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## Research Article

### Improving the Cardiovascular Endurance of Teacher Education Students through the Utilization of the TikTok Application

Ivan B. Masangcay\*, John Paul A. Parungo, Salvador L. Cruz Jr.

College of Education, Don Honorio Ventura State University, Bacolor, Pampanga, Philippines

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#### \*Corresponding author:

E-mail:

[2019994635@dhvsu.edu.ph](mailto:2019994635@dhvsu.edu.ph)

#### ABSTRACT

Driven by the widespread usage of mobile applications, the expansive development of TikTok application has carried considerable challenges and opportunities to the Physical Education industry. Hence, it is imperative to examine the usefulness of this application to mitigate the low cardiovascular endurance of college students since the conduct of research to improve their physical activity engagement is still significant. Thus, this action research sought to improve the cardiovascular endurance of undergraduate teacher education students using the TikTok application as a tool for their physical activity. This study utilized a quantitative approach, specifically, the pretest-post-test design which is classified as quasi-experimental research. Using the normative data from YMCA 3-minute step test, 50 participants from the Bachelor of Elementary Education (BEEd) enrolled in their physical education classes were determined to be qualified based on their pre-test scorecards. Two groups were formed out of them: 25 in the experimental group who were exposed to the intervention and another 25 in the control group who were instructed using the standard discussion. Descriptive statistics and ANOVA-type test analysis were utilized using participants' pre-test and post-test results to ascertain the efficacy of the intervention. Results unveiled that the intervention has significantly improved the experimental group's post-test scores compared to the control group since the post-test results of the control group remained almost stagnant, indicating the intervention's effectiveness by rejecting the null hypothesis. Therefore, this action research inferred that the intervention has efficiently strengthened the cardiovascular endurance of the 1st year BEEd students.

**Keywords:** *Physical Education, Quasi-experimental, TikTok, YMCA*

#### Introduction

Technological innovations are continuously expanding and becoming more

sophisticated. Numerous individuals across the globe are maximizing the advantage of modernized technologies towards productivity and

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efficiency (Dofredo et al., 2023; Tolentino & De Leon-Pineda, 2023). In multimedia systems, the channels for obtaining and disseminating information have continuously offered an accessible avenue for developing a new path toward demand-driven education (Li, 2022). Educational scholars are progressively advocating and incorporating the availability of multimedia communication channels in Physical Education (PE) to organize and elevate the practice of the discipline (Liao, 2021). Driven by the widespread usage of mobile terminals, the expansive development of the TikTok application has carried considerable challenges and opportunities to the physical education industry even before the pandemic. Despite its practitioner relevance and theoretical appeal, inquiries concerning the implications of TikTok in the paradigm of PE were starting to emerge in most literature (Su et al., 2020).

According to the report of Escamilla-Fajardo et al. (2021), the feasibility of the TikTok application as a medium in teaching can creatively stimulate the expression of physical movements in physical education-related disciplines since the music in creating short videos would help college students to create entertaining output conveniently. Relatively, the experimental study of Liao (2021) corroborates that integrating TikTok into PE has dramatically increased students' interest and has improved the quality of teaching, specifically in sports, which indicates the viability of short video software in the education sector.

As reported by Dai et al. (2019), TikTok is a mobile social media platform founded in 2017 that provides an opportunity for its users to generate short video clips. Added by Su et al. (2020), this platform is a phenomenal video-sharing application that allows users to assort the filters, templates, and a built-in music library for generating short video genres (e.g., dancing, acting, and lip-syncing). Similar to other video-sharing platforms, YouTube, for instance, TikTok offers leisure and social features, allowing its users to upload, share, comment, and follow other users (Su et al., 2021). However, one distinguishing element of TikTok that separates it from YouTube is the length of its videos, which can only last for a few seconds to a few minutes, which indicates

its unique yet attractive identity (Chen et al., 2019). Relatively, the size of TikTok videos in terms of a megabyte (MB) is much smaller (Chen et al., 2019) compared to the short videos uploaded on YouTube (Cheng et al., 2013) which attracts numerous citizens across the globe to utilize the application. Additionally, the robust recommender system of TikTok may anticipate the user's interest using their browsing history (Bobadilla et al., 2013) and label the video relevance (Chen et al., 2019). Through its convenience and eye-catching features, TikTok has undoubtedly shown its potential as the fastest-growing application globally (Dai et al., 2019; Indrawati et al., 2022).

