenced Philippine folk and ethnic dance movements; and a 10-minute cool-down with slower dance

sequences, controlled breathing, and static stretching. The intervention followed the principle of progressive overload, beginning with simple, low-intensity routines in the initial weeks to support skill acquisition and movement familiarisation. As the program progressed, dance combinations increased in length, complexity, tempo, range of motion, and repetition, elevating exercise intensity to moderate and then high levels in later weeks. This structured progression aimed to optimise improvements in cardiorespiratory endurance, muscular stamina, coordination, and overall health-related fitness, while maintaining cultural authenticity and participant engagement.

During the intervention, the experimental group performed only the *Indayugan* dance routine and did not participate in any other physical activity programs from the standard PE curriculum. In contrast, the control group continued with regular PE content focused on individual and dual sports, specifically badminton and table tennis. These activities followed existing curriculum guidelines and served as the comparison for evaluating the effects of the *Indayugan* dance-based intervention on students' physical fitness outcome.

Baseline assessments were conducted before the intervention, and post-test evaluations were administered immediately after its completion to determine changes in fitness outcomes. Health-related physical fitness was measured using the Physical Fitness Test prescribed by the Department of Education, which assessed cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition using Body Mass Index (BMI).

Previous studies have demonstrated high reliability for the 3-minute step test (Bohannon et al., 2015), sit-ups (Ojeda et al., 2020), push-ups (Kellner et al., 2021), and the sit-and-reach test (Henriques-Neto et al., 2020). Additionally, BMI measurements obtained using standardised protocols have exhibited strong consistency (Carsley et al., 2019). Collectively, these

findings support the use of these instruments as reliable measures of health-related physical fitness outcomes in intervention research. The study adhered to established ethical standards for research involving human participants. Written informed consent was obtained from all participants, and confidentiality, anonymity, and voluntary participation were strictly maintained throughout the research process. All procedures were classified as minimal risk, and appropriate safeguards were implemented to ensure the safety, well-being, and rights of participants. Although institutional guidelines did not require formal ethical clearance, Central Luzon State University reviewed and authorised the study, ensuring adherence to institutional policies and national standards for protecting human research participants. Data were analysed using paired t-tests to examine

within-group changes over time and independent-samples t-tests to assess post-intervention differences between groups (Okoye & Hosseini, 2024). Statistical significance was set at  $p < .05$ .

## Results

### Baseline comparisons

Independent-samples t-tests were conducted to compare the pre-test scores of the experimental and control groups across all outcome measures. As presented in Table 1, there were no statistically significant differences between groups at pre-test, indicating baseline equivalence. Specifically, cardiorespiratory endurance, push-ups, sit-ups, sit-and-reach, and BMI did not differ significantly ( $p > .05$ ), with effect sizes ranging from small to negligible (Cohen's  $d = 0.14$ – $0.15$ ).

Table 1. Independent-Samples t-Tests on Pre-test Scores: Experimental vs Control

| Measure (unit)  | Control group<br>Pre-Test<br>Mean | Experimental<br>roup Pre-Test<br>Mean | t     | p    | d    |
|---|-----------------------------------|---------------------------------------|-------|------|------|
| Cardio-respiratory Endurance (3-min Step Test, bpm; lower = better) | 96.00                             | 95.20                                 | -0.60 | .551 | 0.15 |
| Push-ups (count)  | 8.00                              | 7.80                                  | -0.33 | .742 | 0.09 |
| Sit-ups (count)   | 13.20                             | 13.60                                 | 0.55  | .585 | 0.14 |
| Sit-and-Reach (cm)  | 21.80                             | 22.40                                 | 0.55  | .586 | 0.14 |
| BMI   | 25.40                             | 25.50                                 | 0.16  | .872 | 0.04 |

