ORIGINAL RESEARCH

The Role of Computer Anxiety and Computer Experience in Digital Health Systems Adoption among Healthcare Workers in Malawi

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Abstract

Introduction

While computer experience is often considered a key determinant of digital health adoption, psychological factors such as computer anxiety may play an equally important role. This study examined the relative contributions of computer experience and computer anxiety to digital health adoption intention among healthcare workers in Malawi.

Methods

A cross-sectional survey was conducted among 615 healthcare workers in Malawi. The primary outcome variable was digital health adoption intention, while key explanatory variables included computer anxiety and Computer experience. Internal consistency was assessed using Cronbach's alpha. Bivariate associations were examined using Welch's t-tests and chi-square tests, while Pearson correlation analysis was used to assess relationships among key variables. Hierarchical linear regression models were estimated to evaluate the independent effects of computer experience and computer anxiety on digital health adoption intention.

Results

Participants reported high digital health adoption intention (mean = 6.52, SD = 1.02) and relatively low computer anxiety (mean = 2.08, SD = 1.33). Compared with healthcare workers with low digital health system adoption intention, those with high adoption intention were more likely to have received DHS training (42.3% vs. 32.8%, $p = 0.021$), reported longer computer use experience (9.2 vs. 7.9 years, $p = 0.010$), and exhibited lower computer anxiety scores (1.77 vs. 2.49, $p < 0.001$). In hierarchical regression analyses, computer experience variables explained only 1.1% of the variation in adoption intention ($R^2 = 0.011$), whereas computer anxiety alone explained 6.9% ($R^2 = 0.069$). After adjusting for computer experience, age, gender, qualification, occupation, and experience, computer anxiety remained the only significant predictor of adoption intention ($\beta = -0.212$, 95% CI: -0.277 to -0.147, $p < 0.001$).

Conclusions

The findings of the study suggest that interventions aimed at reducing computer anxiety play a critical role in improving the acceptance and sustainability of digital health systems in resource-constrained healthcare settings.

Keywords: Digital health systems, computer anxiety, computer experience, technology adoption, healthcare workers.

Introduction

Digital health systems (DHS) have become essential for strengthening healthcare systems worldwide. These technologies include electronic health records, clinical decision support systems, telemedicine platforms, and mobile health applications[1]. Digital health systems have the potential to improve the quality, efficiency, accessibility, and continuity of healthcare services[1,2]. In low- and middle-income countries, digital health systems are increasingly promoted as solutions for addressing health workforce shortages, improving disease surveillance, enhancing data quality, and supporting evidence-based decision making[2].

Malawi has made notable investments in digital health infrastructure over the past decade. The Ministry of Health has implemented various initiatives including electronic medical record systems, and District Health Information Software 2 (DHIS2) to improve healthcare delivery and strengthen health system performance[3]. Despite these investments, successful implementation and sustained use of digital health technologies remain challenging in many settings. Evidence from low- and middle-income countries shows that the effectiveness of digital health interventions depends not only on the availability of technology but also on the willingness of healthcare workers to adopt and use these systems in routine practice[4,5].

Healthcare workers are the primary users of digital health systems; therefore, their acceptance and adoption is critical for DHS implementation success. Previous studies have identified several factors that influence digital health adoption among healthcare workers including perceived usefulness, perceived ease of use, organisational support, digital literacy, and prior computer experience[5,6]. Many implementation programmes have focused on technical training and improving access to computers and digital tools. While these efforts are important, growing evidence indicates that psychological factors also play a significant role in technology adoption[2,5].

Computer anxiety refers to feelings of apprehension,

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fear, or discomfort associated with using computers and digital technologies[7]. Computer anxiety has been shown to negatively affect confidence, perceived ease of use, and willingness to engage with new systems across different settings[8,9]. Individuals with high computer anxiety may resist new technologies even when they have adequate technical skills and experience. However, most studies on digital health adoption in low- and middle-income countries have focused mainly on technical competencies and infrastructure barriers, with limited attention to psychological determinants[1-5].

Recent evidence from Malawi indicates that computer anxiety is a notable barrier to digital health adoption among healthcare workers, highlighting that higher levels of computer anxiety are significantly associated with lower intention to use digital health systems[5]. While this is the case, the relative importance of computer anxiety compared with traditional indicators of computer experience remains insufficiently examined.

This study therefore investigated the relative contributions of computer experience and computer anxiety to digital health adoption intention among healthcare workers in Malawi. Specifically, it assessed whether computer anxiety remains significantly associated with adoption intention after accounting for computer training, computer access, years of computer use, and key socio-demographic and professional characteristics. The study aims to provide evidence that can inform more effective digital health implementation and scaling in Malawi and other resource-constrained settings.

Methodology

Study Design

This study employed a cross-sectional analytical design to investigate the relative contributions of computer experience and computer anxiety to digital health adoption intention among healthcare workers in Malawi.

