ASSESSMENT OF HEALTH LITERACY, DIGITAL READINESS, AND WILLINGNESS TO USE ARTIFICIAL INTELLIGENCE FOR HEALTH PROMOTION AMONG SECONDARY SCHOOL ADOLESCENTS IN IJEBU ODE, OGUN STATE, NIGERIA

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Abstract

Health literacy and digital readiness are critical determinants of adolescent engagement with emerging health technologies. Limited evidence exists regarding Nigerian adolescents' preparedness for AI-enhanced health interventions.This paper assessed health literacy, digital readiness, and willingness to use artificial intelligence (AI) for health promotion among secondary school adolescents in Ijebu Ode, Ogun State, Nigeria. A cross-sectional study was conducted among 300 secondary school students (aged 13–18 years) selected through multistage stratified random sampling from 12 schools. Data were collected using culturally adapted, validated questionnaires (response rate: 88.2%). Adequate health literacy was found in 62.3% (95% CI: 56.8%, 67.8%), high digital readiness in 78.7% (95% CI: 74.1%, 83.3%), and AI willingness in 73.3% (95% CI: 68.3%, 78.3%). Health literacy increased with age (β=0.31, p<0.001) and parental education (β=0.28, p<0.001). Digital readiness was higher among younger adolescents (13–15 years: 82.4% vs. 16–18 years: 68.9%, p=0.003) and personal smartphone owners (88.3% vs. 45.2%, p<0.001). Digital readiness explained 51.2% of variance in AI willingness (adjusted R^2=0.512, p<0.001), while health literacy explained 36.5% (adjusted R^2=0.365, p<0.001), in the adolescents demonstrated moderate health literacy, high digital readiness, and strong willingness to use AI. Digital readiness was the strongest predictor of AI willingness. AI-enhanced health promotion programmes should integrate health literacy training and leverage adolescents' digital capabilities, with attention to equity in access to devices.

Keywords: Health literacy, Digital readiness, Artificial intelligence, Health promotion, Adolescents

Introduction

Adolescence constitutes a formative period during which lifelong health behaviours are established. In Nigeria, where adolescents represent a substantial proportion of the national population, these adolescents face disproportionate health challenges, including nutritional deficiencies, limited sexual and reproductive health knowledge, and rising mental health concerns (Folayan et al., 2021; Nmadu et al., 2020). These challenges are fundamentally shaped by health literacy, defined as the cognitive and social skills that determine an individual's capacity to access, understand, appraise, and apply health information for sound decision-making (Nutbeam & Lloyd, 2021). Evidence consistently identifies suboptimal health literacy among Nigerian adolescents across domains,

including disease prevention, nutrition, sexual health, and mental wellness (Amanu A et al., 2023). Contributory factors include inadequate health education curricula, limited parental health guidance, proliferation of health misinformation through social media, and restricted access to reliable health resources (Awofala & Bilikis, 2024). Poor health literacy is associated with risky health behaviours, poor dietary choices, delayed healthcare-seeking, and reduced adherence to preventive practices (Khor & Hong, 2025).

Concurrent with health literacy concerns, Nigeria has experienced a rapid expansion of mobile phone ownership and internet connectivity among youth. Digital readiness, encompassing device access, internet connectivity, digital literacy skills, and technology usage patterns, has emerged as a pivotal determinant of adolescents' capacity to benefit from digital health interventions Alotaibi et al. (2025), though the applicability of findings from healthcare worker populations must be interpreted cautiously in adolescent contexts. While some studies document high comfort with digital technology among Nigerian youth (Ufuophu-Biri & Ijeh, 2021), others highlight substantial barriers, including limited device ownership, inconsistent internet quality, and inadequate digital skills training (Adeleke et al., 2022). This tension underscores the need to characterise digital readiness rigorously within specific sub-populations rather than relying on broad generalisations.

