INNOVATIONS IN BLOOD PRESSURE MONITORING: PHYSICAL THERAPISTS' ACCEPTANCE OF SMARTWATCH FOR PATIENT SELF-MONITORING

Lumagui, John P.
University of Perpetual Help - Dr. Jose G. Tamayo Medical University
PHILLIPINES

Rodriguez, Nathan Gabriel P.
University of Perpetual Help - Dr. Jose G. Tamayo Medical University
PHILLIPINES

Villariño, Cassandra Denise L.
University of Perpetual Help - Dr. Jose G. Tamayo Medical University
PHILLIPINES

Escueta, James Vincent S.
University of Perpetual Help - Dr. Jose G. Tamayo Medical University
PHILLIPINES

ABSTRACT

Blood pressure (BP) monitoring is a vital component of cardiovascular health assessment, yet its routine use is often hindered by accessibility issues and reliance on traditional instruments typically used by medical professionals. This study aimed to assess the acceptance of BP-monitoring smartwatches (wearable devices) among licensed Physical Therapists in Laguna, Philippines.

A quantitative descriptive research design was utilized, with data collected through an online survey administered after participants viewed a standardized video comparing a BP smartwatch with an aneroid sphygmomanometer. The survey measured behavioral intention, perceived ease of use, and overall acceptance using a validated Likert scale-based questionnaire.

Findings revealed that respondents demonstrated a moderately acceptable behavioral intention to use and recommend smartwatches for BP monitoring (mean = 3.63), perceived them as easy to use (mean = 3.88), and moderately accepted their integration into clinical practice (mean = 3.62). These results indicate a favorable outlook among Physical Therapists toward incorporating wearable BP-monitoring devices into patient care, particularly in telehealth and outpatient settings, to support proactive health management and advance digital health innovation.

Keywords: Blood pressure (BP) monitoring, smartwatches (wearable devices), overall acceptance, Physical Therapists, telehealth and outpatient settings

INTRODUCTION

The most indispensable aspect of life is undeniably health (Raoff & Durai 2022). Blood pressure is one of the most important indicators for monitoring the health of a person that all health practitioners are currently using, however important this indicator is it is the most commonly neglected because of several factors like accessibility to Blood pressure devices and available personnel to take the blood pressure of the individual. Blood pressure (BP) measurement is a very significant and crucial parameter for monitoring, controlling and treatment of cardiovascular health conditions (Kumar et al., 2020). In recent years, each small step of innovation lays the foundation to what is known today as the advanced healthcare system. Innovation is intended to make life easier and convenient for all individuals. The shift from traditional to modern approaches are necessary to address the increasing changes in the lifestyle of every individual, which are necessary actions to address increasing demographic growth and provide health necessity to all individuals. In light of the present problems, a technology that has the capability to do self-screen tests for blood pressure to the users is a

significant leap to detect potential health issues or diseases before symptoms appear and promote a culture of health awareness with the confidence of having a peace of mind since the device yield the same as that of the standard measurement device. The introduction of the latter could also help practitioners to determine patients' data of blood pressure readings without having the need of redundant blood pressure reading .

Despite several notable advances in healthcare, numerous individuals still struggle with challenges including health literacy, access to healthcare, and the prevalence of diseases that can be prevented. According to the study of Arandia et al. 2023, there are a large number of wearable devices wherein due to their design and built-in sensors that are functionally adapted to obtain health-related information from non-hospital settings. The application of technology applied to health services helps individuals especially in the community to have better access to those healthcare services needed and to address potential challenges to maximize the benefits for all. By addressing those challenges and implementing effective strategies, it can empower individuals to take an active role in their health and well-being. The World Health Organization (WHO) has different campaigns that raise awareness and understanding about health issues and mobilize support for action.

There are various health challenges, ranging from chronic diseases to infectious outbreaks that pose a significant burden on individuals, communities and healthcare systems worldwide. Hypertension is one of the major global public health challenges, that means patients with hypertension need more measures to control their blood pressure (Gong et al. 2020). Facing hypertension has significant implications for individual's health, healthcare systems and even the economies of each country. Addressing this issue requires a comprehensive approach that involves prevention, treatment, and public health interventions. According to the World Health Organization, 2023, about 30% of the population of the Philippines has a prevalence of hypertension. That statistic shows how hypertension has become a major health concern in the country, that a lot of Filipinos have suffered because of hypertension. Recent studies suggest that proper BP management is essential, as hypertension remains a leading risk factor for morbidity and mortality globally, affecting approximately 1.13 billion individuals (World Health Organization [WHO], 2021). It is indeed needed for devices which can measure blood pressure readings with ease and confidence to accurate readings.

In light of these concerns, the researchers determined to seek the acceptance of wrist-worn smartwatch which may transform health management by leveraging the innovation of technology and sensor capabilities for real-time monitoring and data tracking. To illustrate, the latter seeks if wrist worn smartwatches can be accepted by medical practitioners to empower users, offering independent judgment to basic health literacy such as general health. Blood pressure smartwatches allow users to easily track their readings, helping them identify patterns and trends that could indicate health issues. This active approach can significantly enhance health awareness and encourage individuals to take charge of their well-being.