Study Setting and Period

The study was conducted across Malawi's three administrative regions (Northern, Central, and Southern) between April and September 2025. To ensure national representation, participants were recruited from selected districts within each region. In the Northern Region, data were collected from Karonga, Rumphi, and Mzimba districts. In the Central Region, participants were drawn from Lilongwe, Dedza, and Ntcheu districts, while in the Southern Region, data were collected from Mangochi, Machinga, Zomba, Chiradzulu, and Blantyre districts. Inclusion of districts from all three regions ensured balanced representation and enhanced the comparability of findings.

Study Population, Sampling, and Data Source

The study population comprised of healthcare workers involved in the delivery, management, and support of healthcare services in Malawi. Participants included clinicians, nurses, administrative personnel, and technical support staff working in selected health facilities. A total of 615 healthcare workers were included in the study.

Data were collected using a structured questionnaire administered to eligible participants. The questionnaire captured information on socio-demographic characteristics, computer experience, computer anxiety, and digital health adoption intention. Participants were recruited using a purposive sampling approach to ensure representation from different professional cadres and geographic regions.

Study Measurements

The primary outcome variable was digital health adoption intention. This construct was measured using three items adapted from established technology acceptance frameworks[6,10]. Participants indicated their level of agreement with statements relating to intention to use digital health systems, willingness to adopt digital health system and readiness to integrate digital health system into routine practice (Table 1). Responses were recorded on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). A composite adoption intention score was computed as the mean of the five items:

$$DHAI_i = \frac{1}{5}\sum_{j=1}^{5} A_{ij}$$

where h adoption intention score for participant i, and A_{ij} represents the response to item *j*. Higher scores indicate stronger intentions to adopt digital health systems.

Computer anxiety was measured using four items assessing feelings of nervousness, discomfort, fear, and uneasiness associated with computer use[8]. Responses were recorded using the same seven-point Likert scale. One positively worded item ("Computers do not scare me at all") was reverse coded to ensure that higher values consistently reflected greater levels of anxiety. The composite computer anxiety score was calculated as:

$$CA_i = \frac{1}{4}\sum_{k=1}^{4} C_{ik}$$

where C r anxiety score for participant i, and C_{ik} represents the response to anxiety item *k* after reverse coding. Higher scores indicate higher levels of computer anxiety.

Computer experience was assessed using five indicators: receipt of computer or DHS training, computer access at work, computer access at home, years of computer use, and average daily hours of computer use. Training and access variables were coded as binary measures (1 = Yes, 0 = No), while years of computer use and daily hours of use were analysed as continuous variables. Additional explanatory variables included age, gender, educational qualification, occupation, and years of health-sector experience. Table 1, summarises the study variables.

Data Analysis

Reliability Assessment

The internal consistency of the computer anxiety and digital health adoption intention scales was evaluated using Cronbach's alpha coefficient[11]. Cronbach's alpha values greater than 0.60 were considered acceptable for exploratory research, while values exceeding 0.70 were interpreted as indicating good internal consistency. Means and standard deviations were also calculated to describe the distribution of the scale scores.

Statistical Analysis

All statistical analyses were conducted using R statistical software. Continuous variables were summarised using means and standard deviations, while categorical variables were presented as frequencies and percentages.

As presented in Table 1, digital health adoption intention was measured using seven Likert-scale items assessing

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respondents' willingness and readiness to adopt digital health technologies. For analysis, a composite adoption intention score was calculated as the mean of the three items, with higher scores indicating greater intention to adopt digital health systems:

$$DHAI_i = \frac{1}{5}\sum_{j=1}^{5} A_{ij}$$

where $DHAI_i$ represents the adoption intention score for participant i, and A_{ij} denotes the response to the *j*- th adoption item.

Participants were subsequently classified into low and high adoption intention groups using the median adoption intention score. Differences between groups were assessed using Welch's two-sample t-tests for continuous variables and Pearson's chi-squared tests for categorical variables.

$$AdoptionGroup_i = \begin{cases} \text{High Adoption Intention}, & \text{if } DHAI_i \geq \text{Median}(DHAI) \\ \text{Low Adoption Intention}, & \text{if } DHAI_i < \text{Median}(DHAI) \end{cases}$$

This median-split categorisation was used solely for descriptive and bivariate analyses[12]. This reflects relative differences in adoption intention within the study sample rather than absolute levels of willingness to adopt digital health systems. Differences between the high and low adoption intention groups were assessed using Welch's two-sample t-tests for continuous variables and Pearson's chi-square tests for categorical variables.