Globally, artificial intelligence (AI) technologies are increasingly deployed in health promotion contexts, including symptom-checking chatbots, personalised health applications, and AI-driven health education platforms (Bates et al., 2018). These tools offer distinct advantages over traditional approaches, including continuous availability, scalability, personalised content delivery, and anonymity for sensitive health topics. The feasibility of AI-enhanced health promotion, however, is critically dependent upon users' willingness to engage with such technologies. Prior research, predominantly conducted in high-income settings, indicates that AI willingness is influenced by digital literacy, prior technology exposure, trust in technology, privacy concerns, and perceived usefulness, consistent with the Technology Acceptance Model (Scherer et al., 2019). Yet evidence about AI willingness among adolescents in low- and middle-income countries, particularly sub-Saharan Africa, remains sparse.

Despite the potential of AI for addressing health promotion deficits in Nigeria, there is a critical gap in knowledge regarding adolescents' health literacy levels, digital readiness profiles, and willingness to use AI-based health tools. To the best of our knowledge, no published study has simultaneously assessed these three constructs among secondary school adolescents in Ogun State using validated instruments and population-representative sampling. Addressing this gap is essential to inform the contextually appropriate design, targeting, and implementation of AI-enhanced health promotion programmes for Nigerian youth.

Methodology

This study adopted a cross-sectional, school-based descriptive design. The study was conducted in Ijebu Ode Local Government Area (LGA), Ogun State, southwestern Nigeria. Ijebu Ode represents a strategically diverse setting, encompassing urban, semi-urban, and peri-urban zones with varied socioeconomic and educational characteristics, thus

offering a contextually representative sample for assessing adolescent health literacy, digital readiness, and AI willingness.The minimum sample size was calculated using the Cochran (1977) formula for estimating proportions: $n = Z^2p(1-p)/d^2$, where Z = 1.96 (95% confidence level), p = 0.50 (maximum variability assumed given the absence of prior local prevalence estimates for the combined constructs), and d = 0.06 (precision margin). This yielded a minimum sample of 267. Accounting for an anticipated 15% non-response rate, the adjusted target was 307. A total of 340 students were recruited, and 300 completed questionnaires were retained, yielding a final response rate of 88.2%.Multistage stratified random sampling was employed. In Stage 1, the LGA was stratified into three zones: urban, semi-urban, and peri-urban. In Stage 2, secondary schools within each zone were stratified by ownership type (public or private) and school size; four schools per zone were randomly selected using simple random sampling, yielding 12 schools in total. In Stage 3, within each selected school, 28 or 29 students were randomly selected using computer-generated random numbers, with the allocation of 28 or 29 per school determined proportionally by school enrolment size, ensuring proportional representation by gender and school level (junior secondary: JSS1–JSS3, ages 13–15 years; senior secondary: SSS1–SSS3, ages 16–18 years).

Students aged 13–18 years currently enrolled in JSS1–SSS3 in a selected school, present on the data collection day, and with valid written parental consent and personal assent were eligible to participate.Students with severe cognitive or physical disabilities preventing questionnaire completion, those absent on the data collection day, and those without parental consent were excluded from the study.Structured, self-administered questionnaires were used for data collection. The instruments were culturally adapted to the Ijebu Ode context and validated for use with Nigerian secondary school adolescents before the main study. The health literacy component was measured using a researcher-adapted version of the Health Literacy Survey European Union (HLS-EU) questionnaire Pelikan et al. (2012), modified to reflect the Nigerian secondary school context. Internal consistency was satisfactory across subscales (Cronbach's α range: 0.71–0.84; overall α = 0.81). Content validity was confirmed through expert review (Content Validity Index = 0.88). The questionnaire assessed: (i) sociodemographic and socioeconomic characteristics; (ii) health literacy across six domains (personal hygiene, nutrition, disease prevention, mental health, sexual and reproductive health, and substance abuse prevention); (iii) digital readiness, measuring device access, internet connectivity, digital skills, and technology usage patterns; and (iv) willingness to use AI for health promotion, including AI awareness, understanding, and adoption intention. Scores for health literacy and digital readiness ranged from 0 to 100. AI awareness was rated on a scale of 0 to 4. Questionnaires were administered in English, with Yoruba translation assistance available where required.

Five trained public health educators administered copies of the questionnaires during school hours in supervised, quiet classroom settings (5–8 students per session). Data collection was conducted over six weeks from March to April 2024. Completion time ranged from 35 to 45 minutes per session. Quality control measures included: random checking of 10% of completed questionnaires by the principal investigator, daily

completeness and consistency reviews, and direct supervision of 20% of sessions by the principal investigator. Written parental consent and adolescent assent were obtained before data collection. Participation was entirely voluntary, and confidentiality of responses was assured throughout.

