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Smartwatch Adoption for Well-Being: The Role of Health Motivation and Performance Expectancy among Teachers

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ABSTRACT

Teachers face increasing pressures related to workload, stress, and health issues, which can negatively impact their productivity and well-being. As a response, smartwatches are a form of wearable technology which offer potential solutions through real-time health monitoring and productivity support. Despite this promise, empirical research on smartwatch adoption among teachers in Malaysia, particularly in the northern region, remains scarce. This study investigates the key determinants influencing smartwatch adoption among school teachers in Perlis by integrating two theoretical frameworks: the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Health Belief Model (HBM). Specifically, the study examines the effects of Health Motivation (HM) and Performance Expectancy (PE) on smartwatch adoption. A quantitative, cross-sectional research design was employed, and data were collected from 500 teachers using a stratified sampling method. The data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM). The findings indicate that both HM and PE significantly influence teachers' adoption of smartwatches. The findings provide practical implications for technology developers and policymakers by identifying key factors that can guide the design of smartwatch features and the formulation of digital well-being initiatives for educators. These insights support evidence-based decisions to promote the adoption of smartwatch technology in the education sector. This study contributes original insights to the limited literature on smartwatch adoption in educational settings, particularly in underexplored regions such as northern Malaysia.

Keywords: Health Motivation, Performance Expectancy, Smartwatch Adoption, Teachers

1. INTRODUCTION

In recent years, the integration of advanced technologies into various sectors has transformed the nature of management, prompting a shift from traditional administrative roles to technology-driven systems (Gutterman, 2023). Technology management is defined as the planning, development, and execution of technological capabilities to align with strategic objectives has become essential for maintaining competitiveness in today's rapidly evolving environment (National Research Council, 1987). Modern technologies such as Artificial Intelligence (AI), Cloud Computing, and the Internet of Things (IoT) are revolutionising industries through enhanced automation, scalability, and decision-making capabilities (Douglas & Christian, 2024).

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One emerging area of interest within this technological evolution is wearable technology (WT), particularly smartwatches. These devices offer real-time health tracking, productivity monitoring, and instant communication functionalities, making smartwatches suitable for various sectors, including education (Mehdi & Alharby, 2016). In line with the United Nations' 2030 Agenda for Sustainable Development, WT contributes to several Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being) and SDG 4 (Quality Education) (Lafuente-Lechuga et al., 2021; Vinuesa et al., 2020). Smartwatches are closely aligned with the goals of Industry 4.0 and Industry 5.0, which emphasise the convergence of human well-being and technological advancement (Xu et al., 2019). These devices support human-machine collaboration and workplace personalisation by enabling individuals to monitor health indicators and manage stress more effectively (Dunne et al., 2007; Izu et al., 2024). In Malaysia, the government has recognised the potential of wearable technology through strategic initiatives to digitalise healthcare and education systems (PwC Malaysia, 2021; Li, 2021).

Globally, WT adoption is increasing. Recent surveys indicate that approximately 30% of Malaysians own some form of wearable device, with 65% using smartwatches for health and fitness tracking (Statista, 2023). While research into consumer usage of WT is growing, there is a noticeable gap in understanding how educators engage with this technology, especially in regions like Perlis. Smartwatches offer unique advantages in education, such as stress monitoring, productivity support, and health awareness, but their use among teachers remains underexplored (Al-Emran, 2021; Manning et al., 2023). In the educational context, wearables have been shown to support both formal and informal learning experiences. Studies suggest that smartwatches enhance personal engagement and provide contextual feedback, particularly when used for behaviour tracking and passive learning (De Arriba-Pérez et al., 2017; Seim et al., 2018). For teachers, these devices can offer reminders, health prompts, and insight into work-related stress, thereby potentially improving job performance and well-being (Almusawi et al., 2021; Soltani & Morice, 2020).