Pearson correlation coefficients were calculated to examine the relationships among computer anxiety, computer experience indicators, demographic characteristics, and digital health adoption intention. To evaluate the independent effects of computer experience and computer anxiety on digital health adoption intention, a hierarchical linear regression approach was employed. The general regression model can be expressed as:

$$DHAI_i = \beta_0 + \beta_1 Training_i + \beta_2 WorkPC_i + \beta_3 HomePC_i + \beta_4 YearsComp_i + \beta_5 HoursComp_i + \beta_6 Anxiety_i + \beta_7 X_i + \varepsilon_i$$

where $DHAI_i$ denotes the digital health adoption intention score for participant .i; is the intercept term; Training_iis a binary variable indicating whether participant ireceived computer or DHS training (1 = Yes, 0 = No); WorkPC_ iindicates access to a computer at the workplace (1 = Yes, 0 = No); HomePC_iindicates access to a computer at home (1 = Yes, 0 = No); YearsComp_idenotes the number of years of computer use; HoursComp_idenotes the average number of hours of computer use per day; Anxiety_irepresents the participant's computer anxiety score; and X_iis a vector of socio-demographic and professional characteristics, including age, gender, educational qualification, occupation, and years of health-sector experience. The parameters β_1to β_7represent the estimated regression coefficients, while ε_ idenotes the random error term assumed to be independently and identically distributed.

Four hierarchical models were estimated. Model 1 included only computer experience variables ((Training$_i$, WorkPC$_i$, HomePC$_i$, YearsComp$_i$, and HoursComp$_i$) . Model 2 examined the effect of computer anxiety alone (Anxiety$_i$). Model 3 incorporated both computer experience and computer anxiety variables simultaneously. Model 4 further adjusted for socio-demographic and professional characteristics, including age, gender, educational qualification, occupation, and years of health-sector experience.

Model performance was assessed using the coefficient of determination (R^2), adjusted coefficient of determination (Adjusted R^2), Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC). The coefficient of determination is defined as:

$$R^2 = 1 - \frac{SS_{res}}{SS_{tot}}$$

where SS_{res} is the residual sum of squares and SS_{tot} is the total sum of squares. Higher values of R^2 indicate greater explanatory power, while lower AIC and BIC values indicate improved model fit after accounting for model complexity.

Potential multicollinearity among predictors was assessed using Variance Inflation Factors (VIFs). VIF values below 5 were considered indicative of acceptable levels of collinearity. In the present study, VIF values ranged from 1.048 to 1.708, indicating no evidence of problematic multicollinearity. Statistical significance was assessed at the 5% level, and results are reported as regression coefficients (β), 95% confidence intervals (95% CI), and p-values.

Ethical Considerations

Participation in the study was voluntary, and informed consent was obtained from all respondents prior to data collection. All survey responses were anonymised before analysis to ensure confidentiality and privacy. Ethical approval for the study was obtained from the Malawi University of Science and Technology Research Ethics Committee (MUSTREC) with ethical reference number P.04/2025/352.

Results

Participant's characteristics

A total of 615 healthcare workers participated in the study. The mean age of participants was 33.0 years (SD = 7.5), and 51.7% were female. Most participants held a diploma (42.3%) or a degree/honours degree (34.1%). Nurses constituted the largest professional group (37.2%), followed by other health professionals (36.6%). The mean duration of health-sector experience was 7.5 years (SD = 6.3). Approximately 38.2% of participants had received DHS training, 57.1% reported access to a computer at work, and 73.2% had access to a computer at home. Participants reported an average of 8.6 years of computer use and 4.7 hours of computer use per day.

Bivariate Associations Between Participant Characteristics and Digital Health Adoption Intention

Table 2 presents the bivariate associations between participant characteristics and digital health adoption intention among healthcare workers in Malawi. No statistically significant differences were observed by age (p = 0.400), gender (p = 0.200), educational qualification (p = 0.300), occupation (p = 0.900), or years of health-sector experience (p = 0.700), as presented in Table 2.

In contrast, several computer-related factors differed significantly between the two groups. Healthcare workers with high digital health adoption intention were more likely to have received computer or DHS training compared with those reporting low adoption intention (42.3% vs. 32.8%, p = 0.021). They also reported significantly greater computer experience, measured by years of computer use (9.2 ± 6.4 vs.

Table 1 Summary of Study Variables and Measurement Indicators

Variable	Category	Indicators/Questions
Digital Health Adoption Intention	Outcome variable	1. I plan to use DHS if it is implemented 2. I expect to use DHS if it is implemented 3. I intend to use DHS if it is implemented
Computer Anxiety	Main independent variable	1. Computers make me feel uncomfortable 2. Working with a computer makes me nervous 3. Computers do not scare me at all 4. Computers make me feel uneasy
Computer Training	Independent variable	1. Have you attended Computer or DHS training before?
Computer Access at Work	Independent variable	1. Do you have access to a personal computer at work?
Computer Access at Home	Independent variable	1. Do you have access to a personal computer at home?
Years of Computer Use	Independent variable	1. On average, how long have you been using computers?
Hours of Computer Use per Day	Independent variable	1. On average, how many hours a day do you use a computer?