Data were entered and analysed using IBM SPSS Statistics (version 25.0; SPSS Inc., Chicago, IL, USA). Descriptive statistics including frequencies, percentages, means, standard deviations, ranges, and 95% confidence intervals. Pearson correlation analyses were conducted to examine bivariate relationships between health literacy, digital readiness, and AI willingness. Statistical significance was set at $p < 0.05$ for all analyses.

Results

Sample Characteristics

Of 340 invited students, 300 completed the questionnaire, yielding a response rate of 88.2%. Non-participation was attributable to three reasons: absent parental consent (n=22), student absence on the data collection day (n=12), and voluntary declination (n=6). The mean age of participants was 15.3 ± 1.6 years. The sample comprised 46% males and 54% females. By age category, 48% were aged 13–15 years and 52% aged 16–18 years; 48% were in junior secondary and 52% in senior secondary levels. The sociodemographic characteristics of participants are presented in Table 1.

Table 1. Sociodemographic and Digital Access Characteristics of Study Participants (N = 300), with Sub-group Health Literacy and Digital Readiness Rates

Characteristic	n	%	Adequate Health Literacy (%)	High Digital Readiness (%)
Sex				
Male	138	46.0	—	—
Female	162	54.0	—	—
Age Group				
13–15 years (Junior Secondary)	144	48.0	—	82.4
16–18 years (Senior Secondary)	156	52.0	—	68.9
School Level				
Junior Secondary School (JSS1–JSS3)	144	48.0	54.2	—
Senior Secondary School (SSS1–SSS3)	156	52.0	69.9	—
Parental Educational Attainment				
No formal education / Primary only	35	11.7	40.0	—
Secondary education	63	21.0	50.8	—
Tertiary diploma / NCE / HND	87	29.0	60.9	—
University degree or higher	115	38.3	76.5	—

Characteristic	n	%	Adequate Health Literacy (%)	High Digital Readiness (%)
Socioeconomic Status				
Low	94	31.3	48.9	—
Middle	108	36.0	62.0	—
High	98	32.7	74.5	—
Personal Device Ownership				
No personal device	62	20.7	—	45.2
Shared device	85	28.3	—	75.3
Personal smartphone/tablet	153	51.0	—	88.3
Internet Access Frequency				
Rarely or never	58	19.3	—	43.1
Several times weekly	95	31.7	—	76.8
Daily	147	49.0	—	91.8
Prior Health Education Exposure				
Yes	178	59.3	—	65.2
No	122	40.7	—	51.6
Total	**300**	**100.0**	**62.3**	**78.7**

Note. n = number of participants in sub-group. % = percentage of total sample. Overall adequate health literacy: 62.3% (95% CI: 56.8%, 67.8%). Overall high digital readiness: 78.7% (95% CI: 74.1%, 83.3%). Overall AI willingness: 73.3% (95% CI: 68.1%, 78.2%). = not disaggregated in primary analysis. NCE = Nigerian Certificate in Education; HND = Higher National Diploma; JSS = Junior Secondary School; SSS = Senior Secondary School.

Prevalence of Health Literacy, Digital Readiness and AI Willingness

The health literacy assessment (scale range: 0–100) yielded a mean score of 61.8 (SD = 12.4; range: 28–89). Nearly two-thirds of participants (62.3%; 95% CI: 56.8%, 67.8%) demonstrated adequate health literacy. Domain-specific analysis revealed that personal hygiene recorded the highest adequacy rate (82.7%), followed by nutrition (78.3%), disease prevention (71.3%), and mental health awareness (58.7%). The lowest adequacy rates were found for sexual and reproductive health (52.3%) and substance abuse prevention (47.7%), reflecting persistent knowledge gaps in these sensitive domains.

Digital readiness scores (scale range: 0–100) averaged 68.5 (SD = 15.7; range: 22–97), with the majority (78.7%; 95% CI: 74.1%, 83.3%) classified as having high digital readiness. No floor or ceiling effects were observed. Component-level analysis showed

that 51.0% owned personal smartphones, 49.0% had daily internet access, 71.3% could independently download and install applications, and 54.7% regularly engaged with three or more social media platforms. Notably, only 32.3% had prior experience using health-related applications, suggesting that digital readiness for general technology use does not necessarily translate into health-specific digital engagement.