### Within-Group Pre-Test to Post-Test changes

Paired-samples t-tests were performed to examine within-group changes from pre-test to post-test (Table 2). In the experimental group, significant improvements were observed in cardiorespiratory endurance ( $t = -14.42$ ,  $p < .001$ ,  $d = 1.66$ ), sit-ups ( $t = 10.95$ ,  $p < .001$ ,  $d = 1.92$ ), sit-and-reach ( $t = 7.00$ ,  $p < .001$ ,  $d = 1.01$ ), and BMI ( $t = -8.20$ ,  $p < .001$ ,  $d = 1.50$ ). The change in

push-ups was not statistically significant ( $t = 0.87$ ,  $p = .390$ ,  $d = 0.12$ ). Similarly, the control group demonstrated significant improvements from pre-test to post-test in cardiorespiratory endurance ( $t = -4.22$ ,  $p < .001$ ,  $d = 0.76$ ), sit-ups ( $t = 3.50$ ,  $p = .001$ ,  $d = 0.63$ ), sit-and-reach ( $t = 2.21$ ,  $p = .035$ ,  $d = 0.28$ ), and BMI ( $t = -3.23$ ,  $p = .003$ ,  $d = 0.63$ ). Changes in push-ups were not significant ( $t = 1.13$ ,  $p = .270$ ,  $d = 0.23$ ).

Table 2. Descriptive Statistics (Pretest and Posttest) by Group (N = 61)

| Measure (unit)               | Group        | Pre-Test Mean | Post-Test Mean | t      | p    | d    |
|------------------------------|--------------|---------------|----------------|--------|------|------|
| Cardio-respiratory Endurance | control      | 96.00         | 92.40          | -4.22  | .001 | 0.76 |
|                              | experimental | 95.20         | 86.00          | -14.42 | .001 | 1.66 |
| Push-ups (count)             | control      | 8.00          | 8.50           | 1.13   | .270 | 0.23 |
|                              | experimental | 7.80          | 8.00           | 0.87   | .390 | 0.12 |
| Sit-ups (count)              | control      | 13.20         | 14.10          | 3.50   | .001 | 0.63 |
|                              | experimental | 13.60         | 17.20          | 10.95  | .001 | 1.92 |
| Sit-and-Reach (cm)           | control      | 21.80         | 23.50          | 2.21   | .035 | 0.28 |
|                              | experimental | 22.40         | 26.60          | 7.00   | .001 | 1.01 |
| BMI                          | control      | 25.40         | 24.20          | -3.23  | .003 | 0.63 |
|                              | experimental | 25.50         | 23.10          | -8.20  | .001 | 1.50 |

**Between-Group Post-Test comparisons**

Independent-samples t-tests were conducted to compare post-test outcomes between the experimental and control groups (Table 3). The experimental group exhibited significantly greater improvements than the control group in

cardiorespiratory endurance ( $t = -5.64, p < .001, d = 1.03$ ), sit-ups ( $t = 4.45, p < .001, d = 1.01$ ), sit-and-reach ( $t = 3.07, p = .003, d = 0.72$ ), and BMI ( $t = -3.64, p < .001, d = 1.00$ ). There was no significant change in either group for push-ups ( $t = -0.81, p = .420, d = 0.21$ ).

Table 3. Independent-Samples t-Tests on Post-test Scores between control group and experimental group

| Measure (unit)   | Control group Post-Test Mean | Experimental group Post-Test Mean | t     | p    | d    |
|--|------------------------------|-----------------------------------|-------|------|------|
| Cardiorespiratory Endurance (3-min Step Test, bpm; lower = better) | 92.40                        | 86.00                             | -5.64 | .001 | 1.03 |
| Push-ups (count)   | 8.50                         | 8.00                              | -0.81 | .420 | 0.21 |
| Sit-ups (count)  | 14.10                        | 17.20                             | 4.45  | .001 | 1.01 |
| Sit-and-Reach (cm)   | 23.50                        | 26.60                             | 3.07  | .003 | 0.72 |
| BMI  | 24.20                        | 23.10                             | -3.64 | .001 | 1.00 |

In summary, the results showed no significant differences between the experimental and control groups across all fitness measures before the intervention. Post-test comparisons showed that the experimental group achieved significantly greater improvements than the control group in cardiorespiratory endurance, sit-ups, sit-and-reach, and BMI. Push-up

performance showed no significant differences. These findings highlight the superior effectiveness of the *Indayugan* intervention over traditional PE classes in improving cardiovascular fitness, core muscular endurance, flexibility, and body composition among female college students. Figure 1 presents a bar chart comparing post-test scores across fitness outcomes.