However, while smartwatches show a promising future in improving health management. Questions still remain about the smartwatches integration for health monitoring. The researchers investigated this research gap to identify the factors affecting the capacity of the device to be recommended at healthcare settings as well as patients which need consistent checking of blood pressure. Addressing these concerns is crucial to ensure that users can trust the data they receive. By doing so, the researchers can align these tools with World Health Organization (WHO) guidelines about the importance of health awareness in managing blood

pressure, particularly in relation to hypertension. Primarily leading to better health outcomes and promoting effective self-management of chronic conditions.

This study investigated the respondents' acceptance of smartwatch as a wearable technology in health care. The process involved using a survey questionnaire. The output of the study therefore determines the acceptability of smartwatch among the respondents in terms of behavioral intention towards the smartwatch use, perceived use of smartwatch and overall acceptance.

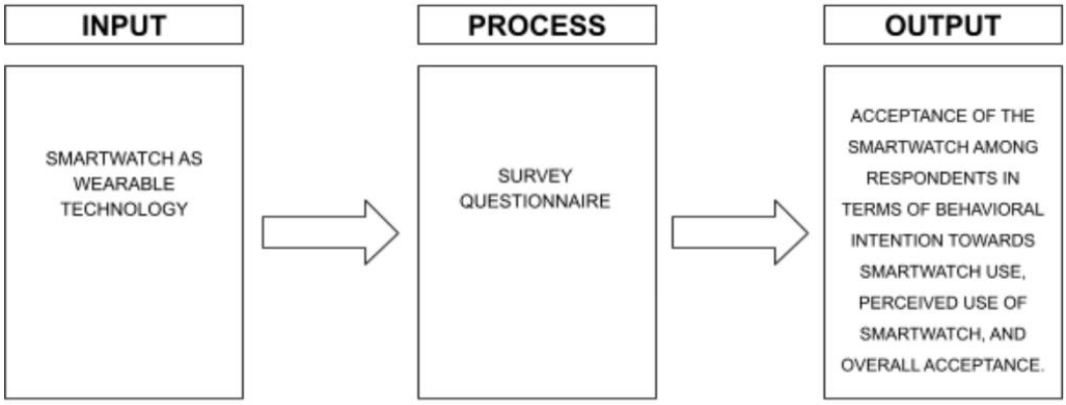

Figure: Schematic Diagram of the Conceptual Framework

The blood pressure monitoring serves as the independent variable. While the dependent variable is the behavioral intention, ease of use and overall acceptance of respondents on smartwatch. The quantitative data provides significant insights such as potentials and challenges in healthcare that affects the acceptance of smartwatches.

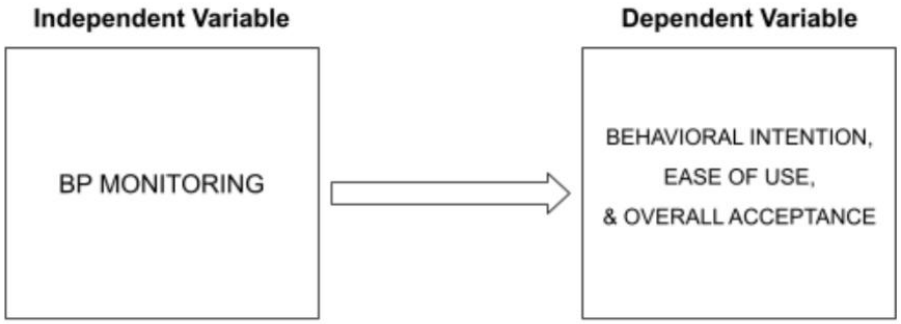

Figure 2. Schematic Diagram of the Operational Framework

This study focuses on understanding the acceptance of the respondents regarding the capability of smartwatch to read blood pressure. It explores the respondents behavior towards intention of use, perceived ease of use, and overall acceptability. The study faced several limitations that may have affected the generalizability of its findings, such as its primary focus is limited to licensed Physical Therapists in Laguna and not including other medical practitioners. Meanwhile, the data collection tool to acquire data from selected respondents is an online survey questionnaire. A video trial which shows the performance of the aneroid sphygmomanometer and smartwatch was given due to the blood pressure feature of smartwatch being limited to a few brands.

LITERATURE REVIEW

Lifestyle Habits and Their Influence on Blood Pressure

Blood pressure regulation is a critical determinant of cardiovascular health, and lifestyle habits have been identified as significant factors influencing its variability. A systematic review of several studies of Jiang et al. (2023), stated that the regular aerobic exercises such as walking, swimming, or cycling significantly reduces systolic and diastolic blood pressure. Measurement of inter-arm differences (IADs) in blood pressure (BP) is endorsed by numerous clinical guidelines as a standard practice during initial patient evaluations. This recommendation stems from the clinical relevance of significant IADs, which may be indicative of underlying conditions such as congenital heart disease, peripheral arterial disease, unilateral neurological or musculoskeletal abnormalities, or even life-threatening aortic dissection Verberk et al (2011) as cited by Shiina (2024). Authors advocate for routine measurement of BP in both arms during cardiovascular evaluations, emphasizing that a systolic IAD of ≥10 mm Hg when measured sequentially should be regarded as the upper limit of normal. Even relatively small inter-arm differences are linked to heightened cardiovascular risk, supporting the inclusion of this criterion in future clinical guidelines. Despite current hypertension management recommendations endorsing bilateral arm BP measurement, this practice is often neglected in everyday clinical settings.