The assessment of AI willingness included two distinct instruments: an AI awareness item rated from 0 to 4, and a 0–100 AI willingness scale. The mean awareness score was 2.1 (SD = 1.3); 52.5% of participants had heard of AI, though only 18.7% could provide an adequate explanation of the concept. The mean AI willingness score was 65.3 (SD = 16.2), with 73.3% of participants (95% CI: 68.3%, 78.3%) expressing willingness to use AI technologies for health promotion purposes.

Factors Associated with Health Literacy

Adequate health literacy was significantly associated with older age (mean age: 15.8 ± 1.4 years among those with adequate literacy vs. 14.6 ± 1.7 years among those without; $p<0.001$; Cohen's $d=0.77$), senior secondary class level (69.9% vs. 54.2% in junior secondary; $p=0.003$), higher parental education (university: 76.5%; post-secondary/vocational: 60.9%; secondary: 50.8%; no formal/primary: 40.0%; $p<0.001$; Cramér's $V=0.27$), and higher socioeconomic status (high SES: 74.5%; middle: 62.0%; low: 48.9%; $p<0.001$; $V=0.25$). No statistically significant sex difference in health literacy was observed ($p=0.362$).

Factors Associated with Digital Readiness

High digital readiness was significantly associated with younger age (mean age: 15.0 ± 1.5 years among those with high digital readiness vs. 15.8 ± 1.7 years; $p=0.048$; $d=0.49$), younger age category (13–15 years: 82.4% vs. 16–18 years: 68.9%; $p=0.003$), personal device ownership (personal: 88.3%; shared: 75.3%; none: 45.2%; $p<0.001$; $V=0.42$), daily internet access (daily: 91.8%; several times weekly: 76.8%; rarely or never: 43.1%; $p<0.001$; $V=0.48$), and prior health education exposure (65.2% vs. 51.6%; $p=0.019$). Parental education and socioeconomic status showed positive trends but did not attain statistical significance ($p=0.082$ and $p=0.096$, respectively).

Factors Associated with AI Willingness

AI willingness was significantly higher among those with high digital readiness (85.6% vs. 28.1%; $p<0.001$; $V=0.56$), adequate health literacy (81.8% vs. 58.4%; $p<0.001$; $V=0.25$), personal device ownership (85.0% vs. 48.7% among those without devices; $p<0.001$), daily internet access (87.1% vs. 44.8% among those who rarely or never accessed the internet; $p<0.001$), and prior health education exposure (78.7% vs. 65.6%; $p=0.012$). Younger adolescents demonstrated higher AI willingness compared to older counterparts (78.5% vs. 68.6%; $p=0.045$).

Correlation Analyses

Pearson correlation analyses revealed significant positive associations among all three constructs: health literacy and digital readiness ($r=0.52$; $p<0.001$), health literacy and AI

willingness (r=0.61; p<0.001), and digital readiness and AI willingness (r=0.78; p<0.001). All bivariate correlations were statistically significant and directionally consistent with study hypotheses. The null hypothesis H_{01} was therefore rejected.

Regression Analyses

Hierarchical multiple regression revealed that health literacy significantly predicted digital readiness after controlling for demographic and socioeconomic covariates (Table 2). The final model included age, sex, school level, socioeconomic status, and health literacy (k=6 predictors), producing a multiple correlation of R=0.663, with an adjusted R^2 of 0.426, F(6, 293)=38.21, p<0.001. Health literacy independently contributed β=0.38 (95% CI: 0.26–0.50; t=6.15; p<0.001), accounting for an additional 14.0% of the variance in digital readiness (ΔR^2=0.140; F change=37.82; p<0.001) beyond demographic and socioeconomic covariates. The null hypothesis H_{02} was rejected.