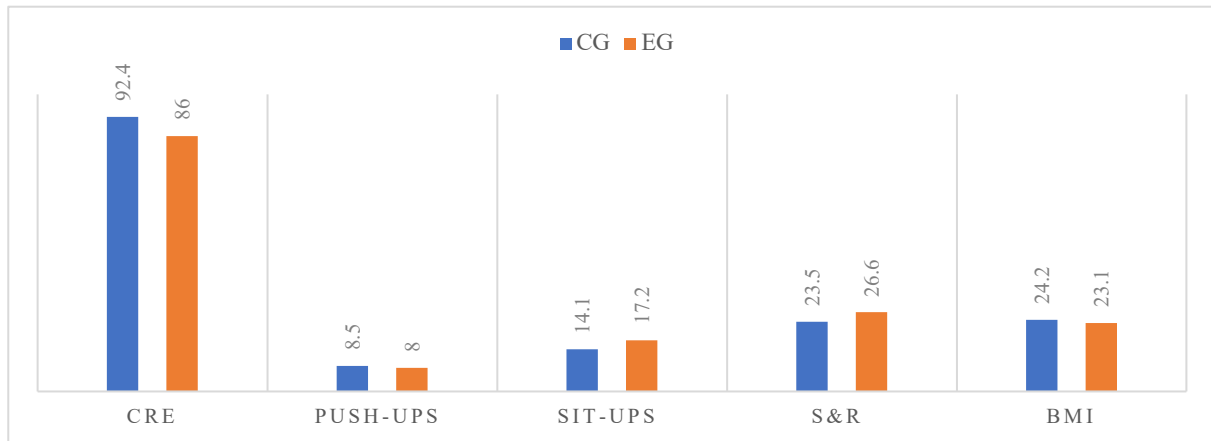


Figure 1. Bar Graph on the Post-test Scores between control group and experimental group

## Discussion

This study examined the effectiveness of *Indayugan*, a culturally grounded Philippine dance intervention, on selected fitness indicators among female college students. Participants in the experimental group showed significantly greater improvements than the control group from pre-test to post-test. Baseline measures were comparable between groups, confirming initial equivalence.

Cardiorespiratory endurance improved markedly in the experimental group, as evidenced by significant reductions in post-exercise heart rate, indicating enhanced cardiovascular efficiency. In addition, the experimental group demonstrated greater gains in muscular endurance, flexibility, and body composition, while push-up performance showed minimal change in both groups.

These results align with prior research indicating that culturally relevant dance and aerobic programs enhance aerobic capacity and cardiovascular function across diverse populations (Dube et al., 2025; Fong Yan et al., 2018). These findings suggest that *Indayugan* elicits greater physiological adaptations than routine exercise, confirming the effectiveness of culturally relevant approaches to cardiovascular fitness.

Flexibility also improved significantly in the experimental group compared to the control group. Gains in sit-and-reach scores

support the literature showing that low-impact aerobics and dance enhance joint mobility, muscle elasticity, and functional movement capacity (Chen et al., 2025; García, 2024; Mathai & Balasubramanian, 2022). This demonstrates that *Indayugan* contributes meaningfully to musculoskeletal health and daily functional ability.

Muscular endurance improved in the core, with the experimental group showing notable gains in sit-ups. These findings are consistent with previous research showing that dance-based interventions emphasizing core and lower-body movements can effectively enhance muscular endurance and functional strength among young adults (Joung & Lee, 2019; Noopud et al., 2019; Vordos et al., 2017). Such programs improve the ability to sustain repeated movements over time, which contributes to overall physical fitness and functional capacity. Push-up performance, which reflects upper-body muscular strength, did not show significant changes in either the experimental group or the control group. This aligns with prior research indicating that aerobic- or dance-focused programs primarily target endurance, flexibility, and core strength. Without specific resistance training, they typically produce minimal improvements in upper-body strength (Ngo et al., 2024). These findings suggest that while *Indayugan* effectively enhances core endurance, additional or complementary

upper-body resistance training may be necessary to improve push-up performance.