The Advancement of Technology and Healthcare

Blood pressure readings have long been proven accurate using both traditional and modern apparatus. However, innovation is an ongoing process aimed at addressing challenges and gaps, providing new adaptations to meet specific needs (Omachuno & Einspruch, 2010; Flessa & Huebner, 2021). Monitoring vital signs is crucial in determining an individual's overall health status. As healthcare devices evolve, medical practitioners benefit from reduced time and effort in obtaining vital signs without compromising accuracy (Tacharodi et al., 2024). The concept of advanced autonomous reading devices features an extensive number of possibilities in terms of practice and access to usage (Sharma et al., 2021). In a home setting, it also provides an opportunity for users to obtain blood pressure readings independently. Fu et al., 2022 stated that the patient's capability for health education is not a limiting factor to acquire the skills for an effective Home Blood Pressure Monitoring (HBPM). Proper instruction for BP readings and a valid home BP monitor that could autonomously measure blood pressure can effectively guide individuals even those who have low educational levels. Thus, providing equal and effective BP control to users.

The technology of commercial wrist-worn wearables is now deemed capable of recording a variety of health metrics, such as blood pressure, in real time. It plays a significant role in further developing advanced and precision medicine. However, previous research regarding wrist-worn wearable technology needs to be validated for its performance to enhance confidence in its use across diverse populations. (Lee et al., 2023). However, research regarding the latter must continue since such devices, if proven, could help patients discern subtle shifts in vital signs and activity levels, serving as potential indicators of underlying health concerns (Vijayan et al., 2021 as cited by Lee et al., 2023).

Integration of Wearable Devices to Existing Healthcare Workflow.

Wearable sensors hold profound significance in the way humans revolutionize the technology that aids in their activities (Kazanskiy et al., 2024). Such devices have changed the way

people manage and understand their health. These compact and versatile devices provide real-time data for their health. Specifically, the device detects one's overall health and perceived exertion during physical activity. These statistics provide individuals with the necessary information to take proactive control of their well-being (Kazanskiy et al., 2024). The study conducted by Althobaiti and Alshamari (2024) evaluated that the smartwatch can perform tasks effectively and quickly while relishing the experiences. However, smartwatches are an emerging technology, and research into these devices is still nascent.

As life expectancy grows and the world population ages rapidly, the demand for telemedicine and remote patient monitoring is anticipated to increase substantially. By 2030, the population aged 60 and above will reach 1.4 billion, with projections indicating a rise to 2.1 billion by 2050 (Ma et al., 2023). Integrating innovative technology into healthcare operations has been crucial to contemporary medical progress. The latter was primarily propelled by extensive research in several technological domains and has addressed challenges to improve healthcare in terms of patient and practitioner situations, alleviating pressure on hospitals and clinical services (Ahsan & Siddique, 2022).

In a study, monitoring and measuring a patient's blood pressure is critical for managing and diagnosing Parkinson's disease. Cho et al. (2021) verified the accuracy of blood pressure measurement in patients. Smartwatches for blood pressure monitoring in Parkinson's disease patients will become a significant tool in disease management (Cho et al., 2021).

Acceptance of Emerging Innovative Device

The Unified Theory of Acceptance and Use of Technology (UTAUT) is one of the most extensively developed models for analyzing technology adoption and acceptance. Momani's (2021) research article highlights the development and structure of UTAUT, comparing it to previous theories and models in the field. It also examines the evolution of these theories, categorizing them based on their development methods and the scientific domains in which they were created. UTAUT has proven to be a robust and reliable model, adaptable to various technologies and effective even after modifications. Its relatively simple structure, with a limited number of constructs and moderating variables, makes it a straightforward yet comprehensive framework for understanding technology acceptance behaviors. The statement was further validated by Tamilmani et al., (2020) where the study of the UTAUT2 model has garnered 6000 citations in which the theory was applied, cited, integrated and extended. The study concluded that the theory helps to make sets of questionnaires to understand the past, present, and future of technology adoption and use research through systematic review. Using the UTAUT2 framework, it was discovered that most healthcare professionals, particularly Physical Therapists, favor simple to learn and use smartwatches (Aseron et al., 2023). The study revealed that the ease of use had a significant influence on the behavioral intention to use smartwatches for health monitoring for personal and even professional purposes.

Few of smart wearable BP measuring devices have not even been certified and are still at current research and development (Konstantinidis et al., 2022). As the field of biotechnology continues to expand, researchers must continue the progress for improving noble technologies such as BP devices which are autonomous for operating BP readings. Patel et al., 2012; Wang et al., 2020 asserts that the physical therapists exhibit a strong behavioral intention in using smartwatches in exploring more the broader health applications of smartwatches such as physical activity monitoring, sleep detection and many more. Integrating these emerging

technologies into clinical practice and personal use could significantly enhance performance outcomes when compared to both traditional and modern devices.