Table 2 Bivariate Analysis of Factors Associated with Digital Health Adoption Intention Among Healthcare Workers in Malawi

Characteristic	Low Adoption Intention (n = 265)	High Adoption Intention (n = 350)	p-value
Age (years)	33.0 ± 8.0	33.0 ± 7.0	0.400
Gender			
Female	146 (55.1)	172 (49.1)	0.200
Male	119 (44.9)	178 (50.9)	
Highest qualification			
Degree/Honours degree	81 (30.6)	129 (36.9)	0.300
Diploma	121 (45.7)	139 (39.7)	
High school certificate	32 (12.1)	34 (9.7)	
Masters/PhD	8 (3.0)	15 (4.3)	
Other	23 (8.7)	33 (9.4)	
Occupation			
Administration officer	6 (2.3)	10 (2.9)	0.900
Nurse	105 (39.6)	124 (35.4)	
Other	95 (35.8)	130 (37.1)	
Physician/Doctor	39 (14.7)	57 (16.3)	
Technical support officer	20 (7.5)	29 (8.3)	

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Table 2 Cont...

Years of health-sector experience	7.6 ± 6.3	7.4 ± 6.3	0.700
Digital health system training	87 (32.8)	148 (42.3)	0.021*
Computer access/use at work	141 (53.2)	210 (60.0)	0.092
Computer access/use at home	186 (70.2)	264 (75.4)	0.120
Years of computer use	7.9 ± 6.0	9.2 ± 6.4	0.010
Hours of computer use per day	4.4 ± 3.7	5.0 ± 3.2	0.053
Computer anxiety score	2.49 ± 1.37	1.77 ± 1.21	<0.001*

Notes: Values are mean ± SD or n (%). P-values were obtained using Welch's two-sample t-test for continuous variables and Pearson's χ^2 test for categorical variables. *p < 0.05; **p < 0.01; ***p < 0.001.

Table 3 Reliability and Descriptive Statistics of Computer Anxiety and Digital Health system Adoption Intention Scales

Scale	Number of Items	Cronbach's α	95% CI	Mean Score	SD
Computer Anxiety	4	0.617	0.568–0.666	2.080	1.330
eHealth Adoption Intention	5	0.912	0.901–0.923	6.520	1.020