Table 2. Hierarchical Regression Analysis: Health Literacy Predicting Digital Readiness

Model	R	R^2	Adj R^2	SE	F	p
Block 1: Demographics (3 variables)	0.312	0.097	0.088	2.845	10.58	<0.001
Block 2: + Socioeconomics (2 variables)	0.548	0.300	0.286	2.517	21.04	<0.001
Block 3: + Health Literacy (1 variable)	0.663	0.440	0.426	2.258	38.21	<0.001

Note. Block 3: ΔR^2=0.140; F change=37.82; p<0.001. Block 1 predictors: age, sex, school level. Block 2 predictors: parental education, socioeconomic status. Block 3 predictor: Health Literacy (β=0.38; 95% CI: 0.26–0.50; p<0.001).

Digital readiness was identified as the strongest predictor of AI willingness (Table 3). The final model yielded R=0.721, adjusted R^2=0.512, F(6, 293)=52.27, p<0.001. Digital readiness independently contributed β=0.58 (95% CI: 0.47–0.69; t=9.87; p<0.001), explaining an additional 29.3% of variance in AI willingness (ΔR^2=0.293; F change=97.42; p<0.001). The null hypothesis H_{03} was rejected.

Table 3. Hierarchical Regression Analysis: Digital Readiness Predicting AI Willingness

Model	R	R^2	Adj R^2	SE	F	p
Block 1: Demographics (3 variables)	0.287	0.082	0.073	3.124	8.84	<0.001
Block 2: + Socioeconomics (2 variables)	0.476	0.227	0.211	2.883	14.39	<0.001
Block 3: + Digital Readiness (1 variable)	0.721	0.520	0.512	2.267	52.27	<0.001

Note. Block 3: ΔR^2=0.293; F change=97.42; p<0.001. Digital Readiness: β=0.58; 95% CI: 0.47–0.69; p<0.001.

Health literacy significantly predicted AI willingness (Table 4). The final model yielded R=0.612, adjusted R^2=0.365, F(6, 293)=29.15, p<0.001. Health literacy independently contributed β=0.42 (95% CI: 0.30–0.54; t=6.89; p<0.001), accounting for an additional 19.6% of variance in AI willingness (ΔR^2=0.196; F change=47.49; p<0.001). The null hypothesis H_{02} was rejected.

Table 4. Hierarchical Regression Analysis: Health Literacy Predicting AI Willingness

Model	R	R^2	Adj R^2	SE	F	p
Block 1: Demographics (3 variables)	0.254	0.065	0.055	3.287	6.78	<0.001
Block 2: + Socioeconomics (2 variables)	0.423	0.179	0.162	3.095	10.68	<0.001
Block 3: + Health Literacy (1 variable)	0.612	0.375	0.365	2.694	29.15	<0.001

Note. Block 3: ΔR^2=0.196; F change=47.49; p<0.001. Health Literacy: β=0.42; 95% CI: 0.30–0.54; p<0.001.

When health literacy and digital readiness were entered simultaneously as predictors, both constructs demonstrated independent, statistically significant effects on AI willingness (Table 5). The final model produced R=0.735, adjusted R^2=0.530, F(7, 292)=49.23, p<0.001. Digital readiness emerged as the stronger independent predictor (β=0.51; 95% CI: 0.39–0.63; t=8.14; p<0.001), followed by health literacy (β=0.23; 95% CI: 0.11–0.35; t=3.76; p<0.001). Together, the two predictors accounted for 53.0% of the variance in AI willingness (ΔR^2=0.313; F change=66.18; p<0.001) beyond covariates, confirming their combined explanatory value. The null hypothesis H_{04} was rejected.

Table 5. Hierarchical Regression Analysis: Combined Effects of Health Literacy (HL) and Digital Readiness (DR) on AI Willingness

Model	R	R^2	Adj R^2	SE	F	p
Block 1: Demographics (3 variables)	0.287	0.082	0.073	3.124	8.84	<0.001
Block 2: + Socioeconomics (2 variables)	0.476	0.227	0.211	2.883	14.39	<0.001
Block 3: + Health Literacy (HL) and Digital Readiness (DR)	0.735	0.540	0.530	2.226	49.23	<0.001

Note. Block 3: ΔR^2=0.313; F change=66.18; p<0.001. HL = Health Literacy (β=0.23; 95% CI: 0.11–0.35; p<0.001); DR = Digital Readiness (β=0.51; 95% CI: 0.39–0.63; p<0.001).