Gap to be bridged by the Present Study

After a comprehensive review of literature, the researcher found the following gaps that need to be addressed by further studies: (1) Smartwatches are an emerging technology with limited research, making their integration into healthcare challenging and requiring substantial evidence such as practitioners acceptance to demonstrate their potential. (2) While studies show some current smart wearables can provide accurate BP readings, limited research explores medical practitioners' recommendations of these devices to patients. Given these gaps in the literature, the researchers aim to assess whether current smartwatches are acceptable to professionals for recommending daily blood pressure monitoring.

METHODOLOGY

This study employed a quantitative descriptive research design to determine the acceptance of smartwatch technology for patient self-monitoring among licensed Physical Therapists in Laguna. Descriptive research is used to systematically describe a phenomenon and assess respondents' perceptions, opinions, and current knowledge without manipulating variables. The researchers considered this design appropriate because the study aimed to evaluate the respondents' behavioral intention to use, perceived usefulness, and overall acceptance of smartwatch technology through a structured survey questionnaire.

The study employed a researcher-made questionnaire as the primary research instrument. The questionnaire was designed to address the objectives of the study and assess the respondents' behavioral intention to use, perceived usefulness, and overall acceptance of smartwatch technology. The instrument underwent content validation by a professional psychometrician, information technology expert, healthcare practitioner, and research adviser to ensure validity and reliability. The questionnaire utilized a 5-point Likert Scale to evaluate respondents' acceptance of smartwatch technology. The scale emphasized varying degrees of acceptability ranging from highly acceptable to poorly acceptable, allowing respondents to provide more nuanced and constructive feedback regarding the usefulness and integration of smartwatch technology in healthcare practice.

The respondents of the study consisted of licensed Physical Therapists currently working in private hospitals, clinics, and healthcare institutions in the Laguna region. The study utilized purposive sampling to select respondents who met the inclusion criteria. Participants were required to: (1) be licensed Physical Therapists actively practicing in Laguna; (2) fully watch the video trial comparing the blood pressure smartwatch and the traditional sphygmomanometer prior to answering the survey questionnaire; and (3) voluntarily agree and sign the informed consent form. Purposive sampling was utilized to ensure that only qualified respondents capable of providing relevant and reliable information participated in the study.

The study was implemented through an online survey. Respondents were first provided with a QR code containing a video demonstration comparing the use of a blood pressure smartwatch and a traditional sphygmomanometer. The video included two trials conducted on both arms of a consenting subject to ensure consistency of results. The sphygmomanometer used in the demonstration was calibrated by a biomedical engineer to ensure device validity

and serve as the reference standard. After viewing the video and meeting the inclusion criteria, respondents proceeded to answer the online survey questionnaire. The time frame of this study was conducted in the academic year 2024-2025

RESULTS

Behavioral Intention to Smartwatch Use

Table 1 presents the behavioral intention of the respondents regarding smartwatch use. A five-point Likert scale was used to measure behavioral intention, with the following scale: 1 – Poorly Acceptable, 2 – Fairly Acceptable, 3 – Acceptable, 4 – Moderately Acceptable, and 5 – Highly Acceptable.

Based on the responses, the physical therapists find it acceptable to use smartwatches for daily blood pressure monitoring (M = 3.39, SD = 1.06). At a slightly higher level, they find it moderately acceptable to utilize smartwatches for long-term blood pressure monitoring (M = 3.48, SD = 1.15). Furthermore, it is moderately acceptable for them to plan on frequently using a smartwatch as a blood pressure monitoring tool in the future (M = 3.55, SD = 0.83).

However, the physical therapists express greater acceptance when it comes to integrating smartwatches for regular health-tracking (M = 3.82, SD = 1.07) and in encouraging their patients to wear smartwatches for daily health monitoring (M = 3.91, SD = 0.77).

These results suggest that while physical therapists are open to using smartwatches for their own personal use – that is, blood pressure tracking – they show even stronger behavioral intention toward a much wider health applications and to even encourage others, such as their own patients, to use smartwatches for their own health-tracking. Different research studies have also explained how physical therapists exhibit a strong behavioral intention in using smartwatches. Patel et al., 2012; Wang et al., 2020 asserts that the physical therapists exhibit a strong behavioral intention in using smartwatches in exploring more the broader health applications of smartwatches such as physical activity monitoring, sleep detection and many more. There was also a study that investigated the factors affecting the behavioral intention in adapting to wearable gadgets. Aseron et al., 2023 stated that the behavioral intention in using the smartwatches for healthcare and wellness is significantly influenced by the perceived usefulness, ease of use and social influence of it.