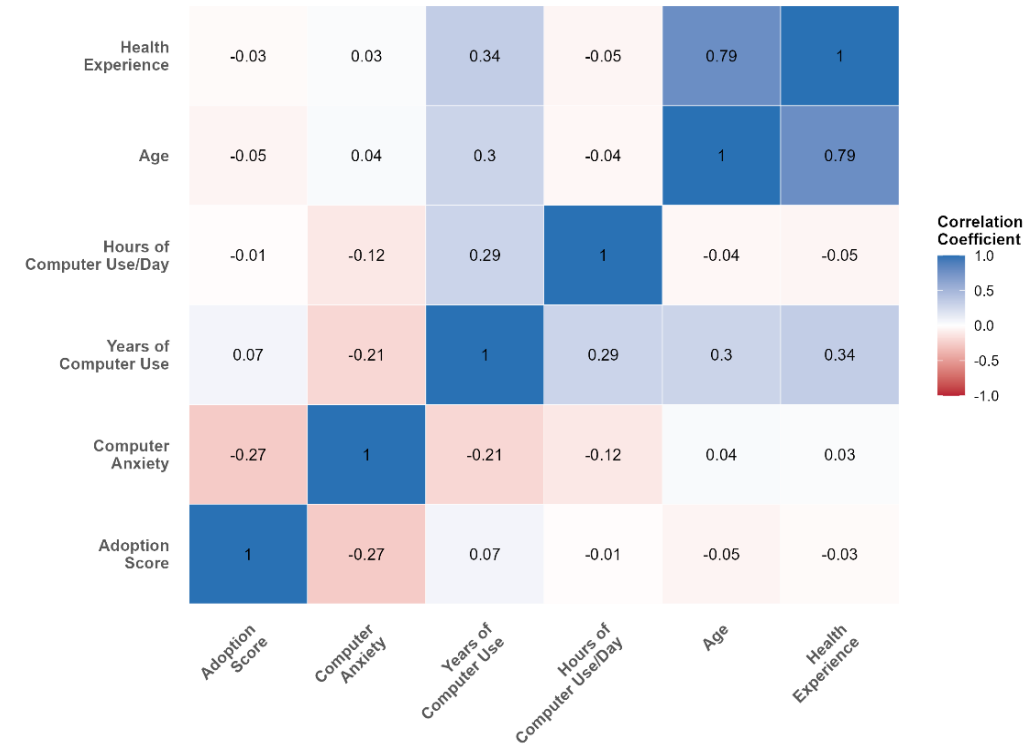

Figure 1 Correlation Matrix of Key Study Variables

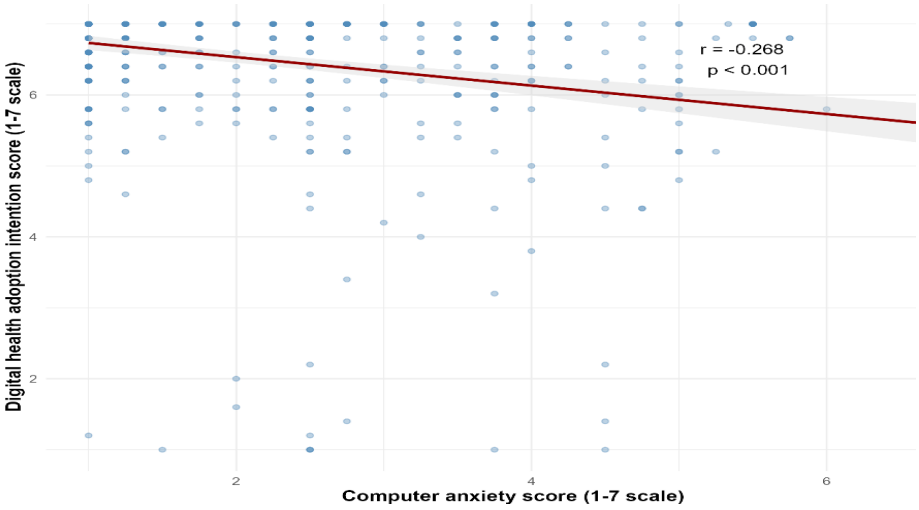

Figure 2 Computer Anxiety and Digital Health System Adoption

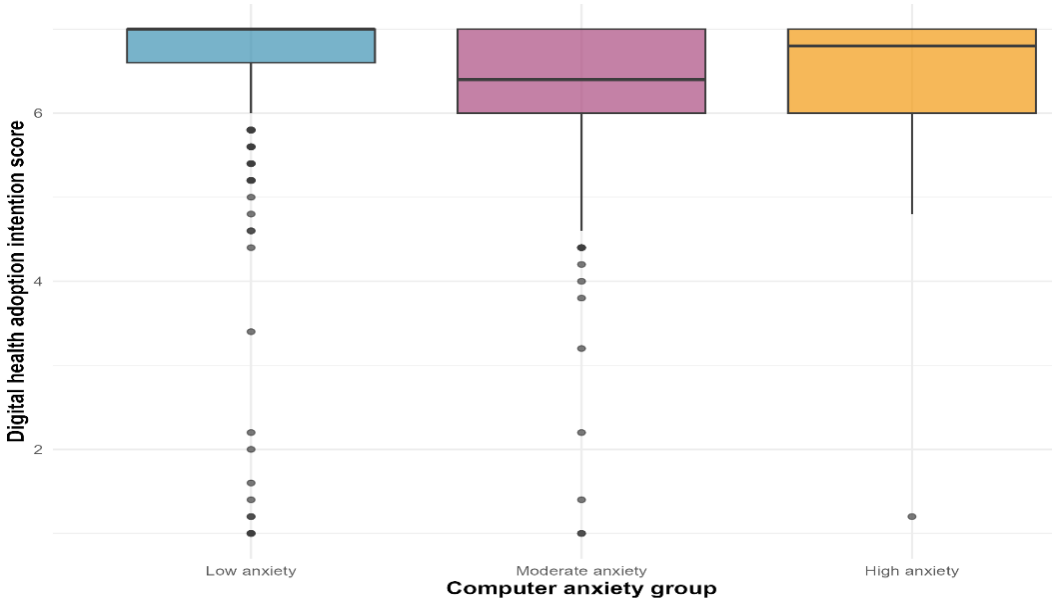

Figure 3 Adoption Intention Across Computer Anxiety Groups

Table 4 Hierarchical Linear Regression Models Predicting Digital Health Adoption Intention

Predictor	Model 1	Model 2	Model 3	Model 4
Computer training	0.126 (-0.050, 0.302)	–	0.141 (-0.029, 0.311)	0.141 (-0.036, 0.318)
PC at work	-0.032 (-0.214, 0.150)	–	-0.007 (-0.183, 0.169)	-0.007 (-0.186, 0.171)
PC at home	0.093 (-0.108, 0.294)	–	0.034 (-0.162, 0.229)	0.008 (-0.194, 0.209)
Years of computer use	0.011 (-0.004, 0.025)	–	0.003 (-0.011, 0.017)	0.008 (-0.009, 0.025)
Hours of computer use/ day	-0.012 (-0.037, 0.014)	–	-0.017 (-0.041, 0.008)	-0.021 (-0.046, 0.005)
Computer anxiety	–	-0.200 (-0.259, -0.142)***	-0.205 (-0.269, -0.142)***	-0.212 (-0.277, -0.147)***

*β = unstandardized regression coefficient; CI = confidence interval. Model 1 included computer experience variables; Model 2 included computer anxiety; Model 3 included both computer experience and computer anxiety; Model 4 was additionally adjusted for socio-demographic and professional characteristics. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion. *p < 0.05; **p < 0.01; ***p < 0.001*

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7.9 ± 6.0 years, p = 0.010). The most pronounced difference was observed for computer anxiety, with participants in the high adoption intention group reporting substantially lower anxiety scores than those in the low adoption intention group (1.77 ± 1.21 vs. 2.49 ± 1.37, p < 0.001). Although healthcare workers with high adoption intention also reported slightly greater computer access at work and home and more hours of computer use per day, these differences did not reach conventional levels of statistical significance. Overall, the findings suggest that computer-related factors, particularly computer anxiety, are more strongly associated with digital health adoption intention than socio-demographic or professional characteristics.