As reported by Sensor Tower, a credible and reliable reference of performance metrics within the realm of mobile applications, the TikTok application has established its remarkable reputation by earning its spot as the second most downloaded mobile application in the year 2019 (Williams, 2019). Hence, it is imperative to examine the usefulness of this application to mitigate the low cardiovascular endurance of college students since the conduct of research to improve their physical activity engagement is still significant.

Kim and So (2019) stated that college students who actively participate in exercise explicitly in cardiovascular endurance three times a week are only a low percentage of the total respondents' population. Although the health benefits of physical activities are disseminated in various references, many adults, specifically college students, still project a decline in physical activity engagements, which also explains why their cardiovascular endurance is at a low level of healthiness (Caestine et al., 2017). Considering the law reforms where physical education is promulgated in the Philippines (Tolentino et al., 2022), most of the country's citizens, specifically college students, were determined to be sedentary, resulting in weak cardiovascular endurance (Cagas et al., 2022). This was further justified by the findings of Pituk and Cagas (2019), which revealed that almost half of university students demonstrated a low PA level, specifically their cardiovascular endurance. Hence, there is a dire need to facilitate studies that would practically examine the feasibility of utilizing commonly

used applications to promote physical activity among college students (Masangcay et al., 2023).

## Methods

This action research aims to improve the cardiorespiratory endurance among teacher education-students specializing in Elementary Education when the TikTok application is introduced in their aerobic physical activities. This study utilized a quantitative approach, specifically, the pretest-posttest design, a type of quasi-experimental research. Using the normative data from the YMCA 3-minute step test, 50 respondents were determined to be qualified based on their pre-test scorecards. Two groups were formed: 25 qualified participants in the experimental group who were subjected to the intervention and another 25 in the control group who were instructed using the standard discussion.

## Intervention

The researchers manually downloaded 12 videos from the TikTok application, classified and validated as aerobic dance routines by an expert in the physical education-related discipline. These were used as a basis for the students to craft their videos by following the said dance videos' choreography using the application. The dance moves and routines demonstrated in the obtained videos have simple choreography yet moderate-to-vigorous intensity to keep participants moving at a level that would elicit 30-45 minutes of physical activity in their dance practice and choreography using the application. The researchers also monitored and documented the students' dynamic warm-up and static cool-down. The intervention lasted for only four (4) weeks. A total of 12 dance videos from the students were submitted.

## Data Collection Procedures

Before implementing the intervention, the researchers collected the data from the student PFT scorecards, specifically, their pretest in YMCA 3-minute Step Test results, with the student's permission. Afterward, the YMCA 3-minute Step Test was again administered after implementing the intervention as part of the

post-test. In administering the post-test, the resting heart rate was recorded for one (1) minute before administering the YMCA 3-minute Step Test to ensure the significant results taken from the said testing. After this, the respondents were instructed regarding the pace and rhythm for the test of up, up, down, and down as the stepping cycle. At the signal to begin, the metronome was set to 96 bpm (24 steps per minute), and the participants started to begin the cycle of movement using a 12-inch/ 30 cm step which lasted for only three (3) minutes following the condition of the said standard. Afterward, the respondents were given 60 seconds of rest while locating their fingers firmly on the radial artery before researchers recorded their resting heart rates for one (1) minute. Finally, the respondents' level of cardiovascular endurance was empirically classified using the normative provided data in the YMCA 3-minute Step Test.

## Data Analysis

This action research statistically tested the results using the analysis of variance (ANOVA) to determine the significant difference between two or more category groups (Dimitrov, 2003). In this regard, the method was utilized to track if there was a statistically significant difference between the pretest and posttest gathered data (Dimitrov, 2003). In doing so, the researchers analyzed and interpreted the collected quantitative data of pre-to-post-physical fitness test results with the help of an expert statistician. Descriptive statistics were utilized to describe inferential statistical comparisons (Kaur et al., 2018).