In Malaysia, teachers face increasing workload pressures, extended working hours, and heightened stress levels due to administrative responsibilities and growing digital teaching demands (Rahman et al., 2024; Watermeyer et al., 2021; Hamid et al., 2024). These challenges have intensified concerns related to physical fatigue, mental well-being, and work–life balance among educators, thereby strengthening the relevance of health-oriented technologies such as smartwatches in the teaching profession. Furthermore, with the growing prevalence and capabilities of smartwatches, there remains a critical lack of empirical research on their adoption among school teachers in Malaysia, particularly in less-studied regions like Perlis. To address this gap, the present study focuses on identifying key adoption factors, specifically HM and PE, and their impact on teachers' intention to adopt smartwatches. HM reflects a teacher's internal drive to maintain personal well-being, while PE captures beliefs about whether using the smartwatch will enhance teaching performance. By examining these factors through the lens of established theoretical models such as UTAUT and HBM, the study seeks to develop a deeper understanding of smartwatch adoption dynamics in educational settings.

The findings aim to support strategic decisions by policymakers, education stakeholders, and technology developers in fostering a more supportive, health-conscious, and efficient teaching environment.

Given that, below are the research objectives of this study:

- To investigate the effect of HM on smartwatch adoption among Malaysian school teachers.
- To explore the effect of PE on smartwatch adoption among Malaysian school teachers.

2. LITERATURE REVIEW

This research is underpinned by two widely recognised theories in technology adoption, which are the HBM and the UTAUT. These models offer distinct but complementary viewpoints. HBM emphasises health behaviour, while UTAUT focuses on performance-related expectations. These 2 theoretical foundations form a strong theoretical basis for examining smartwatch adoption among school teachers in Malaysia.

HBM, developed to explain health-related actions, proposes that individuals are more likely to take preventive health measures if they perceive themselves to be at risk, recognise the seriousness of potential health issues, and believe that a particular behaviour, such as using health technology which can reduce that risk (Glanz et al., 2015; Rosenstock et al., 1988). Within this study, HM is drawn from the HBM framework and reflects a teacher's personal desire to safeguard or enhance their health. Given the stressful nature of the teaching profession, teachers who are highly motivated to maintain their health may be more inclined to use smartwatches as tools for health monitoring and self-care (Agyemang-Duah et al., 2020; Cheung et al., 2019).

The UTAUT, introduced by Venkatesh et al. (2003) consolidates concepts from multiple earlier models of technology acceptance. It identifies several key factors that influence an individual's intention to adopt technology, including performance expectancy, effort expectancy, social influence, and facilitating conditions. Among these variables, PE is the belief that using a technology will improve job performance, which is often found to be the strongest predictor of adoption behaviour (Marikyan & Papagiannidis, 2023; Venkatesh et al., 2003). In educational environments, teachers may see smartwatches as beneficial for enhancing productivity, managing schedules, or improving work organisation. If teachers believe that these devices will positively impact their performance, their likelihood of adopting them increases.

By integrating HBM and UTAUT, this study aims to provide a comprehensive understanding of the factors influencing smartwatch adoption. While HBM addresses personal health concerns, UTAUT explains the professional and functional advantages perceived by users. This combined approach recognises that educators may be driven by both a desire to stay healthy and a need to perform their tasks more effectively. Few prior studies have merged these two frameworks in the context of education, making this research an important step toward understanding wearable technology adoption from both a health and performance perspective (Baba et al., 2019; Chen et al., 2023).

Table 1 Definition of Latent Variable

Latent Variable	Definition
Smartwatch Adoption (SA)	Conceptualised as a behavioural intention or decision-making process in which individuals choose to accept and use smartwatches.
Health Motivation (HM)	Encompasses attitudes, beliefs, and subjective norms related to health-related actions and represents the importance that an individual places on maintaining or improving their health.
Performance Expectancy (PE)	The belief that using a technology will improve job performance, which often found to be the strongest predictor of adoption behaviour

In conclusion, the literature supports the growing relevance of WT in enhancing health and productivity, yet its application in the teaching profession, especially in Malaysia, remains underexamined. By focusing on HM and PE, this study provides a targeted investigation into the

personal and professional motivations that influence smartwatch adoption, contributing valuable insights to both academic research and policy development in education and digital health.

