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Effectiveness of Fitness Tracker Application on Increasing Physical Activity of Physical Education Students

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ABSTRACT

The objective of this study was to assess the efficacy of a fitness tracker application in enhancing physical activity (PA) among students enrolled in the Physical Education Study Program at Muhammadiyah University of Sorong. Using a quasi-experimental pretest-posttest control group design, 40 students were split into two groups: an experimental group that used apps like Google Fit and Strava and a control group that did not use any apps. The intervention continued for four weeks. The results indicated that the experimental group had substantial increases in exercise frequency (84%) and duration (71.8%), intensity, and intrinsic motivation ($p < 0.05$), corroborated by a high Effect Size, in contrast to the control group, which exhibited no change. The application features were demonstrated to be efficacious as a self-monitoring and motivational instrument. This study suggests that fitness tracker applications are an effective intervention and proposes their introduction into the Physical Education curriculum to boost student competency and their role model potential.

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INTRODUCTION

Even while technology makes living easier, modern lifestyles are generally linked to lower levels of physical activity in people all over the world(Collins et al., 2021; Desmawati, 2019). This trend makes things harder for the public health sector in several ways. Regular activity is very important in schools, especially for kids who are in Physical Education (Erliana & Hartoto, 2023). As future teachers, coaches, and educators, they must perform two responsibilities at once: keep healthy and be good examples for future students and communities (Rahman, 2023). The inability of Physical Education (PE) pupils to sustain an active lifestyle may adversely affect their reputation and future academic achievements (Anindito & Nabillah, 2023; Xu et al., 2021). Physical Education students, particularly at Muhammadiyah University of Sorong, often struggle to maintain a regular exercise routine outside of class. Key inhibiting factors include limited time due

to busy academic schedules, fluctuating motivation, and the lack of practical monitoring tools.

Fitness tracking apps, which are also called fitness trackers, are becoming a new tech-based way to solve this problem (Rahmayani & Sukihananto, 2022; Simanungkalit et al., 2025; Yang & Koenigstorfer, 2021). These apps do more than just keep track of things; they also let users keep track of their own statistics in real time, including qualitative (workout intensity) and quantitative (steps, duration, and calories) (Daffa et al., 2017; K, 2024). The psychological theory of self-monitoring says that being more conscious of your own conduct will help you make more positive and consistent adjustments in how you act. Features like daily goal setting, motivational notifications, and gamification have made intrinsic motivation stronger.

A considerable body of research has investigated the efficacy of wearable technology within the general population; however, further comprehensive studies are required to understand the specific effects of fitness tracker applications on physical education students, who maintain distinct personal lives, academic commitments, and responsibilities apart from their educational endeavors. This research addresses this deficiency.

Consequently, this study seeks to assess the efficacy of a fitness tracker application in enhancing the frequency, duration, and intensity of physical activity among Physical Education students at Muhammadiyah University of Sorong. This study's findings are anticipated to provide a substantial contribution to the utilization of technology as an effective pedagogical and intervention method in cultivating Physical Education professionals who are not only academically proficient but also health-conscious.

METHODS

Type and Design of Research

This study employed a quantitative methodology and was quasi-experimental in nature. We chose a pretest-posttest control group design because it let us compare the effects of the intervention (which included using a fitness tracking app) on the treatment group and the control group. This made it possible to see how well the treatment worked by comparing the scores before and after the intervention (Huang et al., 2021).

Location and Time of Research

This research was conducted in the Physical Education Study Program under the Faculty of Teacher Training and Education at Muhammadiyah University of Sorong. The intervention took place over four weeks.

Population and Sample

This study included all current students in the Physical Education Study Program. The sample was chosen using a purposive sampling strategy(Kurnianti et al., 2025; Supriyanto et al., 2021). The primary criteria for sample selection included students in their first semester, unfamiliar with fitness monitoring applications, and willing to

engage completely in the study. There were 40 pupils in all, and they were split into two groups:

1. The Experimental Group (n=20) was the group that used fitness tracking apps like Strava, Samsung Health, or Google Fit during the intervention.
2. The Control Group (n=20) did not use this program during the intervention since they were doing things as they usually do.

Research Instruments

There are three kinds of tools used to collect data that make sure it is accurate and reliable:

1. Physical Activity Questionnaire: A questionnaire based on the International Physical Activity Questionnaire (IPAQ) was used to find out how much, how long, and how hard respondents worked out over the week. Digital activity logs confirmed the information from the questionnaire.
2. Intrinsic Motivation Questionnaire: This was used to find out if the students wanted to work out before and after the intervention. The scores go from 0 to 100. This questionnaire has been validated and fulfills the necessary criteria for reliability.
3. Digital Tracking Data (Pedometer): Daily quantitative data (steps/duration) from physical activity tracking applications like Google Fit served as objective metrics to assess the increase in daily physical activity across the experimental groups.