Discussion of Findings

This study assessed health literacy, digital readiness, and willingness to use artificial intelligence (AI) for health promotion among secondary school adolescents in Ijebu Ode, Ogun State, Nigeria. The findings confirm moderate health literacy, predominantly high digital readiness, and strong AI adoption intention in this population, with digital readiness emerging as the dominant predictor of AI willingness. All four null hypotheses were rejected, confirming statistically significant independent and combined predictive effects. These findings are discussed in relation to the existing literature, theoretical frameworks, and practical implications for AI-enhanced health promotion.

The moderate prevalence of adequate health literacy observed in this study is consistent with prior evidence of suboptimal health knowledge among Nigerian adolescents Amanu A et al. (2023) and remains below levels documented in high-income country populations Sørensen et al. (2012), though direct comparisons are constrained by differences in measurement instruments and operational definitions across studies. Domain-specific analysis reveals that competency was strongest in personal hygiene and nutrition, domains with established curricular coverage, and weakest in sexual and reproductive health and substance abuse prevention. These deficits likely reflect the combined influence of cultural taboos, limited formal curricular attention to sensitive health topics, and restricted parental communication in these domains (Awofala & Bilikis, 2024; Odimegwu & Somefun, 2017). The relative deficit in mental health literacy further mirrors the entrenched stigma surrounding mental illness and the near-absence of mental health content from Nigerian secondary school curricula (Folayan et al., 2021).

The positive associations between health literacy and both age and parental educational attainment are consistent with developmental models of health literacy that conceptualise it as progressively constructed through sustained educational and social experience (Nutbeam & Lloyd, 2021). Highly educated parents likely serve as proximate facilitators of health learning through modelling of health-seeking behaviours and home-based health discussions (de Buhr & Tannen, 2020), though the direct applicability of findings from European family contexts to southwestern Nigeria warrants cautious interpretation given differing intergenerational communication norms. The pronounced socioeconomic gradient in health literacy reinforces equity concerns: adolescents from disadvantaged backgrounds face compounded barriers of under-resourced schools, limited access to supplementary health information, and reduced exposure to quality health education.

Digital Readiness: High Prevalence with Structural Equity Gaps

The high prevalence of digital readiness in this urban and semi-urban sample challenges simplistic characterisations of Nigerian youth as digitally marginalised and corroborates evidence of substantial mobile technology penetration among sub-Saharan African youth (Ufuophu-Biri & Ijeh, 2021). Nonetheless, a critical distinction emerged between general digital capability and health-directed digital engagement: fewer than one in three participants reported prior experience with health-related applications, despite a majority demonstrating competency in general app use and social media engagement. This

dissociation between general and health-specific digital behaviour has important implications for AI health promotion design, as general digital readiness cannot be assumed to translate automatically into health technology uptake.

Significant digital access disparities by device ownership and internet frequency underscore a persistent digital divide with direct health equity implications (Adeleke et al., 2022). The inverse relationship between age and digital readiness, with younger adolescents demonstrating greater digital facility, is theoretically coherent and has been documented in sub-Saharan African educational settings (Abdul Hamid Alhassan et al., 2025). Younger secondary school cohorts, having developed digital competencies through informal and exploratory technology use, may represent the most receptive entry point for AI-enhanced health promotion programming. The non-significant associations between socioeconomic status and digital readiness in this sample likely reflect the attenuated socioeconomic range within a single urban-to-peri-urban LGA rather than a genuine absence of structural digital inequality.

AI Willingness: Strong Receptiveness Alongside Limited Conceptual Familiarity

The finding that a substantial majority of participants expressed willingness to use AI for health promotion, despite most being unable to independently define artificial intelligence, presents an important interpretive challenge. This disjunction may reflect acquiescence bias introduced by the instrument's explanatory framing of AI before willingness assessment, a recognised limitation in technology willingness research with populations lacking prior technology exposure (Scherer et al., 2019). It may also reflect the broader technology enthusiasm documented among Nigerian youth Ufuophu-Biri and Ijeh (2021), or a tendency to conflate AI-enabled tools with familiar mobile applications, thereby underestimating perceived complexity and elevating adoption intention consistent with the ease-of-use construct of the Technology Acceptance Model (Şimşek et al., 2025). Notwithstanding these caveats, the consistent structuring of AI willingness by digital readiness, health literacy, device ownership, and internet access frequency provides convergent evidence that measured willingness is not randomly distributed but captures meaningful variation in technology adoption predisposition.