HM refers to an individual's internal drive to maintain or improve their personal health. According to the HBM, individuals are more likely to engage in health-related behaviours, including the use of digital health tools, when they recognise potential health risks and believe that taking preventive actions will be beneficial (Glanz et al., 2015; Orji et al., 2012). In the context of teaching, a profession often associated with high stress levels and limited time for self-care, meanwhile functions of smartwatches offer real-time health tracking and stress management features that can support well-being (Manning et al., 2023). Previous research has shown that individuals who are health-motivated are more inclined to adopt wearable technologies, especially those offering features such as heart rate monitoring, physical activity tracking, and stress alerts (Agyemang-Duah et al., 2020; Cheung et al., 2019). Therefore, it is reasonable to expect that teachers with higher health motivation will be more likely to adopt smartwatch technology as a tool for maintaining personal wellness.

Moreover, PE as defined in the UTAUT framework, is the degree to which an individual believes that using a technology will enhance their job performance (Venkatesh et al., 2003). In educational settings, teachers often face multiple responsibilities that require effective time management, task tracking, and efficient communication. Smartwatches, with features such as calendar reminders, notification syncing, and quick access to alerts, have the potential to improve professional efficiency (Al-Emran, 2021; Gopinath et al., 2022). Studies consistently show that PE is one of the most significant predictors of behavioural intention to adopt new technologies, particularly when users perceive clear benefits to their productivity and job effectiveness (Marikyan & Papagiannidis, 2023). For teachers, the perception that smartwatches can streamline day-to-day activities and support classroom readiness could increase their willingness to adopt such devices.

Therefore, the researchers proposed that:

- H_1: Health Motivation (HM) has a positive effect on Smartwatch Adoption.
- H_2: Performance Expectancy (PE) has a positive effect on Smartwatch Adoption.

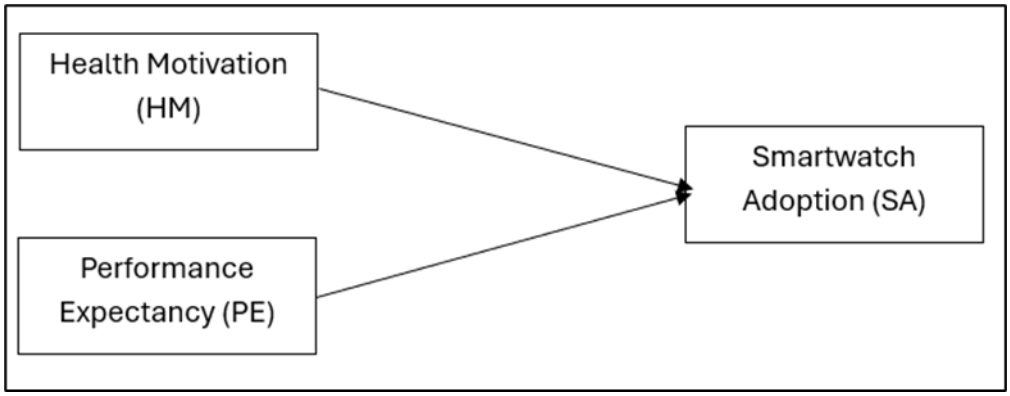

Figure 1. Research Framework

Although the UTAUT includes additional constructs such as Effort Expectancy and Social Influence, this study intentionally adopts a simplified conceptual model focusing on HM and PE. This decision was guided by contextual relevance. The study examines voluntary smartwatch adoption rather than mandatory system use, where focusing on analysing health concerns and performance benefits is expected to play a more dominant role. HM represents internal health-related motivation derived

from the HBM, while PE reflects functional usefulness as emphasised in UTAUT (Venkatesh et al., 2003; Chin, 1998). Prior research supports the theoretical robustness of simplified models when constructs are closely aligned with the study objectives and context.

