



Awareness and Utilisation of Artificial Intelligence in Enhancing Exercise and Physical Health Education Adherence among University Students in Enugu State

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Abstract

Artificial intelligence has emerged as an innovative technology for promoting healthy lifestyle through personalized exercise guidance, real time feedback, wearable devices, and intelligent fitness applications. Despite its growing global adoption, awareness and utilisation of AI based exercise technologies among university students in Nigeria remains relatively low due to inadequate digital infrastructure, limited institutional support and insufficient integration into physical and health education programs. This study examined the awareness and utilization of artificial intelligence in enhancing exercise and physical health education adherence among university students in Enugu State, Nigeria. The study adopted across sectional survey design. The population comprises 66,775 undergraduate students from public universities in Enugu States a sample of 389 students was selected using a multistage sampling procedure. Data were collected using a researcher-developed questionnaire. The reliability coefficient of 0.71 using Cronbach's alpha was obtained. The Frequency and percentages were used to answer the research questions, whereas chi-square statistics tested the hypothesis at the 0.05 level of significance. The findings revealed that most students were aware of AI-based exercises technologies (81.7%), although their level of utilisation was only moderate (49.4%). The study further indicated that students perceived AI technologies as effective in improving exercise participation and adherence to physical health education activities. The study proved that increased awareness and institutional support could significantly improve the utilisation of AI technologies for exercise and physical health education adherence. However, universities should integrate AI-based fitness technologies into physical and health education programs and organize awareness campaign to improve students' adoption of AI-supported exercise interventions.

Keywords: Artificial intelligence, Awareness, Utilisation, Exercise adherence, Physical health education

Introduction

Regular participation in exercise and adherence to physical health education are fundamental to maintaining physical fitness, enhancing mental well-being, preventing non-communicable diseases, and improving quality of life. According to the World Health Organization (WHO, 2022), physical inactivity remains one of the leading behavioural risk factors for non-communicable diseases such as obesity, hypertension, diabetes mellitus, cardiovascular diseases, and certain cancers. University students represent a critical population because the lifestyle habits developed during this stage often extend into adulthood. However, increasing academic



demands, sedentary lifestyles, technological dependence, and poor motivation have contributed to declining participation in regular physical activity among university students. Consequently, improving adherence to exercise and physical health education has become an important public health and educational priority.

Recent advances in Artificial Intelligence (AI) have created new opportunities for promoting healthy lifestyles through innovative and personalized approaches to exercise and health education. Artificial Intelligence refers to computer systems capable of performing tasks that normally require human intelligence, including learning, reasoning, decision-making, pattern recognition, and problem-solving (Russell & Norvig, 2021). Similarly, the Organisation for Economic Co-operation and Development (OECD, 2023) describes AI as machine-based systems that generate predictions, recommendations, or decisions that influence real or virtual environments based on predefined objectives. Within the context of exercise and physical health education, AI technologies include wearable fitness devices, intelligent mobile applications, virtual fitness coaches, smart exercise monitoring systems, and personalized health recommendation platforms that provide real-time feedback, monitor physical activity, and encourage sustained participation in healthy behaviours.

The growing application of AI in health promotion is transforming the way individuals engage in exercise and monitor their physical well-being. AI-powered technologies can analyse users' health data, generate individualized exercise prescriptions, monitor physiological responses, provide motivational reminders, and adjust exercise programmes according to users' progress. These capabilities make AI particularly valuable in promoting long-term adherence to exercise and physical health education programmes. Recent studies have shown that AI-supported interventions improve exercise participation, motivation, self-monitoring, and health outcomes by providing personalized guidance that is difficult to achieve through conventional approaches alone (OECD, 2023; Topol, 2023).

Awareness of AI technologies is an important prerequisite for their effective utilization. Awareness refers to the extent to which individuals possess knowledge and understanding of the existence, functions, and potential benefits of AI technologies (Dwivedi et al., 2023). In this study, awareness refers to university students' knowledge of AI-based technologies and their potential to promote exercise participation and adherence to physical health education. Students who are aware of available AI tools are more likely to adopt wearable devices, intelligent fitness applications, and virtual coaching platforms for monitoring physical activity and improving healthy lifestyle behaviours. Conversely, inadequate awareness may discourage the adoption of AI technologies regardless of their availability.