Research Procedures

The research stages are conducted as follows:

1. Pretest: Two groups (experimental and control) completed initial assessments (pretest) through questionnaires assessing physical activity and motivation (Das et al., 2021; Zhang et al., 2023).
2. Treatment (4-week intervention):
   - Experimental Group: For 60 to 90 minutes, they were given structured training and a briefing on how to use the app, sync data, establish a daily goal (at least 10,000 steps), and the necessity of keeping track of their own progress. This group was requested to use the app to keep track of and record their physical activity after four weeks (Marques-Sule et al., 2022; Zhang et al., 2023).
   - The Control Group did not get treatment using the app, but they kept doing their usual physical routines without using technology.
3. Measurements taken after the intervention: After the four-week intervention, all groups had their final measurements taken with the same tools to see how their physical activity and motivation had changed.

Data Analysis Techniques

We used statistical tools to look at the data we had gathered. The steps for analysis are:

1. Normality and Homogeneity Test: This is to make sure that the data is normally distributed and has the same variance, which is necessary for parametric statistics.

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2. Paired Sample t-test: This test is used to find big differences (improvements) between scores on the pretest and posttest for each group.
3. Independent Sample t-test: This test is used to compare the mean posttest scores of the Experimental Group and the Control Group.
4. Size Analysis (Cohen's d): Used to find out how strong the treatment's effect was, in addition to the significant value (p).

RESULTS AND DISCUSSION

Research result

This section presents descriptive data and the results of inferential statistical tests conducted on the experimental and control groups after a four-week fitness tracker intervention.

Initial Data (Pretest) and Statistical Assumption Test

The classical assumption test was performed before the hypothesis test. Parametric statistical analysis was possible on the pretest and posttest data because they were normally distributed ($p > 0.05$) according to the Shapiro-Wilk normality test. The variances of both groups were equal, according to the homogeneity test.

There were no significant differences in mean scores for all variables (frequency, duration, intensity, and motivation) between the Experimental and Control Groups, according to preliminary statistical analysis of the pretest data (independent t-test). This homogeneity indicates that both groups were in comparable conditions before the treatment. Therefore, the differences that occurred after the test can be legitimately attributed to the impact of the intervention.

Descriptive Results of Comparison of Pretest and Posttest

Table 1 presents a comparative summary of the mean scores of the four main variables measured before and after the intervention:

Table 1.

Average Comparison of Pretest and Posttest Results (N=40)

Indicator (Average)	Group	Pretest	Posttest	Change (Gain)	Increase (%)
Exercise Frequency (times/week)	Experiment	2.5	4.6	+2.1	84%
	Control	2.6	2.8	+0.2	7.7%
Exercise Duration (minutes/session)	Experiment	32	55	+23	71.8%
	Control	34	36	+2	5.8%
Exercise Intensity (scale 1–10)	Experiment	5.2	7.6	+2.4	46.1%
	Control	5.1	5.3	+0.2	3.9%
Motivation Score (Scale 1-100)	Experiment	62	84	+22	35.4%
	Control	63	66	+3	4.7%

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Descriptive Data Interpretation: The superiority of the experimental group is clearly demonstrated in Table 1. The increase in exercise duration to 55 minutes per session (a 71.8% increase) and exercise frequency to 84% is strong evidence that the self-monitoring mechanism offered by the app successfully generated previously unavailable depth and consistency of exercise. The app's effects encompassed both physical and psychological aspects, increasing motivation scores by 35.4%. This indicates a broad effect. In contrast, the Control Group experienced an average increase of only 8% across all variables. This suggests that fitness information alone is not sufficient to change behavior without interactive monitoring tools.

Hypothesis Testing and Statistical Significance

Inferential analysis was performed to test the significance of changes within groups and differences between groups:

Table 2:

Summary of t-Test Results Significance (p-value)

Variables	Paired t-Test (Experiment)	Independent t-test (Posttest)	Effect Size (Cohen's d)
Exercise Frequency	< 0.01	< 0.05	High (d ≥ 0.80)
Exercise Duration	< 0.01	< 0.05	High (d ≥ 0.80)
Exercise Intensity	< 0.05	< 0.05	Medium-High
Motivation Score	< 0.05	< 0.05	High (d ≥ 0.80)

Interpretation of Inferential Test:

1. Intervention Validity (Paired t-test): Highly significant increases in Frequency and Duration ($p < 0.01$) prove that the application treatment definitively changed the students' exercise habits. This test confirms that the intervention treatment is valid.
2. Comparative Effect (Independent t-test): The existence of a significant difference in posttest scores between groups ($p < 0.05$ for all variables) statistically confirms that the fitness tracker application is the main determining factor that causes superior results in the Experimental Group.
3. Effect Size : Cohen's d values that are consistently in the High category ($d \geq 0.80$) provide strong evidence that the impact of the application is substantive,

Overall, the quantitative data from this study convincingly supports the hypothesis that the use of a fitness tracking app is an effective and powerful method for increasing physical activity and motivation in Physical Education students.