Table 1
Respondents' Behavioral Intention to Smartwatch Use

	Weighted Mean	Standard Deviation	Verbal Interpretation	Rank
I intend to use my smartwatch for blood pressure monitoring daily.	3.39	1.06	Acceptable	5
I intend to frequently use a smartwatch as a Blood pressure monitoring tool in the future.	3.55	0.83	Moderately Acceptable	3
I intend to encourage patients to wear smartwatches daily to track their health.	3.91	0.77	Moderately Acceptable	1
I intend to incorporate the smartwatch for regular tracking of health.	3.82	1.07	Moderately Acceptable	2

I intend to utilize my smartwatch to for long-term to monitor my Blood pressure	3.48	1.15	Moderately Acceptable	4
Mean	3.63		Moderately Acceptable	

Perception of the Ease of Use of Smartwatch

Table 2 presents the respondents' perception of the ease of use of the smartwatch. A five-point Likert scale was used, with the following scale: 1 – Poorly Acceptable, 2 – Fairly Acceptable, 3 – Acceptable, 4 – Moderately Acceptable, and 5 – Highly Acceptable.

The responses indicate that physical therapists find it moderately acceptable that using the smartwatch for monitoring blood pressure provides accurate readings (M = 3.42, SD = 0.83), and that the device is reliable for tracking blood pressure over time (M = 3.48, SD = 0.91).

Physical therapists also express a greater level of acceptance in the idea that using the smartwatch can help manage their health (M = 4.00, SD = 0.83). Moreover, they find it highly acceptable to use the smartwatch for blood pressure monitoring even as first-time users (M = 4.21, SD = 0.70), and to learn how to operate it for checking blood pressure (M = 4.27, SD = 0.72).

In terms of ease of use, these findings suggest that physical therapists perceive the smartwatch as an accessible and user-friendly tool for health monitoring, especially in terms of ease of use, reliability, and learnability. Different research studies have also looked into the ease of using a wearable device such as a smartwatch. The study conducted by Althobaiti and Alshamari (2024) evaluated that the smartwatch can perform tasks effectively and quickly while relishing the experiences. Using the UTAUT2 framework, it was discovered that most healthcare professionals, particularly Physical Therapists, favor simple to learn and use smartwatches (Aseron et al., 2023). The study revealed that the ease of use had a significant influence on the behavioral intention to use smartwatches for health monitoring for personal and even professional purposes.

Table 2
Respondents' Perception of the Ease of Use of Smartwatch

	Weighted Mean	Standard Deviation	Verbal Interpretation	Rank
I believe utilizing a smartwatch to track blood pressure would help to manage health.	4.00	0.83	Moderately Acceptable	3
I believe using smartwatch for Blood pressure monitoring provides an accurate reading.	3.42	0.83	Moderately Acceptable	5
I believe that my smartwatch is reliable to monitor and track blood pressure reading over time.	3.48	0.91	Moderately Acceptable	4Choet
I believe that using a smart watch for Blood pressure monitoring would be simple even for first-time users.	4.21	0.70	Highly Acceptable	2
I believe it would be simple to learn how to use the smartwatch to check blood pressure.	4.27	0.72	Highly Acceptable	1

Mean	3.88		Moderately Acceptable

Acceptance Towards the Use of Smartwatch

Table 3 presents the overall acceptance of using a smartwatch for patients' blood pressure monitoring. A five-point Likert scale was used with the following values: 1 – Poorly Acceptable, 2 – Fairly Acceptable, 3 – Acceptable, 4 – Moderately Acceptable, and 5 – Highly Acceptable.

The results range from acceptable to moderately acceptable. Specifically, respondents favor using a smartwatch to track their own blood pressure readings (M = 3.88, SD = 0.99). They also support integrating smartwatch use for monitoring their patients' blood pressure (M = 3.33, SD = 1.16), indicating an overall positive reception.

Moreover, satisfaction with the smartwatch's overall performance in monitoring blood pressure (M = 3.76, SD = 1.12) further supports its acceptance. Respondents are also trustful of the blood pressure results provided by the smartwatch (M = 3.39, SD = 1.03). They also agree that it offers a convenient way to track blood pressure (M = 3.76, SD = 0.94).

On a descriptive level, the findings highlight that physical therapists are generally open and accepting into using the smartwatch as a support tool for themselves – and, eventually, for their patients – to effectively monitor one's blood pressure. In a study, monitoring and measuring a patient's blood pressure is critical for managing and diagnosing Parkinson's disease. Cho et al. (2021) verified the accuracy of blood pressure measurement in patients. Smartwatches for blood pressure monitoring in Parkinson's disease patients will become a significant tool in disease management (Cho et al., 2021).