Reliability and Descriptive Statistics of Study Scales

Table 3 presents the reliability and descriptive statistics for the computer anxiety and digital health adoption intention scales. The digital health adoption intention scale demonstrated excellent internal consistency, with a Cronbach's alpha of 0.912 (95% CI: 0.901–0.923), indicating a high degree of reliability among the five items used to measure adoption intention. In contrast, the computer anxiety scale exhibited acceptable reliability for exploratory research, with a Cronbach's alpha of 0.617 (95% CI: 0.568–0.666).

Descriptive statistics indicated that participants generally reported low levels of computer anxiety, with a mean score of 2.080 (SD = 1.330) on the seven-point scale. Conversely, digital health adoption intention was high, with a mean score of 6.520 (SD = 1.020), suggesting a generally favourable disposition toward the adoption of digital health technologies among healthcare workers. Taken together, these findings indicate that although respondents reported relatively low anxiety towards computer use, they expressed strong intentions to adopt and use digital health systems in their professional practice.

Correlations Among Computer Anxiety, Computer Experience, and Adoption Intention

Figure 1 presents the correlation matrix for the key study variables. Digital health adoption intention was negatively correlated with computer anxiety (r = -0.270), indicating that healthcare workers who reported higher levels of anxiety when using computers tended to exhibit lower intentions to adopt digital health systems. This relationship was the strongest correlation observed between adoption intention and any of the explanatory variables, highlighting the potential importance of psychological barriers in shaping digital health acceptance.

In contrast, years of computer use showed a weak positive correlation with digital health adoption intention (r = 0.07), suggesting that greater computer experience was only marginally associated with increased willingness to adopt digital health technologies. Similarly, hours of computer use per day exhibited virtually no relationship with adoption intention (r = -0.01), indicating that frequency of computer use alone may not be sufficient to influence adoption intentions.

Computer anxiety was negatively correlated with years of computer use (r = -0.21) and hours of computer use per day (r = -0.12), suggesting that individuals with greater exposure to computers generally experienced lower levels of anxiety when using digital technologies. Years of computer use was positively correlated with hours of computer use per day (r = 0.29), indicating that participants with longer experience using computers also tended to use them more frequently.

Age was positively correlated with years of computer use (r = 0.30), while health-sector experience was positively correlated with years of computer use (r = 0.34). The strongest association observed in the correlation matrix was between age and health-sector experience (r = 0.79), reflecting the expected relationship whereby older healthcare workers generally have accumulated more years of professional experience.

Relationship Between Computer Anxiety and Digital Health Adoption Intention

Figure 2 illustrates the relationship between computer anxiety and digital health adoption intention among healthcare workers. A statistically significant negative correlation was observed between computer anxiety and adoption intention (r = −0.268, p < 0.001), indicating that healthcare workers with higher levels of computer anxiety tended to report lower intentions to adopt digital health systems.

As shown in Figure 2, the downward trend suggests that increasing anxiety toward computer use is associated with reduced willingness to engage with digital health technologies. Although the magnitude of the correlation was modest, computer anxiety demonstrated the strongest association with adoption intention among all variables examined.

To further explore this relationship, participants were categorized into low, moderate, and high computer anxiety groups (Figure 3). Healthcare workers with lower anxiety scores consistently exhibited higher digital health adoption intention scores compared with those reporting moderate or high anxiety. This finding suggests that psychological barriers related to technology use may play a more important role in digital health adoption than prior computer experience alone.

Hierarchical Regression Analysis of Factors Associated with Digital Health Adoption Intention

Table 4 presents the hierarchical linear regression models examining the association between computer experience, computer anxiety, and digital health adoption intention among healthcare workers. In Model 1, computer experience variables explained only a small proportion of the variation in digital health adoption intention (R^2 = 0.011). None of the computer experience indicators, including computer training, computer access at work or home, years of computer use, and hours of computer use per day, were significantly associated with adoption intention.

In Model 2, computer anxiety emerged as a significant predictor of digital health adoption intention. Higher levels of computer anxiety were associated with lower adoption intention scores (β = -0.200, 95% CI: -0.259 to -0.142, p < 0.001), and computer anxiety alone explained 6.9% of the variation in adoption intention (R^2 = 0.069), substantially more than the computer experience variables.

When computer experience and computer anxiety were included simultaneously in Model 3, computer anxiety remained a strong and statistically significant predictor of adoption intention (β = -0.205, 95% CI: -0.269 to -0.142, p < 0.001). In contrast, none of the computer experience variables were independently associated with adoption intention after accounting for anxiety. Model 3 provided the best overall fit to the data, with the lowest Akaike Information Criterion (AIC = 1621.04) and Bayesian Information Criterion (BIC =

1655.91), indicating the most parsimonious model.