Utilisation refers to the actual and consistent use of AI technologies to accomplish desired health-related goals. According to Venkatesh et al. (2022), utilization represents the extent to which users actively employ technological systems after accepting them as useful and easy to use. Likewise, OECD (2023) explains that AI utilization involves the practical deployment of intelligent systems to improve efficiency, performance, and decision-making. Within the present study, utilization refers to the extent to which university students use AI-supported fitness applications, wearable devices, intelligent health monitoring systems, and virtual fitness coaches to enhance exercise participation and physical health education adherence.



Exercise is a planned, structured, repetitive, and purposeful form of physical activity designed to improve or maintain physical fitness and overall health (Mota & Marques, 2023). Regular participation in exercise contributes to healthy body composition, improved cardiovascular fitness, better mental health, enhanced academic performance, and reduced risk of chronic diseases. Physical health education, on the other hand, equips learners with the knowledge, attitudes, practical skills, and values necessary to adopt healthy lifestyles through regular physical activity, balanced nutrition, disease prevention, and personal health management. Adherence to exercise and physical health education therefore refers to the consistency with which individuals participate in recommended exercise programmes and comply with health-promoting practices over time (André et al., 2024).

Globally, the application of AI in exercise and health promotion has expanded rapidly. The global market for AI-powered fitness technologies continues to grow as wearable devices, intelligent exercise applications, and virtual coaching platforms become increasingly integrated into everyday health management (Statista, 2025). Technologies such as AI-enabled smartwatches, personalized fitness applications, and intelligent health monitoring systems provide users with individualized exercise recommendations, monitor physiological parameters, and deliver real-time feedback that promotes sustained exercise participation and healthier lifestyles.

Although AI-assisted fitness technologies are becoming increasingly common worldwide, their adoption remains relatively limited in many African countries. Sub-Saharan Africa continues to experience a growing burden of non-communicable diseases associated with physical inactivity. WHO (2022) estimates that non-communicable diseases account for approximately (37%) of all deaths in the region. Limited digital infrastructure, inadequate internet connectivity, financial constraints, poor technological literacy, and insufficient institutional support continue to restrict the integration of AI into health promotion programmes across many African countries. Nevertheless, AI offers significant opportunities to improve access to exercise guidance and personalized health education, particularly where qualified fitness professionals and health educators are limited.

Nigeria faces similar challenges. Despite increasing smartphone ownership and internet access among university students, participation in regular exercise remains below recommended levels. The Nigerian Heart Foundation (2021) reported that a substantial proportion of Nigerian adults do not engage in sufficient physical activity, thereby increasing the prevalence of obesity, hypertension, diabetes, and other lifestyle-related diseases. Although AI-powered fitness technologies have the potential to enhance exercise participation through individualized coaching, progress monitoring, and motivational feedback, their integration into university physical and health education programmes remains minimal. Limited awareness, inadequate digital infrastructure, insufficient institutional investment, and lack of empirical evidence continue to hinder their widespread adoption.

Several empirical studies have demonstrated the potential of AI to improve exercise participation and physical health outcomes. Chtourou et al. (2020) reported that AI-supported fitness platforms significantly increased users' motivation and commitment to regular exercise. Chen and Zhu (2021) found that AI-assisted physical education enhanced student engagement and enabled teachers to monitor learners' progress more effectively. More recently, Topol (2023) emphasized that AI can facilitate highly personalized health interventions that improve long-term



behavioural adherence and disease prevention. However, most existing studies have been conducted in developed countries where digital infrastructure and AI adoption are considerably more advanced than in many developing nations.

Despite the increasing global interest in AI-supported health promotion, there is limited empirical evidence regarding the awareness and utilisation of AI technologies for enhancing exercise and physical health education adherence among university students in Nigeria, particularly in Enugu State. Most Nigerian studies have focused on general ICT adoption, e-learning, or AI in educational administration, with relatively little attention given to AI applications in exercise and health promotion. This creates an important knowledge gap regarding students' level of awareness, extent of utilisation, and perceptions of AI technologies for improving exercise participation and adherence to physical health education. . Specifically, the study seeks to determine the level of awareness of AI technologies for enhancing exercise and health education adherence among university students in Enugu State; determine the level of utilisation of AI technologies for enhancing exercise and health education adherence among university students in Enugu State; and assess the perceived influence of AI technologies on exercise and health education adherence among university students in Enugu State. It is against this background that this study investigated the awareness and utilisation of Artificial Intelligence in enhancing exercise and physical health education adherence among university students in Enugu State. The findings are expected to provide empirical evidence that will assist university administrators, health educators, policymakers, and public health practitioners in developing strategies for integrating AI technologies into physical and health education programmes, thereby promoting healthier lifestyles among university students.