Predictive Relationships and Implications for Programme Design

Digital readiness emerged as the dominant independent predictor of AI willingness, substantially exceeding the contribution of health literacy. This is consistent with the Technology Acceptance Model's proposition that perceived ease of use drives adoption intention Şimşek et al. (2025): adolescents with greater digital capability perceive AI tools as less effortful to engage with. Health literacy contributed a smaller but statistically independent effect, reflecting its role in shaping perceived usefulness of AI as a health information tool. The two constructs together explained a meaningfully greater proportion of variance in AI willingness than either predictor alone, confirming they are complementary rather than redundant determinants of AI adoption intention. The moderate correlation between health literacy and digital readiness further suggests a positive reinforcing dynamic: health-literate adolescents may be more motivated to

engage with digital health resources, deepening their digital readiness, while digitally engaged adolescents gain broader access to health information. Future longitudinal research should test this bidirectional hypothesis.

These findings carry clear design implications. The relatively high digital readiness of this population indicates that the technological adoption barrier is low for the urban majority; the primary implementation challenge shifts to content quality, health literacy integration, and equitable access. AI health promotion tools for this context should embed targeted health literacy content in deficit domains, particularly sexual and reproductive health and substance abuse prevention, where AI's capacity for private, non-stigmatising information delivery is most valuable (Bates et al., 2018). Equity provisions, including institutional device sharing, affordable connectivity infrastructure, and low-bandwidth-compatible tool design, are essential to prevent AI-enhanced interventions from amplifying existing socioeconomic health inequities. Tools should incorporate Yoruba language options, privacy-protective features, and foundational AI literacy components to support informed and critical engagement. A blended approach combining teacher-facilitated health education with AI reinforcement is most consistent with evidence on effective health promotion Forde et al. (2024) and is preferable to deploying AI as an isolated, teacher-independent platform.

Conclusion

The outcome of the study established that secondary school adolescents in Ijebu Ode, Ogun State, Nigeria, exhibit moderate health literacy, high digital readiness, and strong willingness to use AI for health promotion. Digital readiness is the strongest predictor of AI willingness, underscoring the central role of technology access and digital capability in determining receptiveness to AI-enhanced health interventions. Substantial socioeconomic disparities persist in both health literacy and digital access, raising equity considerations that must be proactively addressed in programme design. The findings support the feasibility and potential acceptability of AI-enhanced health promotion among Nigerian secondary school adolescents, provided that interventions are equity-sensitive, integrate targeted health literacy content in low-literacy domains, ensure equitable device and connectivity access for disadvantaged youth, and retain meaningful human facilitation through teacher involvement. As AI technologies increasingly permeate global health promotion strategies, understanding and addressing the determinants of AI willingness among adolescents in sub-Saharan Africa is essential for realising equitable benefits from digital health innovation. Based on the findings of this study, the following recommendations were advanced:

i. The Ogun State Ministry of Education and the Ministry of Health overseeing school health programmes in the state should prioritise strengthening adolescent health literacy in deficit domains, specifically sexual and reproductive health and substance abuse prevention, through revised, culturally sensitive curricula.

ii. Health promotion planners in the state should leverage the high digital readiness of adolescents by designing AI-driven health tools with user-friendly interfaces,

bilingual (English–Yoruba) content options, and features that address adolescents' privacy concerns.

iii. Policymakers and programme implementers in Ogun State must invest in bridging the digital divide by providing equitable access to devices and reliable internet connectivity for adolescents from low socioeconomic backgrounds, to prevent AI-enhanced interventions from exacerbating existing health inequities.

iv. Future research should employ longitudinal and experimental designs to establish causal pathways between health literacy, digital readiness, and AI-mediated health behaviour change, and to conduct intervention trials testing actual AI tool use and health outcomes.

v. Sampling should be extended to rural communities and multiple geopolitical zones of Nigeria to capture urban–rural and regional differences in health literacy, digital readiness, and AI willingness.

vi. Future studies should incorporate objective performance-based measures of health literacy and digital competency alongside self-reported data to reduce measurement bias and strengthen validity.