The findings remained largely unchanged in the fully adjusted model (Model 4), which controlled for age, gender, qualification, occupation, and health-sector experience. Computer anxiety continued to be the only statistically significant predictor of digital health adoption intention (β = -0.212, 95% CI: -0.277 to -0.147, $p < 0.001$). None of the demographic, professional, or computer experience variables were significantly associated with adoption intention. These results suggest that computer anxiety is a more important determinant of digital health adoption intention than computer experience or socio-demographic characteristics among healthcare workers in Malawi.

Discussion

This study examined the relative importance of computer experience and computer anxiety in shaping digital health adoption intention among healthcare workers in Malawi. Three key findings emerged. First, healthcare workers reported generally high levels of digital health adoption intention and relatively low levels of computer anxiety. Second, computer anxiety was negatively associated with adoption intention and emerged as the strongest predictor of adoption intention in multivariable analyses. Third, although computer experience and DHS training were associated with adoption intention at the bivariate level, these associations diminished after accounting for computer anxiety, suggesting that psychological readiness may be more important than technical familiarity in determining willingness to adopt digital health technologies.

An encouraging finding of this study is the generally high level of digital health adoption intention observed among healthcare workers. Participants reported strong intentions to adopt and use digital health systems, suggesting a favourable environment for digital transformation within the Malawian health sector. This finding is consistent with growing evidence from low- and middle-income countries showing increasing acceptance of digital health technologies among healthcare workers, particularly as governments continue to invest in electronic health records, telemedicine platforms, and digital health information systems1. The high reliability observed for the adoption intention scale further strengthens confidence that the construct was measured consistently across participants.

The most important finding, however, is the prominent role of computer anxiety. Healthcare workers who reported higher levels of computer anxiety consistently exhibited lower intentions to adopt digital health systems. This relationship was evident in the correlation analyses and remained statistically significant across all regression models, even after adjusting for socio-demographic characteristics, professional background, and computer experience indicators. These findings are consistent with the Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology, which suggest that emotional responses toward technology influence perceived ease of use and behavioural intentions[6,10]. Healthcare workers who experience anxiety when interacting with digital technologies may be more likely to perceive digital systems as difficult, intimidating, or disruptive to their workflow, thereby reducing their willingness to adopt them.

These findings are also consistent with findings from previous studies examining the adoption of electronic health records, telemedicine systems, and other digital health innovations. Several studies have identified technology-related anxiety as a significant barrier to digital health implementation among healthcare professionals[4,13,14]. Recent evidence from low-resource settings similarly highlights the importance of confidence, self-efficacy, and attitudes toward technology in determining successful implementation of digital health interventions[2,7]. Together, these studies suggest that technological adoption is influenced not only by access to technology but also by users' perceptions and emotional responses to it.

In this study, computer experience alone was a relatively weak predictor of adoption intention. Although healthcare workers with higher adoption intentions were more likely to have received DHS training and reported more years of computer use, these relationships disappeared after computer anxiety was included in the regression models. This suggests that the benefits of computer experience may operate indirectly through reducing anxiety and increasing confidence. The negative correlation observed between computer anxiety and years of computer use supports this interpretation. Individuals who have accumulated more experience using computers may become more comfortable with technology over time, leading to lower anxiety levels and greater openness toward digital innovations. Similar conclusions have been reported in previous studies showing that confidence and self-efficacy often mediate the relationship between computer experience and technology adoption[8,15].

The correlation analysis provides further insight into these relationships. While computer anxiety showed the strongest association with adoption intention, years of computer use demonstrated only a weak positive correlation. This pattern reinforces the argument that familiarity with computers alone may not be sufficient to drive adoption behaviour. Instead, what appears to matter most is whether healthcare workers feel comfortable and confident when interacting with technology. The strong correlation between age and health-sector experience was expected and reflects normal career progression rather than any meaningful influence on digital health adoption.

Interestingly, socio-demographic and professional characteristics were not significantly associated with adoption intention. Age, gender, educational attainment, occupation, and years of professional experience did not appear to influence healthcare workers' willingness to adopt digital health systems. These findings suggest that resistance to digital health technologies is not concentrated within specific demographic groups. Rather, psychological factors such as confidence and anxiety may be more important determinants of adoption behaviour. Similar observations have been reported in studies conducted in low- and middle-income countries, where organisational support, perceived usefulness, and technology-related attitudes often outperform demographic factors in explaining technology acceptance[1].

The findings have important implications for digital health policy and implementation. Many digital health programmes focus primarily on infrastructure development, equipment provision, and technical training. While these investments remain essential, the present study suggests that they may not be sufficient on their own. Efforts to improve digital health adoption should also address psychological barriers

to technology use. Practical hands-on training, mentorship programmes, supportive supervision, continuous user support, and user-centred system design may help build confidence and reduce anxiety among healthcare workers. Such approaches may be particularly important in resource-constrained settings where opportunities for technology exposure are often limited.