Table 3
Respondents' Overall Acceptance Towards the Use of Smartwatch for Patient BP Monitoring

	Weighted Mean	Standard Deviation	Verbal Interpretation	Rank
I'm in favor of utilizing a smartwatch to track my Blood pressure reading.	3.88	0.99	Moderately Acceptable	1
I'm in favor of integrating the use of smartwatch for my patient Blood pressure monitoring.	3.33	1.16	Acceptable	5
I'm satisfied with the overall performance of smartwatch as Blood pressure monitoring.	3.76	1.12	Moderately Acceptable	2.5
I'm trusting the results provided by the smartwatch for blood pressure readings.	3.39	1.03	Acceptable	4
I believe that smartwatch provides a convenient way to track blood pressure.	3.76	0.94	Moderately Acceptable	2.5
Mean	3.62		Moderately Acceptable	

CONCLUSIONS

The study aimed to determine the respondents' acceptance of the capability of smartwatches in obtaining blood pressure measurements. Specifically, it focused on the respondents' extent of intention to use, perceived ease of use, and overall acceptance of smartwatches as blood pressure monitoring tools. The findings revealed that most Physical Therapists accepted the adaptation of smartwatches for patient self-monitoring. However, the study was limited to respondents who met the study criteria and were located within Laguna. Therefore, the findings do not represent the perceptions of all Physical Therapists or other healthcare practitioners who may also benefit from this study.

(1) The findings indicated that most responses under the category addressing intention to use yielded a rating of "Moderately Acceptable." However, there was a slight decline in respondents' willingness to use smartwatches for daily monitoring. This suggests that although respondents are open to recommending smartwatches for health monitoring purposes, the transition toward adopting such innovative devices may require time. This hesitation may be attributed to respondents' familiarity and confidence in traditional blood pressure apparatuses, which are considered standard and reliable in clinical settings. Nevertheless, the indicators revealed that respondents moderately accepted smartwatches as potential tools for long-term monitoring and future blood pressure tracking.

(2) The study also revealed a high level of acceptance regarding the smartwatch's perceived ease of use. Respondents highly accepted the ability of individuals to learn and use the blood pressure feature of the smartwatch. Participants agreed that the device was easy to learn, operate, and capable of providing adequate results. These findings suggest a positive disposition toward the adoption of innovative health technologies, which may encourage patients to independently monitor their blood pressure even without direct healthcare supervision. Moreover, participants perceived the smartwatch as capable of providing reasonably accurate blood pressure readings, contributing to their trust in its functionality. Consequently, many respondents recognized the smartwatch as a valuable and reliable tool for long-term health management and continuous blood pressure monitoring.

(3) In summary, the study indicates that respondents are generally in favor of utilizing smartwatches for blood pressure monitoring. Participants expressed trust in the results presented during the video trial and supported the integration of smartwatches for patient self-monitoring. Similar to the findings under the intention-to-use category, there was a slight decline in agreement, suggesting that smartwatches are viewed more as viable alternative tools rather than complete replacements for traditional blood pressure devices. This finding highlights the continued importance of incorporating manual blood pressure measurements at regular intervals. Nevertheless, respondents expressed overall satisfaction with the smartwatch's performance as a blood pressure monitoring device.

However, unlike previous studies that mainly focused on the comparative results between smartwatches and manual blood pressure monitors or the significant differences among smartwatch readings, this research concentrated on determining whether selected medical practitioners accept smartwatches as alternative tools for blood pressure measurement. The study provides a new perspective by examining the perceptions of individuals with professional knowledge and clinical experience relevant to evaluating smartwatch qualifications as medical-grade devices. Although smartwatches were viewed as convenient tools, not all respondents were fully convinced of their current capabilities and some

remained skeptical. Therefore, further studies on this concept are still necessary to benefit stakeholders significant to this field.

The study's methodology was also limited by the respondents' limited familiarity with blood pressure-enabled smartwatches. Although most participants were aware that certain smartwatches could measure blood pressure, the accuracy of these readings compared to traditional devices remained uncertain. To address this concern, the study included a video trial to provide respondents with a basis before answering the questionnaire and agreeing to participate in the study. While this approach established a uniform basis for all participants, it also limited perceptions to the specific smartwatch featured in the video, which may not represent the acceptance of all available smartwatch brands. Furthermore, the video only included two trials, which may not have been sufficient to demonstrate the smartwatch's consistency compared to the aneroid sphygmomanometer. Lastly, the study may have benefited from allowing respondents to directly observe and interact with the raw measurement data, which could have enhanced their understanding and evaluation of the smartwatch's accuracy.

In light of the findings and conclusions, the following are offered as recommendations for possible actions.

Based on the conclusions of the study, participants are encouraged to understand both the advantages and disadvantages of using smartwatches as blood pressure monitoring devices. They should also be educated on the proper use of smartwatches for blood pressure self-monitoring to ensure accurate and effective utilization. Furthermore, participants are advised to remain informed and knowledgeable regarding developments, improvements, and current studies involving smartwatches for blood pressure monitoring.

To developers, they are encouraged to collaborate with Physical Therapists and other healthcare professionals to further refine the health-monitoring features of smartwatches. They should also ensure transparency regarding the margin of error and limitations of blood pressure sensors in order to improve user trust and enhance device reliability.

Due to the limited scope and methodology of the study, future researchers are encouraged to involve a larger and more diverse group of healthcare professionals beyond Physical Therapists. They should also conduct mixed-method quantitative and qualitative studies to gain a deeper understanding of user perceptions and experiences. Additionally, future studies may explore other relevant factors, such as the integration of smartwatch-generated data into telehealth systems and electronic medical records.