Methods

Study design and setting

This study adopted a cross-sectional survey research design to examine the awareness and utilisation of Artificial Intelligence (AI) in enhancing exercise and physical health education adherence among university students in Enugu State, Nigeria. A cross-sectional design was considered appropriate because data were collected from the respondents at a single point in time to assess their awareness, utilisation, and perceived influence of AI technologies on exercise and physical health education adherence without manipulating any study variables.

The study was conducted in Enugu State, located in the South-East geopolitical zone of Nigeria. The state hosts two major public universities included in this study: the University of Nigeria, Nsukka (UNN) and the Enugu State University of Science and Technology (ESUT). These institutions were selected because they have large undergraduate student populations and offer opportunities for students to engage in physical and health education activities.

Study population

The target population comprised 66,775 undergraduate students enrolled in the two public universities in Enugu State. According to the official records of the respective universities, the University of Nigeria, Nsukka had 36,910 undergraduate students, while Enugu State University of Science and Technology had 29,865, giving a total population of 66,775 students.



Sample size and sampling technique

A sample size of 389 undergraduate students was selected for the study. The sample size was determined using the recommendation of Cohen et al. (2018), which suggests that for populations above 2,500, a minimum sample of 333 respondents is adequate at a 95% confidence level and 5% margin of error. To improve representativeness and compensate for possible non-response, a sample of 389 respondents was used.

A multistage sampling procedure involving proportionate stratified random sampling and convenience sampling was employed. In the first stage, the population was stratified according to the two public universities in Enugu State. A proportionate allocation technique was used to determine the number of respondents selected from each university based on their respective student populations. Consequently, 210 respondents were selected from the University of Nigeria, Nsukka, while 179 respondents were selected from Enugu State University of Science and Technology, giving a total sample of 389 respondents. In the second stage, respondents who met the inclusion criteria and voluntarily agreed to participate were recruited using convenience sampling until the required sample size for each institution was attained.

Data collection instrument

Data were collected using a researcher-developed structured questionnaire titled Awareness and Utilization of Artificial Intelligence for Exercise and Physical Health Education Questionnaire (AUAIEPHEQ). The questionnaire consisted of six sections: Section A: Socio-demographic characteristics (age and institution). Section B: Awareness of AI-based exercise technologies (Yes/No) and sources of awareness (social media, friends/peers, online articles, and school/academic sources). Section C: Identification of specific AI-based exercise technologies (Yes/No). Section D: Utilization of AI-based exercise technologies (Yes/No). Section E: Frequency and type of AI technology used. Frequency of use was measured using three response options (Daily, Weekly, Occasionally), while types of AI technologies included Smart Fitness Applications, AI Personal Trainers, and AI-enabled Wearable Devices. Section F: Perceived influence of AI on exercise and physical health education adherence, measured using a five-point Likert scale ranging from Strongly Agree (5) to Strongly Disagree (1).

The questionnaire was subjected to face and content validation by five experts from the Department of Human Kinetics and Health Education, University of Nigeria, Nsukka. The experts examined the instrument for clarity, relevance, appropriateness of language, coverage of the study objectives, and suitability of the items for measuring the study variables. Their observations and recommendations were incorporated into the final version of the questionnaire before data collection commenced.

A pilot study was conducted among undergraduate students from a public university outside the study area who possessed characteristics similar to the study population. Data obtained from the pilot study were analyzed using Cronbach's Alpha reliability coefficient to determine the internal consistency of the instrument. The overall reliability coefficient obtained was 0.71, indicating acceptable internal consistency and confirming that the instrument was reliable for the study.



Data collection procedure

Ethical approval for the study was obtained from the appropriate Institutional Health Research Ethics Committee before the commencement of data collection. Permission to conduct the study was also obtained from the management of the participating universities. The researchers visited the selected faculties and departments with the assistance of trained research assistants. The purpose of the study was clearly explained to the participants, and they were informed that participation was entirely voluntary. Written informed consent was obtained from all respondents before questionnaire administration. Participants were assured that the information provided would be treated with strict confidentiality and used solely for research purposes. To ensure privacy and anonymity, no names, registration numbers, telephone numbers, or other personal identifiers were collected. Completed questionnaires were securely stored and accessed only by the researchers.