3. RESEARCH METHODOLOGY

This study employed a stratified sampling approach to ensure proportional representation of school teachers across different geographical areas and school levels in Perlis, Malaysia. The population was first divided into relevant strata based on location and type of school, consistent with the study objectives. Data collection was then conducted through online questionnaires distributed via professional networks and voluntary participation channels to facilitate access to respondents within each stratum. While online distribution relied on professional networks for practicality, the sampling structure remained stratified. Nevertheless, as participation within each stratum depended on respondent availability and willingness, the findings should be interpreted with caution in terms of broader generalisability. To capture a broad perspective on smartwatch adoption, the sample included teachers from various academic disciplines, teaching levels, and income groups. A structured questionnaire was used as the primary instrument, comprising validated measurement items for each construct. The questionnaire also captured demographic information such as age, gender, and school level.

Furthermore, data collection was conducted through a structured online questionnaire distributed via Google Forms, which allowed for efficient dissemination and real-time response tracking. Participants received detailed information about the research, including its objectives, the benefits of participation, assurances of confidentiality, and the voluntary nature of the study. Prior to beginning the survey, each respondent signed an informed consent form, indicating their willingness to participate. The data collection period was from 1st April 2025 to 30th June 2025, during which 500 valid responses were collected, representing a strong participation rate. Personal information remained anonymous unless participants consented to share it for potential future contact.

3.1 Data Analysis

The data collected from teachers in Malaysia were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM), a statistical technique well-suited for examining complex relationships between constructs in a theoretical model. This approach was selected because the smartwatch adoption framework developed in this study includes multiple interacting variables, making PLS-SEM ideal due to its capacity to accommodate such complexity. Additionally, PLS-SEM is robust with moderate sample sizes. In this case, the sample consisted of 500 teachers in Perlis, and PLS-SEM does not require the data to be normally distributed, which is advantageous given the use of Likert-scale survey responses. This methodology is particularly beneficial for theory development and model testing. In this study, it facilitated the evaluation of how independent variables, specifically HM and PE influence the dependent variable, SA. PLS-SEM also supports the prediction and assessment of relationships among multiple constructs, making it highly appropriate for exploring the dynamics of wearable technology adoption among educators.

The analysis process was conducted in two main stages. The first stage involved assessing the measurement model to ensure the constructs were measured reliably and validly. This included evaluating indicator reliability, internal consistency, convergent validity, and discriminant validity within a reflective measurement framework. The second stage focused on the structural model, where the hypotheses were tested. This phase included examining path coefficients, determining

effect sizes, evaluating predictive relevance (Q^2), and analysing moderation effects, such as the role of gender in the adoption framework. Together, these stages provided a comprehensive understanding of the factors influencing smartwatch adoption in the educational context.

3.2 Ethical Considerations

This study adhered strictly to ethical research principles, prioritising participant welfare, informed consent, and data confidentiality. All participants were fully briefed on the study's objectives, procedures, and their rights, including the right to withdraw at any time without penalty. Anonymity was preserved by assigning identification codes, and all collected data were treated with strict confidentiality. Privacy protection was extended through the secure handling of potentially sensitive information, particularly health-related smartwatch usage data. The research design emphasised minimising any emotional or psychological discomfort by ensuring clear, respectful, and non-intrusive questionnaire items. The study operated under the ethical oversight of Universiti Malaysia Perlis (UniMAP), from which formal approval was obtained. The research was guided by the principles of beneficence, non-maleficence, integrity, and respect for autonomy, reflecting a commitment to ethical transparency and responsibility throughout the research process.