Body composition, as assessed by BMI, improved significantly in the experimental group, whereas it remained relatively unchanged in the control group. This pattern is consistent with the existing literature, which indicates that culturally grounded dance interventions can effectively enhance body composition and support weight management. Such improvements are particularly relevant for promoting long-term cardiometabolic health (Douka et al., 2019; Loo et al., 2019; Malkogeorgos et al., 2020).

Overall, these findings indicate that *Indayugan* effectively enhances multiple aspects of physical fitness, including cardiovascular endurance, muscular endurance, flexibility, and body composition, through a culturally meaningful and structured exercise program. The intervention demonstrates that traditional dance can serve as an evidence-based approach to improving physiological health in female college students. Beyond its physical fitness benefits, the *Indayugan* intervention has important implications for cultural preservation. By incorporating traditional Filipino folk and ethnic dance movements into a structured exercise program, the intervention promotes awareness, appreciation, and engagement with the country's intangible cultural heritage.

Participation in *Indayugan* allows female college students to experience cultural practices in a meaningful, embodied way, reinforcing the transmission of traditional movements, rhythms, and expressions that might otherwise be underutilised in contemporary settings. This integration of physical activity and cultural education demonstrates that culturally grounded interventions can simultaneously support health promotion and the preservation of heritage, fostering both individual well-being and collective cultural identity, which is consistent with previous studies (Guo & Li, 2025; Luque Suárez et al., 2023).

The findings further highlight the distinct advantages of the *Indayugan* dance intervention over conventional Physical Education in promoting optimal fitness outcomes. The routine specifically engages key health-related fitness components through culturally anchored movements, such as rhythmic stepping, sustained lower-body stances, and repeated upper- and lower-body actions that build muscular endurance and strength. These exercises require the continual activation of major muscle groups while maintaining coordination and rhythm, thereby fostering cardiovascular endurance, muscular endurance, flexibility, and improved body composition. In contrast, conventional sport-based instruction may lack consistent physical involvement and balanced exercise intensity, as these activities often emphasise skill performance rather than ongoing movement.

These results extend both theory and practice by demonstrating that culturally grounded dance interventions, such as *Indayugan*, can enhance health-related fitness and foster cultural engagement among female college students. Embedding exercise within familiar cultural frameworks offers a practical way to promote physical activity that aligns with culturally responsive pedagogy and health promotion. These results have important implications for curriculum design and educational policy. Integrating cultural dance into Physical Education programs can increase student participation, encourage sustained engagement in physical activity, and support the preservation of intangible cultural heritage.

Combining physical development with cultural awareness fosters a more holistic model of student well-being. Including *Indayugan* Dance as an elective in the college Physical Education curriculum supports the broader goals of higher education to advance comprehensive student development through culturally meaningful physical activities. Rooted in Philippine culture, *Indayugan* Dance also

provides educators and curriculum planners with a practical framework for incorporating culturally grounded activities into academic programs, promoting both educational enrichment and cultural preservation.

Limitations of this study include the absence of systematic measures of psychosocial or mental health outcomes, such as stress reduction, mood, or self-efficacy, which previous research suggests may also benefit from dance-based interventions. The study also used a short-term follow-up, limiting the ability to determine whether the observed improvements in physical fitness and engagement are sustained over time.

Future studies could incorporate qualitative methods, such as interviews or focus groups, to explore participants' subjective experiences and perceptions of cultural engagement. Including physiological markers, such as blood pressure and heart rate variability, would clarify the clinical and biological effects of culturally grounded exercise programs. Combining quantitative and qualitative approaches would provide a more comprehensive understanding of the multidimensional benefits of traditional dance interventions and inform strategies for culturally inclusive fitness promotion in higher education settings.

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### Disclosure statement

The author declares no conflict of interest.

### Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this manuscript, the author used Grammarly to improve language clarity, grammar, and phrasing. The author carefully reviewed and revised the output to ensure accuracy and takes full responsibility for the content of the final manuscript.

### Notes on Contributors

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