## Result and Discussion

*The Control and Experimental Groups' Cardiovascular Endurance Levels before the Intervention's Implementation*

Table 1 indicates the distributions of heart rates for the pretest of the participants for the control and experimental groups. The participants in the control group had an average score of 122.76 ( $SD = 6.307$ ), while the experimental group had a mean of 129.08 ( $SD = 11.597$ ). The results indicate that both groups look mostly similar, with almost the same mean and standard deviations. No change or improvement in

heart rate can be seen from the plots. Moreover, the findings reveal that the total number of participants in both groups got higher than 107 scores in their pretest with the equivalent

rating of (below average), indicating a low cardiovascular endurance fitness based on the YMCA standard.

Table 1. Pretest results of the control and experimental group before the intervention's implementation

Pretest	Control Group		Experimental Group	
	Mean	SD	Mean	SD
Cardiovascular Endurance	122.52	6.325	129.08	11.597

According to Pituk and Cagas (2019), almost half of the population in higher education still projects a decline in physical activity engagement, affecting their cardiovascular endurance. Considering the law reforms where physical education is promulgated, most of the citizens, specifically college students, were determined to be sedentary, resulting in weak cardiovascular endurance (Cagas et al., 2022). Nonetheless, this displays the participants' cardiovascular endurance fitness before implementing the intervention.

*The Control and Experimental Groups' Level of Cardiovascular Endurance, Specifically, their Post-test in the YMCA 3-Minute Step Test, as a result of their Exposure to the Utilization of the TikTok application*

Dance interventions through the utilization of technologies, the TikTok application, for instance, are currently being explored for improving cardiovascular endurance, mobility, balance, strength, mood, and sleep quality (Ahmad et al., 2015; Safra & Andal, 2022). For this

reason, table 2 shows the distributions of heart rates for the post-test of both the control and experimental groups. The control group, which had not been exposed to the intervention, had a mean score of 122.76 ( $SD = 6.307$ ), which was almost stagnant if compared to their pretest results, indicating that the majority of them have remained classified as having low (below average) cardiovascular endurance based on the YMCA standard.

On the other hand, the experimental group, which was subjected to the intervention, was recorded and considered notable, with a mean score of 80.36 ( $SD = 2.215$ ), indicating a considerable difference in their pretest and posttest results. Since most of the participants in the experimental group got a score lower than 93 in their posttest, the results manifest an improvement in their cardiovascular endurance based on the YMCA standard. Therefore, the null hypothesis that "the cardiovascular endurance of students has no significant improvement after integrating the TikTok application as a medium of aerobic physical activity" is not sustained.

Table 2. The results of the posttest of the control and experimental groups after the implementation of the intervention

Posttest	Control Group		Experimental Group	
	Mean	SD	Mean	SD
Cardiovascular Endurance	122.76	6.307	80.36	2.215

Safra and Andal (2022) further justified that TikTok dances, which are determined to be popular with students nowadays, helped them to improve their cardiovascular endurance, which has been reflected in their dance performance. Thus, Štajer et al. (2022) argued that fitness development should follow

technological trends since it delineates the PE industry. Also, the experimental study of Liao (2021) corroborates that the implications of the TikTok application in PE have efficiently stimulated the students' interest and provided a substantial reference for utilizing the Internet in the context of the subject.

**Summary Statistics and Visualization**

Figure 1 presents an overview of the experimental and control groups' pretest and posttest results. The heart rate was measured twice in a pretest and posttest for the control and experimental groups. For the experimental group, the post-test scores were measured after the intervention. The researchers tracked and compared the improvement between the pretest and posttest scores for each group.

Figure 1 displays the 24 distribution of the data per category. Based on the mean and standard deviations, there were almost no

significant changes between the pretest and posttest scores for the control group since their mean scores ranged from 120 and above. However, there is a significant difference between the pretest and posttest scores for the experimental group since their posttest mean scores yielded 80, indicating an improvement in the participant's cardiovascular endurance. Nevertheless, this indicates an improvement in the experimental group compared to the control group after the implementation of the intervention.