A total of 389 questionnaires were administered and successfully retrieved, representing a 100% response rate. Data were coded and entered into the Statistical Package for the Social Sciences (SPSS) version 29.0 for analysis.

Data analysis

Frequencies and percentages were used to answer the research questions on awareness, utilisation, and perceived influence of Artificial Intelligence technologies. The study hypothesis was tested using the Chi-square (χ^2) test of independence at a 0.05 level of significance. Statistical decisions were based on the p-value. The null hypothesis was rejected when $p \leq 0.05$ and rejected when $p > 0.05$.



Results

Table 1: **Demographic Characteristics of Respondents (n = 389)**

	Variables	Frequency (f)	Percentage (%)
<i>Age</i>			
	16—20 year	95	24.4
	21—25 years	186	47.8
	26—30 years	72	18.5
	Above 30 years	36	9.3
Total		389	100
<i>Institution</i>			
	University of Nigeria, Nsukka	211	54.2
	Enugu State University of Science and Technology	178	45.8
Total		389	100

The results in Table 1 indicate that the largest proportion of respondents (47.8%) were between 21 and 25 years of age, followed by those

aged 16–20 years (24.4%), 26–30 years (18.5%), and above 30 years (9.3%). More than half of the respondents (54.2%) were students of the University of Nigeria, Nsukka, while 45.8% were from Enugu State University of Science and Technology.



Table 2: Level of awareness and Utilisation of AI-based Exercise Technologies among University Students in Enugu State? (n=389)

B .Awareness of AI-based exercise technology	Response	Frequency	Percentage (%)
Aware	Yes	318	81.7%
	No	71	18.3%
Sources of Awareness		(n=318)	
	Social Media	172	54.0%
	Friends/Peers	50	15.7%
	Online Article/Plug	65	20.4%
	School/ Academic Source	31	9.7%
C. Identification of specific tools			
Can identify specific AI tools	Yes	150	38.6%
	No	239	61.4%
D. Utilization AI-based exercise Technology			
Have used AI-based exercise tech	Yes	192	49.4%
	No	197	50.6%
E. Frequency of Use (Among Users only)			
	Daily	20	10.4%
	Weekly	40	20.8%
	Occasionally	132	68.6%
Type of AI exercise Technology used			
		(n=192)	
	Smart fitness App	64	33.3%
	AI Personal Trainer	100	52.1%
	Wearable Devices	28	14.7%
With AI			

The findings presented in Table 2 indicate that the majority of respondents were aware of AI-based exercise technologies. Social media was the most frequently reported source of awareness, whereas school or academic sources contributed the least. Although awareness was generally high, fewer than half of the respondents reported having used AI-based exercise technologies. Among those who had used such technologies, occasional use was the most common pattern, while AI personal trainers were the most frequently utilized AI-based exercise technology.



Table 3: Perceived Influence of AI- Technologies on Exercise and Physical Health Education Adherence among University Students (n= 389)

Response Category	Frequency (N)	Percentage (%)
Strongly Agree (5)	40	10.3
Agree(4)	151	38.8
Neutral(3)	140	36.0
Disagree (2)	48	12.3
Strongly Disagree(1)	10	2.6
Mean Perceived Effectiveness Score	—	3.4 (±0.8)

The table 3 presents that most students (49.1%) either strongly agree or agree that AI-based exercise technologies are effective in promoting exercise behaviour, indicating a general positive perception. About (36%) are neutral, possibly reflecting uncertainty or lack of experience with the technologies. A smaller portion (14.9%) expressed disagreement or strongly disagreement, highlighting some skepticism or concern. The average rating of 3.4 (on 5 point scale) reflects a moderate level of confidence in AIs influence for sustained exercise behaviour among University students.

Table 4: Chi-Square Summary of Difference in the level of awareness and Utilisation of AI based exercise technologies among university students in Enugu State Precautions (N=369)

Item	Used	Do not use	χ^2	df	P value	Decision
	Yes	No				
	O(E)	O(E)				
Aware	191(156.86)	127(161.11)	79.88	1	<.001	Ho l rejected
Not Aware	1(35.11)	70 (35.89)				

Table 4 shows that Pearson Chi-square test of independence was conducted to determine whether awareness of AI-based exercise technologies was associated with their utilization among university students in Enugu State. The analysis showed a statistically significant association between awareness and utilization, $\chi^2(1, N = 389) = 79.88$, $p < .001$. Consequently, the null hypothesis was rejected. The finding indicates that students who were aware of AI-based



exercise technologies were significantly more likely to utilize them than students who were not aware.