4. RESULTS AND DISCUSSION

4.1 Participant Recruitment and Data Collection

Table 2 Respondent Demographics

Variable	Category	Frequency	Percentage
Gender	Male	272	54.4%
	Female	228	45.6%
Ethnicity	Malay	352	70.4%
	Indian	93	18.6%
	Chinese	55	11%
Age	29 and below	56	11.2%
	30 – 39	272	54.4%
	40 – 49	111	22.2%
	50 and above	61	12.2%
Education Level	Diploma	24	4.8%
	Bachelor's Degree	421	84.2%
	Master's Degree	40	8%
	Doctorate	15	3%
Type of School	Primary	239	47.8%
	Secondary	261	52.2%
Teaching Area	Kangar	220	44%
	Arau	121	24.2%
	Padang Besar	159	31.8%
Gross Personal Monthly Income Level	RM 3,500 and below	66	13.2%
	RM 3,501 – RM 5,000	110	22%
	RM 5,001 – RM 8,000	130	26%
	RM 8,001 – RM 12,000	135	27%
	RM 12, 001 and above	59	11.8%
Subject(s) Taught	Sciences (including Physics / Chemistry / Biology)	34	6.8%
	Mathematics and Additional Mathematics	55	11%
	Physical Education and Health	50	10%

Variable	Category	Frequency	Percentage
	Arts and Music	72	14.4%
	Language	65	13%
	History and Geography	65	13%
	Technology, Technical and Skills	72	14.4%
	Religious and Moral Education	52	10.4%
	Business, Accounting and Economics	35	7%

The demographic profile of the participants revealed a balanced gender distribution, with 54.4% male and 45.6% female teachers. The sample primarily consisted of Malay teachers (70.4%), followed by Indian (18.6%) and Chinese (11%) educators. In terms of age, the majority of respondents were aged 30–39 years (54.4%), with 22.2% aged 40–49, 11.2% under 30, and 12.2% aged 50 and above, offering a broad age representation.

Moreover, regarding educational qualifications, 84.2% held a Bachelor's degree, 8% had a Master's degree, and 3% possessed a Doctorate, while 4.8% had a Diploma. The study also ensured balanced representation across teaching levels, with 47.8% teaching in primary schools and 52.2% in secondary schools. Geographically, participants were drawn from Kangar (44%), Arau (24.2%), and Padang Besar (31.8%), covering the main teaching areas in Perlis.

Furthermore, income levels among the respondents varied, with 53% earning between RM 5,001 – RM 12,000, 13.2% earning below RM 3,500, and 11.8% earning above RM 12,001, reflecting a range of economic backgrounds. The respondents also represented a variety of subject areas, including Arts & Music (14.4%), Technology & Skills (14.4%), History & Geography (13%), and Language (13%), among others, ensuring wide academic representation.

This diverse and well-balanced sample strengthens the validity and generalisability of the study. By including teachers from various demographics and professional backgrounds, the research offers valuable insights into smartwatch adoption patterns within the Malaysian education context, potentially guiding future strategies for technology integration in schools.

Data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) with the SmartPLS 4.0 software. This method was selected due to the model's predictive orientation and its ability to accommodate formative and reflective constructs. The procedure involved the evaluation of the measurement and structural models and was finalised with hypothesis testing.

4.2 Measurement Model

Descriptive analysis showed a balanced demographic distribution among respondents in terms of gender, age, and teaching experience. Most teachers reported moderate familiarity with wearable technology, and a sizable portion had not previously used smartwatches, indicating a promising opportunity for adoption.

The measurement model met all reliability and validity requirements, with high composite reliability and acceptable average variance extracted (AVE) values for each construct. Discriminant validity was confirmed using the Heterotrait-Monotrait (HTMT) criterion.

Table 3 Measurement Model Validity and Reliability Indicators.

Latent Variable	Indicators	Indicator Loading	rho_A	AVE	Validity	Reliability
Smartwatch Adoption (SA)	SA1	0.850	0.907	0.675	Yes	Yes
	SA2	0.773				
	SA3	0.868				
	SA4	0.864				
	SA5	0.810				
	SA6	0.758				
Health Motivation (HM)	HM1	0.789	0.859	0.609	Yes	Yes
	HM2	0.834				
	HM3	0.791				
	HM4	0.723				
	HM5	0.765				
Performance Expectancy (PE)	PE1	0.825	0.865	0.585	Yes	Yes
	PE2	0.756				
	PE3	0.758				
	PE4	0.711				
	PE5	0.759				
	PE6	0.776				

Table 3 shows the results of the measurement model assessment, which confirms the reliability and validity of the constructs examined in this study. SA, HM, and PE. The indicator loadings for all items within each latent variable exceeded the acceptable threshold of 0.70, demonstrating strong factor loadings and ensuring that each item meaningfully contributes to its respective construct. For SA, the six indicators exhibit high loadings, ranging from 0.758 to 0.868, with rho_A = 0.907 and AVE = 0.675, confirming both reliability and validity. The high AVE value indicates that more than 67.5% of the variance in SA is explained by its indicators, further solidifying its construct validity. This suggests that teachers' intention to adopt smartwatches is effectively captured by these measurement items.