Discussion

The results of this study statistically support the hypothesis that fitness tracker use can increase physical activity and intrinsic motivation in physical education students. The application was deemed practically relevant and resulted in significant improvements in the experimental group ($p < 0.05$) and a large effect size ($d < 0.8$).

Justification for Increasing Physical Activity through Self-Monitoring

The success of the self-monitoring function was demonstrated by a significant increase in exercise duration (71.8%) and frequency (84%) in the Experimental Group. The app transformed previously subjective physical activity into measurable and objective data (steps, minutes, and calories). This is how this mechanism works. These results align with research conducted, which emphasized the importance of self-regulation and self-monitoring in the process of behavior change.

The experimental group used real-time app data to identify the difference between intentions and actions. The control group, on the other hand, relied solely on internal awareness and showed stagnation (less than 8% improvement)(Huang et al., 2021). This function consistently provided cognitive stimulation that maintained subjects' commitment. These results support argument that wearable activity trackers play a crucial role in increasing students' active participation (Huang et al., 2021; Yang & Koenigstorfer, 2021).

The Psychological Role of Gamification and Increasing Intrinsic Motivation

The app impacts psychological aspects beyond physical adherence, with motivation scores increasing by up to 35.4%. Non-extrinsic gamification aspects of the app include achievement badges, weekly progress charts, and reminder notifications.

This fact aligns with the Autonomy and Competence Theory. When students successfully achieve their daily step goals (competence) and have the freedom to choose their own time and activities (autonomy), their intrinsic motivation is strengthened (Huang et al., 2021; Yang & Koenigstorfer, 2021). This is particularly important in physical education because students with high intrinsic motivation are more likely to maintain healthy habits after the intervention ends, resulting in sustainable results.

Pedagogical Implications and Strengthening the Competencies of Prospective Educators

The results show that effective implementation in Physical Education students has significant pedagogical value. Physical Education students are not only educated to participate in physical activity, but they are also educated to manage their fitness professionally. This application gives them the ability to assess digital fitness. This self-monitoring experience can be used as a case study or intervention tool for other students. This supports the idea of (Simanungkalit et al., 2025) that educational and sports technology should be integrated. According to this study, curriculum reviews should include modules that teach students to use tracker technology as a fitness teaching and evaluation tool. This will produce graduates who are ready to face the digital fitness trend.

Contrast Results and Justification of Intervention Duration

Given the significant difference between the Experimental group, which experienced a sharp increase, and the Control group, which stagnated, it can be concluded that the increase was a direct result of the treatment and not due to external variables such as seasonal changes or public awareness levels. Although the four-week intervention duration was relatively short, the strength of the impact (high Effect Size)

suggests that appropriate technological interventions can lead to significant behavioral changes in a short period of time. However, this limitation requires further research to test the long-term validity of these behavioral changes.

CONCLUSION

This quasi-experimental study convincingly concluded that using a fitness tracker app increased physical activity and intrinsic motivation among students in the Physical Education Study Program at Muhammadiyah University of Sorong. The results were based on rigorous statistical analysis and in-depth discussion. The app demonstrated itself as an effective causal intervention. Statistical significance ($p < 0.05$) and a large effect size indicated significant increases in exercise frequency (84%) and duration (71.8%). This effectiveness was driven by the app's two functions: it helped people monitor themselves (self-monitoring) and increased intrinsic motivation through gamification and measurable goal setting, successfully linking fitness knowledge with active lifestyle practices.

Implicitly, the findings of this study have significant pedagogical implications. By providing physical education students with digital fitness management skills, the app successfully enhanced their capabilities as future educators. The results support the urgent need to incorporate tracking technology into the learning and evaluation strategies of physical education curricula. Institutions should consider implementing courses based on digital self-monitoring. This would teach students how to effectively use personal health management apps and provide theoretical knowledge. This would produce graduates who are prepared to be role models for active lifestyles in the digital age.

Despite the fact that this study indicates that the app is effective in the short term, further research is needed to determine its behavioral validity and sustainability. To test the efficacy of long-term habit adoption, future research should extend the intervention duration, perhaps six months to a year. Additionally, comparative research on different brands of proctoring apps or testing blended learning intervention models—a combination of digital and in-person proctoring—would provide a broader understanding of how to optimize this technology in academic settings.

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