Discussion

The study examined the awareness and utilization of Artificial Intelligence (AI) in enhancing exercise and physical health education adherence among university students in Enugu State, Nigeria. The findings revealed that awareness of AI-based exercise technologies was generally high among the respondents. This suggests that university students are increasingly becoming familiar with AI applications used in fitness and health promotion. The widespread use of smartphones, social media platforms, and internet-enabled devices among young adults may have contributed to this level of awareness. However, awareness alone does not necessarily translate into effective utilization, particularly where institutional support and digital infrastructure remain inadequate.

The finding on awareness is consistent with the study of Almaiah et al.. (2020), who reported that awareness is a major determinant of the acceptance and adoption of emerging digital technologies among students. Similarly, Dwivedi et al. (2021), observed that individuals who possess adequate knowledge of AI technologies are more likely to develop favourable attitudes towards their adoption and use. The finding also supports the report of the Organisation for Economic Co-operation and Development (2023), which emphasized that awareness remains one of the strongest drivers of AI utilization in educational and health-related settings.

The study further revealed that the utilization of AI-based exercise technologies was relatively lower than the level of awareness. This indicates that although many students are familiar with AI applications for exercise and health promotion, fewer translate that awareness into regular use. This disparity may be attributed to limited access to AI-enabled devices, inadequate internet connectivity, subscription costs associated with premium fitness applications, insufficient digital literacy, and the limited integration of AI technologies into university physical and health education programmes. Consequently, students may recognize the potential benefits of AI technologies without having sufficient opportunity or motivation to use them consistently.

This finding agrees with Venkatesh et al (2022) who reported that awareness alone is insufficient to promote technology utilization unless users perceive the technology as useful, accessible, and easy to use. It is also consistent with recent evidence indicating that infrastructural and economic barriers continue to limit the adoption of AI-supported health technologies in many developing countries. The study also established a statistically significant association between awareness and utilization of AI-based exercise technologies among university students. This implies that students who are aware of AI-supported exercise technologies are considerably more likely to utilise them than those who lack such awareness. The finding reinforces the importance of awareness creation as a prerequisite for the successful adoption of emerging technologies within educational settings. It also provides empirical support for the Technology Acceptance Model, which posits that knowledge and perceived usefulness influence users' acceptance and subsequent utilization of technological innovations.

The observed association corroborates the findings of Dwivedi et al. and the Organisation for Economic Co-operation and Development (2023), both of which reported that increasing awareness significantly enhances the adoption of AI technologies across education and



healthcare sectors. Similarly, recent studies have shown that students who receive adequate orientation and institutional support demonstrate greater willingness to integrate digital technologies into their learning and health-related activities.

The findings have important implications for higher education institutions and public health practitioners. Universities should move beyond creating awareness by integrating AI-supported fitness technologies into physical and health education curricula, providing students with access to appropriate digital resources, and organizing regular training programmes that improve digital competence. Such interventions are likely to promote sustained utilization of AI technologies, enhance exercise participation, and contribute to healthier lifestyles among university students.

Conclusion

The study concludes that university students in Enugu State generally possess a high level of awareness of AI-based exercise technologies; however, this awareness has not translated into widespread utilization. A significant association exists between awareness and utilization, indicating that increased awareness is associated with a greater likelihood of adopting AI technologies for exercise and physical health education adherence. The findings highlight the need for universities and other stakeholders to strengthen institutional support for AI-assisted fitness initiatives through improved digital infrastructure, curriculum integration, awareness campaigns, and continuous training. These measures have the potential to enhance students' participation in regular exercise and promote long-term adherence to healthy lifestyles.

Recommendations

1. Universities should integrate AI-supported fitness applications and wearable technologies into physical and health education programmes to improve students' participation in exercise activities.
2. University management should organize regular awareness campaigns, workshops, and digital literacy programmes to improve students' knowledge and effective utilization of AI-based exercise technologies.
3. Government agencies and educational institutions should improve digital infrastructure, including reliable internet access and smart learning facilities, to encourage wider adoption of AI technologies for health promotion.
4. Physical and health education lecturers should receive periodic professional development on AI-supported teaching and exercise technologies to facilitate their effective integration into instructional practice.
5. Future researchers should investigate additional factors, such as digital literacy, socioeconomic status, technology acceptance, and institutional support, that may influence the utilization of AI-based exercise technologies among university students.



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