Similarly, HM demonstrates strong reliability (rho_A = 0.859) and validity (AVE = 0.609), with indicator loadings between 0.723 and 0.834. The AVE value exceeding 0.50 indicates that the construct appropriately captures the intended concept, reinforcing the role of health-related motivation in smartwatch adoption. This confirms that teachers who prioritise their health are more likely to consider WT as part of their daily routines. For PE, the six indicators also show high loadings (0.711 to 0.825), ensuring consistent measurement within the construct. The reliability coefficient (rho_A = 0.865) and validity (AVE = 0.585) confirm that PE is a robust predictor of smartwatch adoption. The AVE value suggests that nearly 59% of the variance in PE is captured by its indicators, reinforcing the notion that teachers see smartwatches as effective tools for enhancing productivity and improving efficiency.

Overall, the high reliability and validity across all three constructs ensure the measurement model's robustness, supporting the subsequent structural analysis. The findings affirm that HM and PE play critical roles in influencing Smartwatch Adoption among teachers, providing a strong theoretical basis for understanding wearable technology acceptance in educational settings.

Table 4 Discriminant Validity (as per the HTMT)

Hypothesis	Heterotrait-monotrait ratio (HTMT)
PE <-> HM	0.091
SA <-> HM	0.258
SA <-> PE	0.304

Discriminant validity assesses whether the constructs in a model are distinct from one another, ensuring that each variable measures a unique concept rather than overlapping with others. The heterotrait-monotrait (HTMT) ratio of correlations is a widely used criterion for evaluating discriminant validity (Hair et al., 2021). HTMT values below the threshold of 0.85 indicate sufficient discriminant validity, confirming that constructs are empirically distinct (Hair et al., 2021).

In this study, the HTMT values in Table 4 demonstrate that HM and PE are clearly differentiated, as reflected by their low correlation (HTMT = 0.091). This suggests that while both constructs influence smartwatch adoption, they represent separate dimensions, where HM focuses on personal health-related motivations, while PE is centred on performance and efficiency perceptions. Similarly, the relationship between SA and HM yields an HTMT value of 0.258, confirming that smartwatch adoption is influenced by health motivation but remains conceptually distinct. This aligns with prior research emphasising that individuals motivated by health concerns are more likely to adopt wearable technologies. However, smartwatch adoption is also driven by other factors beyond health-related motivations.

Lastly, the HTMT ratio between SA and PE is 0.304, indicating that performance-related benefits play a role in adoption without overshadowing other influences. This reinforces the idea that teachers perceive smartwatches as valuable productivity tools while simultaneously considering additional adoption drivers such as health awareness and usability. Overall, the low HTMT values across all construct pairs confirm strong discriminant validity, meaning that the study's measurement model is well-structured, with each factor capturing distinct aspects of smartwatch adoption behaviour among school teachers in Malaysia.

4.3 Hypotheses Testing

Table 5 Hypothesis Result

Hypothesis Number	Hypothesis	β Value	T Value	p Value	Hypothesis Testing Outcome
H_1	Health Motivation (HM) → Smartwatch Adoption (SA)	0.224	5.607	0.000	Supported
H_2	Performance Expectancy (PE) → Smartwatch Adoption (SA)	0.267	6.292	0.000	Supported

Table 5 shows the hypothesis results of H_1 and H_2. HM shows a positive and significant effect on SA ($\beta = 0.224$, $p = 0.000$, $t = 5.607$), confirming H_1 as significant. This indicates that teachers who are motivated to maintain their health are more likely to adopt smartwatches for personal well-being and productivity. Similarly, PE also demonstrates a strong correlation with Smartwatch Adoption ($\beta = 0.267$, $p = 0.000$, $t = 6.292$), supporting H_2. This result suggests that teachers perceive smartwatches as valuable tools that enhance efficiency and performance, increasing their likelihood of adoption.