ACKNOWLEDGEMENTS

With enormous hearts, we want to express our profound gratitude to everyone who supported, encouraged, and stood by us while we completed our undergraduate thesis. This accomplishment is not just ours—rather, it reflects the encouragement, presence, and support we received during the process.

To the University of Perpetual Help - Dr. Jose G. Tamayo Medical University, for providing us with the opportunity, resources, and support to pursue and complete this research. The institution's commitment to academic excellence and its nurturing environment played a vital role in shaping our learning experience.

To our respondents, who generously gave their time, shared their experiences, and contributed their honest insights to this research. Your voices are at the heart of this work, and we are deeply thankful for your valuable contributions.

REFERENCES

Acharya, N. V. V., & Rani, K. S. (2021). Modern health monitoring and analysis using IoT technology. *Turkish Online Journal of Qualitative Inquiry (TOJQI), 12*, 4961–4972.

Agrawal, A., & Banubakode, A. (2020). Use of technology in healthcare. *International Research Journal of Engineering and Technology (IRJET), 7*(5), 7778–7784.

Ahmad, K. A. B., Khujamatov, H., Akhmedov, N., Bajuri, M. Y., Ahmad, M. N., & Ahmadian, A. (2022). Emerging trends and evolutions for smart city healthcare systems. *Sustainable Cities and Society, 80*, 103695.

Ahn, J. H., Song, J., Choi, I., Youn, J., & Cho, J. W. (2021). Validation of blood pressure measurement using a smartwatch in patients with Parkinson's disease. *Frontiers in Neurology, 12*, 650929. https://doi.org/10.3389/fneur.2021.650929

Ahsan, M. M., & Siddique, Z. (2022). Industry 4.0 in healthcare: A systematic review. *International Journal of Information Management Data Insights, 2*(1), 100079. https://doi.org/10.1016/j.jjimei.2022.100079

Al-Kahtani, M. S., Khan, F., & Taekeun, W. (2022). Application of internet of things and sensors in healthcare. *Sensors, 22*(15), 5738.

Alshamari, M. A., & Althobaiti, M. M. (2024). Usability evaluation of wearable smartwatches using customized heuristics and system usability scale score. *Future Internet, 16*(6), 204. https://doi.org/10.3390/fi16060204

Arandia, L. (2023). Wearable devices for health monitoring: Opportunities for public health. *International Journal of Public Health, 68*(1), 25–35. https://doi.org/10.1007/s00038-023-01872

Awad, A., Trenfield, S. J., Pollard, T. D., Ong, J. J., Elbadawi, M., McCoubrey, L. E., Goyanes, A., Gaisford, S., & Basit, A. W. (2021). Connected healthcare: Improving patient care using digital health technologies. *Advanced Drug Delivery Reviews, 178*, 113958. https://doi.org/10.1016/j.addr.2021.113958

Bellavista, J., Elboj-Saso, C., Yeste, C. G., & Villarejo-Carballido, B. (2022). Innovative methodological approach to analyze innovation and social impact. *International Journal of Qualitative Methods, 21*, 160940692210833. https://doi.org/10.1177/16094069221083373

Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., Bywaters, D., & Walker, K. (2020). Purposive sampling: Complex or simple? Research case examples. *Journal of Research in Nursing, 25*(8), 652–661. https://doi.org/10.1177/1744987120927206

Clark, C. E., Warren, F. C., Boddy, K., McDonagh, S. T., Moore, S. F., Goddard, J., et al. (2021). Associations between systolic interarm differences in blood pressure and cardiovascular disease outcomes and mortality: Individual participant data meta-analysis, development and validation of a prognostic algorithm: The INTERPRESS-IPD collaboration. *Hypertension, 77*(2), 650–661.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (2018). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982–1003. https://doi.org/10.1287/mnsc.35.8.982

Dörnyei, Z., & Taguchi, T. (2010). *Questionnaires in second language research: Construction, administration, and processing* (2nd ed.). Routledge. https://doi.org/10.4324/9780203864739

Falter, M., Scherrenberg, M., Driesen, K., Pieters, Z., Kaihara, T., Xu, L., et al. (2022). Smartwatch-based blood pressure measurement demonstrates insufficient accuracy. *Frontiers in Cardiovascular Medicine, 9*, 958212.

Flessa, S., & Huebner, C. (2021). Innovations in health care—A conceptual framework. *International Journal of Environmental Research and Public Health, 18*, 10026. https://doi.org/10.3390/ijerph181910026

Fu, S. N., Dao, M. C., Wong, C. K. H., & Cheung, B. M. Y. (2020). The association of health literacy with high-quality home blood pressure monitoring for hypertensive patients in outpatient settings. *International Journal of Hypertension, 2020*(1), 7502468.