Conclusion

This study examined the relative importance of computer experience and computer anxiety in shaping digital health adoption intention among healthcare workers in Malawi. Although bivariate analyses indicated that greater computer experience was associated with higher adoption intention, hierarchical regression analyses showed that computer anxiety was the only consistent and statistically significant predictor after controlling for computer training, access, years and hours of computer use, and socio-demographic and professional characteristics. These findings suggest that psychological readiness toward technology, rather than technical familiarity alone, is a key determinant of digital health adoption. Healthcare workers with higher levels of computer anxiety were significantly less likely to express intentions to adopt digital health systems, highlighting technology-related anxiety as a major barrier to digital transformation in Malawi's health sector.

The findings challenge the assumption that investments in infrastructure and technical training alone are sufficient to ensure successful digital health implementation. By demonstrating that computer anxiety exerts a stronger influence on adoption intention than experience-related factors, this study underscores the importance of addressing psychological barriers alongside technical capacity building. Digital health programmes should therefore incorporate interventions such as hands-on practical training, peer mentoring, continuous user support, and user-centred system design to improve confidence and reduce anxiety. Addressing these barriers will be critical for achieving sustained adoption of digital health technologies and maximising their potential to strengthen healthcare delivery and improve health outcomes in Malawi and other resource-constrained settings.

Limitations

This study has several limitations. First, the cross-sectional design does not allow causal relationships between computer anxiety and digital health adoption to be established. Secondly, both computer anxiety and adoption intention were assessed using self-reported measures, which may be subject to reporting bias. Despite these limitations, the study provides valuable evidence on the relative importance of computer anxiety and computer experience in shaping digital health adoption intentions among healthcare workers in Malawi.

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Ethical approval and consent to participate

Ethical approval for the study was obtained from the Malawi University of Science and Technology Research Ethics Committee (MUSTREC) with ethical reference number P.04/2025/352.

Conflicts of Interest

The authors declare no conflict of interest

References

1.World Health Organization. Global strategy on digital health 2020–2025. Geneva: World Health Organization; 2021. Available from: https://www.who.int/docs/default-source/documents/gs4dhdaa2a9f352b0445bafbc79ca799dce4d.pdf

2.Mamuye A, Dagne T, Negash S. Sustainability of eHealth solutions in LMICs. JMIR Formative Research. 2023;7:e41487

3.Ministry of Health Malawi. Malawi Digital Health Strategy 2020–2025. Lilongwe: Ministry of Health; 2020.

4.Gagnon, Marie-Pierre et al. "Systematic review of factors influencing the adoption of information and communication technologies by healthcare professionals." Journal of medical systems vol. 36,1 (2012): 241-77. doi:10.1007/s10916-010-9473-4

5.Nkoloma M, Gombachika H, Mikeka C, Maluwa A. Key factors influencing intention to use digital health systems among healthcare workers in Malawi. Malawi Med J. 2026;38(1).

6.Venkatesh V, Morris MG, Davis GB, Davis FD. User acceptance of information technology: toward a unified view. MIS Q. 2003;27(3):425–78.

7.Kostkova P. Grand Challenges in Digital Health. Front. Public Health. 2015; 3:134. doi: 10.3389/fpubh.2015.00134

8.Igbaria, Magid and Saroj Parasuraman. "A Path Analytic Study of Individual Characteristics, Computer Anxiety and Attitudes toward Microcomputers." Journal of Management 15 (1989): 373 - 388.

9.Holden RJ, Karsh BT. The Technology Acceptance Model: its past and its future in health care. J Biomed Inform. 2010;43(1):159–72.

10.Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Q. 1989;13(3):319–40.

11.Cronbach LJ. Coefficient alpha and the internal structure of tests. Psychometrika. 1951;16(3):297–334.

12.Iacobucci D, Posavac SS, Kardes FR, Schneider MJ, Popovich DL. The median split: robust, refined, and revived. Journal of Consumer Psychology. 2015;25(4):690–704.

13.Kruse CS, Kothman K, Anerobi K, Abanaka L. Adoption factors of the electronic health record: a systematic review. JMIR medical informatics. 2016 Jun 1;4(2):e19.

14.Saleh H, Lundborg CS, Sharma M. Perceived benefits and barriers of medical doctors regarding electronic medical record systems in an Indian private-sector healthcare facility. BMC Health Services Research. 2025 May 19;25(1):719.

15.Rahimi B, Nadri H, Lotfnezhad Afshar H, Timpka T. A systematic review of factors affecting adoption and use of electronic health records. J Med Syst. 2018;42(12):1–20.

16.Ashmawy R, Saleh A, Elnakib M, Wahdan I. Acceptance of e-consultation services in hospitals: modified TAM questionnaire. J Egypt Public Health Assoc. 2025;100(1):1–11. doi:10.1186/s42506-025-00187-x.

17.Kumpulainen H, Laitinen A, Rantanen M. ICT acceptance in social and healthcare contexts. Int J Hum Comput Stud. 2025;190:103219.