4.4 Coefficient of Determination (R^2)

The R^2 value, or coefficient of determination, indicates how much of the variation in the dependent variable. In this case, SA can be accounted for by the independent variables, HM and PE. In this study, the R^2 value is 0.124, which means that 12.4% of the variance in smartwatch adoption among teachers is explained by the model. Based on the guidelines provided by Chin et al., (1998), an R^2 value of 0.19 is considered weak, 0.33 moderate, and 0.67 substantial. Therefore, the value obtained in this research reflects a relatively weak level of explanatory power.

The R^2 indicates that HM and PE explain a modest proportion of variance in smartwatch adoption among teachers. Such R^2 values are not uncommon in behavioural and social science research, where technology adoption decisions are influenced by complex and context-specific factors (Chin, 1998). In this study, teachers' adoption behaviour may also be shaped by school policies, peer influence, access to technology, and personal routines, which were not included in the current model. Importantly, the significant path coefficients indicate that HM and PE are meaningful predictors of adoption, providing theoretical support for the dual influence of health and performance motivations. Future research can expand the model by incorporating additional constructs to improve explanatory power while retaining the core insight provided by the present findings.

5. CONCLUSION, IMPLICATION, LIMITATIONS AND RECOMMENDATIONS

5.1 Conclusion

This study set out to understand what encourages teachers to adopt smartwatches, with a focus on two main factors, HM and PE. Based on responses from 500 teachers in Perlis and analysed using PLS-SEM, the findings clearly show that both HM and PE play meaningful roles in influencing teachers' intention to use smartwatches. In other words, teachers are more likely to consider smartwatches when they are concerned about their health and believe the device can help them perform better in their daily tasks. From a research point of view, this study provides a fresh perspective by combining two different models, one that focuses on health behaviour and another on technology usage. While past research often focused on one or the other, this study brings both together to better understand WT use in schools. Although only two factors were tested, the results show they are both significant, and the model helps explain part of the decision-making process behind smartwatch adoption.

In real-life terms, the study provides useful suggestions for schools, education leaders, and tech companies. If the goal is to increase smartwatch usage among teachers, then efforts should focus on showing how these devices can make teaching more efficient and also support teachers' personal health. Campaigns, training, or programmes that explain and demonstrate these benefits could lead to higher adoption. However, the study also has its limits. Since it only looked at teachers in Perlis and focused on two variables, the results may not apply to all teachers across Malaysia or in other professions. Besides, because the data were collected at one point in time, it does not show how opinions or behaviour may change over time.

To build on these findings, future research could explore other important factors such as peer influence, ease of use, or cost. It would also be helpful to study a wider group of people and use methods that track changes over time. This could lead to a better understanding of how smartwatch usage grows and what helps or stops people from adopting the technology in the long term. This

research adds valuable knowledge to the area of WT in education. It highlights that both health awareness and the need for better performance can lead teachers to consider smartwatches as useful tools in their professional and personal lives.

5.2 Implications

This study helps improve existing theories by combining two popular models, the HBM and the UTAUT. These models are often used in different types of research where HBM is mostly used to study health behaviours, while UTAUT is used to study technology use. This study brings them together to explain why teachers might want to use smartwatches. The results show that HM has a strong effect. Teachers who care about their health are more likely to use smartwatches because they believe the devices can help them monitor things like stress, heart rate, or activity levels. This shows that even though teachers are not health professionals, their concern for personal health can still lead them to use health-related technology. In addition, PE also had a strong and positive effect. Teachers who believe smartwatches can help them manage time, stay organised, or be more productive are more likely to use them. This supports the idea that when people believe technology will help them do their job better, they are more willing to use it. So, this study helps prove that both health goals and work goals can influence whether someone chooses to adopt a smartwatch.