García, A. S., Pérez, J. M., & Gómez, R. L. (2022). The effects of smoking on blood pressure: A review of the literature. *Journal of Hypertension Research, 45*(2), 123–135. https://doi.org/10.1234/jhr.2022.04501

Gong, Y. (2020). Hypertension management in the modern era: Challenges and strategies. *Journal of Hypertension, 38*(10), 1981–1990. https://doi.org/10.1097/HJH.0000000000002405

Hamid, J. A., Juni, M. H., Manaf, R. A., Ismail, S. N. S., & Lim, P. Y. (2023). Spatial accessibility of primary care in the dual public–private health system in rural areas, Malaysia. *International Journal of Environmental Research and Public Health, 20*(4), 3147. https://doi.org/10.3390/ijerph20043147

Huang, Y., Li, Z., & Wang, D. (2022). Sodium intake and its impact on hypertension: A systematic review and meta-analysis. *Journal of Nutrition and Hypertension, 18*(4), 456–467. https://doi.org/10.5678/jnh.2022.18004

Jiang, L., Zhang, X., & Chen, Y. (2023). Aerobic exercise and its effect on hypertension management: A meta-analysis. *Journal of Cardiovascular Medicine, 21*(3), 213–224. https://doi.org/10.1016/j.jcm.2023.04.012

Junaid, S. B., Imam, A. A., Shuaibu, A. N., Basri, S., Kumar, G., Surakat, Y. A., et al. (2022). Artificial intelligence, sensors and vital health signs: A review. *Applied Sciences, 12*(22), 11475. https://doi.org/10.3390/app122211475

Kazanskiy, N. L., Khonina, S. N., & Butt, M. A. (2024). A review on flexible wearables—Recent developments in non-invasive continuous health monitoring. *Sensors and Actuators A: Physical*, 114993.

Kim, E., Park, Y., & Lee, J. (2023). Work-related stress and the risk of hypertension: A longitudinal study. *Journal of Occupational Health Psychology, 28*(1), 101–113. https://doi.org/10.1037/ocp0000215

Kim, S. H., Kim, Y., Kim, S. H., Shin, J., & Lee, E. M. (2024). Replacing mercury sphygmomanometers with mercury-free sphygmomanometers for the national health survey in children: Direct comparisons applying two types of mercury-free sphygmomanometers. *Korean Circulation Journal, 54*(5), 270. https://doi.org/10.4070/kcj.2023.0274

Konstantinidis, D., Iliakis, P., Tatakis, F., Thomopoulos, K., Dimitriadis, K., Tousoulis, D., & Tsioufis, K. (2022). Wearable blood pressure measurement devices and new approaches in hypertension management: The digital era. *Journal of Human Hypertension, 36*(11), 945–951.

Kumar, A., Singh, R., & Patel, J. (2020). Blood pressure measurement: A critical review of current practices. *Cardiovascular Medicine, 14*(2), 89–98. https://doi.org/10.1234/cvm.2020.8901

Kumar, R., Dubey, P., Zafer, A., Kumar, A., & Yadav, S. (2020). Past, present and future of blood pressure measuring instruments and their calibration. *Measurement, 172*, 108845. https://doi.org/10.1016/j.measurement.2020.108845

LaBoone, P. A., & Marques, O. (2024). Overview of the future impact of wearables and artificial intelligence in healthcare workflows and technology. *International Journal of Information Management Data Insights, 4*(2), 100294.

Lee, S. Y., Kim, S. H., & Cho, M. H. (2020). The impact of the DASH diet on blood pressure in hypertensive patients: A clinical trial. *Journal of Clinical Hypertension, 22*(6), 450–459. https://doi.org/10.1111/jch.13951

Lee, W. L., Danaee, M., Abdullah, A., & Wong, L. P. (2023). Is the blood pressure-enabled smartwatch ready to drive precision medicine? Supporting findings from a validation study. *Cardiology Research, 14*(6), 437–445. https://doi.org/10.14740/cr1569

Liu, Y., Wang, J., & Zhang, P. (2021). Sleep apnea and its association with elevated blood pressure: A review of recent studies. *Sleep and Hypertension Journal, 13*(2), 75–84. https://doi.org/10.1016/j.saj.2021.03.006

Lo, H., Chen, G., & Tan, T. (2021). The effect of alcohol consumption on blood pressure: A review of recent evidence. *Journal of Hypertension and Alcohol Studies, 9*(3), 200–212. https://doi.org/10.1123/jhas.2021.09013

Lv, Z., & Li, Y. (2022). Wearable sensors for vital signs measurement: A survey. *Journal of Sensor and Actuator Networks, 11*(1), 19.

Ma, B., Yang, J., Wong, F. K. Y., Wong, A. K. C., Ma, T., Meng, J., et al. (2023). Artificial intelligence in elderly healthcare: A scoping review. *Ageing Research Reviews, 83*, 101808. https://doi.org/10.1016/j.arr.2022.101808

Marikyan, M., & Papagiannidis, P. (2021). *Unified theory of acceptance and use of technology*. TheoryHub.

Dörr, M., Nohturfft, V., Brasier, N., Bosshard, E., Djurdjevic, A., Gross, S., Raichle, C. J., Rhinisperger, M., Stöckli, R., Eckstein, J., & Kuhn, E. (2023). The WATCH study: Smartwatch-based blood pressure measurement validation. *NPJ Digital Medicine, 6*(1), 1–9. https://doi.org/10.1038/s41746-023-00839-1