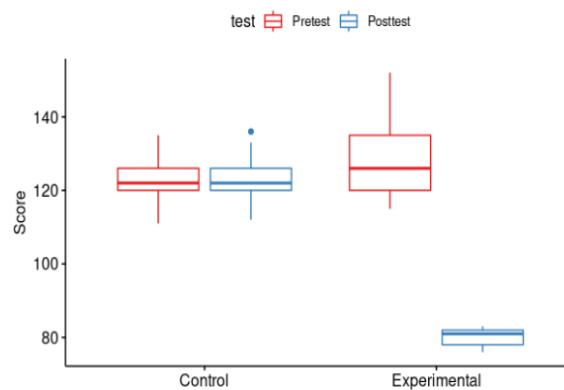


Figure 1. Summary of the results of the pretest and posttest of the control and experimental group

**T-test Results**

Table 3 summarizes the scores of the control and experimental groups. Results indicate that the difference between the scores of the control and experimental groups is highly

significant. Since the experimental group t-test was recorded below 0.05, the results revealed a significant difference compared to the insignificant results of the control group.

Table 3. The results of the posttest of the control and experimental groups after the implementation of the intervention

Category	Pretest		Posttest		t-test p-value	Verbal Interpretation
	Mean	SD	Mean	SD		
Control	122.52	6.325	122.76	6.307	0.8937	not significant
Experimental	129.08	11.597	80.36	2.215	0.001	significant difference

**Two-way Repeated Measures ANOVA**

The purpose of the two-way repeated measures ANOVA was to test whether there is a significant interaction between the effects of the students' group (control, experimental) and test time (pretest, posttest) on the heart rate. It can determine whether there is a significant improvement between pretest and posttest scores and whether the intervention

affected the improvement. As presented in Table 5, the findings of this test revealed that there is a highly significant difference between the post-test scores of the control and experimental groups which indicates the effectiveness of the intervention by rejecting the null hypothesis. The posttest scores of the experimental group outperformed the control group, showing that the intervention was efficient in

strengthening the cardiovascular endurance of the students since their posttest scores were notably improved compared to the stagnant scores of the control group. Nonetheless, the

results indicate that the heart rate of the students in the experimental group has considerably improved after the implementation of the said intervention.

Table 4. T-tests comparing the scores between the control and experimental groups

Cardiovascular Endurance			
Statistic	F	p p<.05	Verbal Interpretation
Group	146.510	<0.001	reject null
Test	96 268.076	<0.001	reject null
Group: Test	96 273.411	<0.001	reject null

### Conclusion

Before the intervention's implementation, the respondents' cardiovascular endurance for both experimental and control groups was determined to be below average, which indicates urgent mitigation to improve their cardiovascular endurance. With the scholar's initiatives to mitigate this problem, the integration of the new media mainstream through the incorporation of the TikTok application in the aerobic dance routine of students responded to their level of cardiovascular endurance.

This action research revealed that the intervention has significantly affected the experimental group's posttest scores compared to the control group since the pretest and posttest results of the control group remained almost the same. Since there is a considerable difference in the pretest and posttest scores of the experimental group, which indicates significant improvement regarding the participant's heart rates, the researchers inferred that the implementation of the intervention by utilizing the TikTok application in the experimental group has efficiently reinforced the cardiovascular endurance of the BEED students. Therefore, the null hypothesis that "the cardiovascular endurance of students has no significant improvement after the integration of the TikTok application as a medium of their aerobic physical activity" is not sustained.

The findings of this action research would offer an additional layer of reference in considering the utilization of TikTok applications across educational institutions. Features of this platform ensure its sustainability, popularity, and convenience which could positively reinforce the novelty of the offerings of

demand-driven education. Thus, future scholars and practitioners should consider the outcome of this action research in response to the advancements and future status of the PE industry.

### Recommendations

1. Future researchers may consider the longer duration of time in implementing the intervention using the TikTok application to maximize the results of their study.
2. Future research undertakings should utilize machinery (i.e., external bands and pulse oximeters) to eliminate the possibility of social desirability bias, which can ascertain the credibility of the results relative to the intervention.
3. Future research undertakings shall consider the usage of self-reported questionnaires to determine the usefulness and convenience of the TikTok application to the participants.
4. Future researchers should consider more participants from other programs to attain the generalizability of the results, which could further justify the effectiveness of the intervention.

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