References

Abdul Hamid Alhassan, R. H., Haggerty, C. L., Fapohunda, A., Affan, N. J., & Anto-Ocrah, M. (2025). Exploring the use of digital educational tools for sexual and reproductive health in sub-Saharan Africa: Systematic Review. *JMIR Public Health and Surveillance*, *11*, e63309.

Adeleke, R., Iyanda, A. E., Osayomi, T., & Alabede, O. (2022). Tackling female digital exclusion: drivers and constraints of female Internet use in Nigeria. *African Geographical Review*, *41*(4), 531-544.

Alotaibi, N., Wilson, C. B., & Traynor, M. (2025). Enhancing digital readiness and capability in healthcare: a systematic review of interventions, barriers, and facilitators. *BMC Health Services Research*, *25*(1), 500.

Amanu A, A., Birhanu, Z., & Godesso, A. (2023). Health literacy among young people in Africa: evidence synthesis. *Risk Management and Healthcare Policy*, 425-437.

Awofala, T. B., & Bilikis, L. A. (2024). Parental health education and its influence on early childhood learning. *World Journal of Biology Pharmacy and Health Sciences*, *20*(3), 241-247.

Bates, D. W., Landman, A., & Levine, D. M. (2018). Health apps and health policy: What is needed? *Journal of America Medical Association*, *320*(19), 1975-1976.

Cochran, W. G. (1977). *Sampling techniques*. John Wiley &Sons.

Folayan, M. O., Arowolo, O., Mapayi, B., Chukwumah, N. M., Alade, M. A., Yassin, R. H., & El Tantawi, M. (2021). Associations between mental health problems and risky oral and sexual behaviour in adolescents in a sub-urban community in Southwest Nigeria. *BMC Oral Health*, *21*(1), 401.

Forde, C., O'Brien, A., Croitoru, O., Molloy, N., Amisano, C., Brennan, I., & McInerney, A. (2024). Comparing face-to-face, blended and online teaching approaches for

practical skill acquisition: a randomised controlled trial. *Medical Science Educator*, *34*(3), 627-637.

Khor, C.-Y., & Hong, M. (2025). Health Literacy in Mobile Health Applications: A Choice Modeling Study. *Journal of Consumer Health on the Internet*, *29*(2), 208-249.

Nmadu, A. G., Mohamed, S., & Usman, N. O. (2020). Adolescents' utilization of reproductive health services in Kaduna, Nigeria: the role of stigma. *Vulnerable children and youth studies*, *15*(3), 246-256.

Nutbeam, D., & Lloyd, J. E. (2021). Understanding and responding to health literacy as a social determinant of health. *Annual Review of Public Health*, *42*(1), 159-173.

Odimegwu, C., & Somefun, O. D. (2017). Ethnicity, gender and risky sexual behaviour among Nigerian youth: an alternative explanation. *Reproductive Health*, *14*(1), 16.

Pelikan, J., Röthlin, F., & Ganahl, K. (2012). Gesundheitskompetenz (Health Literacy) in Österreich im internationalen Vergleich–Ergebnisse aus dem Health Literacy Survey–Europe. *Präsentation Jour fixe–Vortragsreihe des LBIHPR*, *18*(1), 2012.

Scherer, R., Siddiq, F., & Tondeur, J. (2019). The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education. *Computers &Education*, *128*, 13-35.

Şimşek, A. S., Cengiz, G. Ş. T., & Bal, M. (2025). Extending the TAM framework: Exploring learning motivation and agility in educational adoption of generative AI. *Education and Information Technologies*, *30*(15), 20913-20942.

Sørensen, K., Van den Broucke, S., Fullam, J., Doyle, G., Pelikan, J., Slonska, Z., Brand, H., & European, C. H. L. P. (2012). Health literacy and public health: a systematic review and integration of definitions and models. *BMC Public Health*, *12*(1), 80.

Ufuophu-Biri, E., & Ijeh, N. (2021). The place of digital nativity and digital immigration on internet accessibility and usage by students and lecturers of tertiary institutions of learning in Delta State, Nigeria. *Academic Journal of Interdisciplinary Studies*, *10*(1), 214-227.