This study also makes a helpful contribution by creating a simple model that still works well. Instead of using many different factors, the study focuses only on two, HM and PE. Even with just these two, the model was able to explain part of why teachers decide to use smartwatches. This means researchers do not always need a complicated model to understand user behaviour. The model also shows how two different ideas, where health behaviour and technology use can be combined to study wearable devices. This is especially useful because smartwatches are both health tools and technology tools. Future researchers can build on this model by adding more factors, testing it in other professions, or using it in other regions.

From a practical perspective, the findings provide valuable insights for schools, education policymakers, and technology developers seeking to promote smartwatch adoption among teachers. The results suggest that adoption initiatives should emphasise two core value propositions, which are performance enhancement and health support. For schools and education authorities, professional development programmes can be designed to demonstrate how smartwatches assist teachers in monitoring stress levels, receiving movement reminders, and tracking sleep patterns, while simultaneously supporting task efficiency through scheduling assistance, quick notifications, and time management functions. The study also offers practical guidance for technopreneurs and wearable technology developers targeting the education market.

Smartwatch features such as automated lesson duration reminders, classroom-appropriate stress monitoring, brief guided breathing or relaxation modules between teaching sessions, and intelligent notification filtering can enhance perceived usefulness among teachers. By aligning smartwatch functionalities with classroom realities and teachers' daily routines, technology developers can increase the relevance and adoption potential of wearable devices in educational settings (Al-Emran, 2021; Manning et al., 2023).

Furthermore, by focusing on teachers in Perlis, this study addresses an important contextual gap in the literature, which has predominantly concentrated on urban populations or general users. The findings provide empirical insights into the needs of educators in a smaller and less urbanised state, offering implications that may be transferable to other rural or less-developed regions in Malaysia and comparable contexts internationally.

5.3 Limitations and Recommendations

While this study provides meaningful insights into smartwatch adoption among teachers, it is important to acknowledge several limitations that may affect the interpretation and generalisability of the findings. First, the study only focused on two independent variables, HM and PE. Although both were found to have a significant positive influence on SA, the model explained only 12.4% ($R^2 = 0.124$) of the variance. This suggests that many other factors may also contribute to teachers' decisions to adopt or reject smartwatch technology. Variables such as social influence, ease of use, cost, technology anxiety, or support from schools could be important but were not included in the current model.

Second, this study focused on secondary school teachers in Perlis, Malaysia. A stratified sampling approach was employed to ensure representation across schools within the state. Given that teachers in Perlis share similar technology exposure, adhere to the same policies, and operate under comparable administrative expectations, the findings can be considered generalisable within this context. Nonetheless, teachers' technology adoption behaviour may differ in other states, urban areas, or educational systems with varying infrastructure, culture, or policy frameworks.

Third, the study used a cross-sectional design, meaning the data were collected at a single point in time. This approach does not allow for tracking changes in behaviour or perception over time. Teachers' opinions about smartwatches might evolve as they gain more exposure to the technology, face new health challenges, or experience changes in their work environment. Therefore, the current findings only reflect their views at the time of the survey and may not capture long-term adoption behaviour.

Based on these limitations, several recommendations can be made for future research. Future studies are encouraged to expand the model by incorporating additional constructs and explicitly examining Social Influence as a moderating variable, given that teaching is a highly collaborative profession where peer norms, collegial support, and school culture may significantly shape technology adoption decisions. Second, future research should involve more diverse samples, including teachers from other states, educators from different school types (public and private), and even professionals from other industries. This would allow comparisons between groups and make the findings more general and useful for broader applications.

Lastly, future researchers are encouraged to use longitudinal research designs to track changes over time or adopt mixed-method approaches that combine surveys with interviews or focus groups. This can offer richer insights into why users adopt or reject wearable technology and what practical challenges they may face. For example, a teacher might initially resist smartwatches but subsequently adopt them later due to health reasons or school policy changes. Understanding these changes can help educators, policymakers, and technology providers create better strategies to support long-term adoption.

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