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An Analysis of Active Seniors' Sports Wearable Devices Acceptance Intention and Use Behavior: The Focus on the Technology Readiness Index and UTAUT*

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Abstract

Purpose: This study addresses a research gap by providing a comprehensive analysis of the acceptance and use of wearable sports devices among active seniors, linked through an integrative theoretical framework. Based on the identification of the research gap in the current literature review, this study investigates the association between technology readiness, the Unified Theory of Acceptance and Use of Technology (UTAUT), acceptance intention, and use behavior among active seniors using sports wearable devices in South Korea. **Research design, data and methodology:** The study targeted adults in their 50s and 60s with experience using smartwatches or smart bands. A purposive sampling method was used, and data was collected via online surveys administered through smartphones. A total of 44-item questionnaire was developed using validated scales. Items were measured using a 5-point Likert scale. **Results:** The study confirmed that positive technology readiness significantly impacts all four UTAUT factors, while negative readiness does not. Among the UTAUT components, only performance expectancy and facilitating conditions influenced acceptance intention. **Conclusions:** The study gives evidence-based reasons why wearable devices can be used in health monitoring, promoting physical exercise, and improving the quality of life of older adults, thus showing that the integration of wearable technology into healthcare and wellness programs can be effective for seniors.

Keywords : Sports Wearable Device, Smart Device Distribution, UTAUT, Active Seniors, TRI

JEL Classification Code: L15, M31, L83

1. Introduction

The modern world of leisure sports is experiencing an essential shift that can be explained by two major trends in society: digital transformation and aging. The adoption of technology and the role of health maintenance as the population ages have increasingly become a critical issue in

society worldwide as demographic changes to an aging population become a reality (Jane et al., 2024). The active seniors are older adults who actively exercise and show interest in the activities of a modern lifestyle; they are seen as a distinct category between the aged group, and the new digitalized society (Barbaccia et al., 2022). The spread of wearable sports devices has transformed the way people track and control their health and fitness practices. Such

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advanced technological devices provide health-monitoring functions in real-time, feedback systems that are individualized, and they can be integrated with other connected apps, thus forming entire ecosystems that motivate and guide behaviors toward living healthier lives (Coman et al., 2024). The wearable technology market in the world has been growing exponentially, and the wearable sports and fitness applications are a significant part of this growth, as users are becoming more conscious about their health and adopting more preventive health care measures.

The use of wearable sports devices is an opportunity and a challenge for active seniors.

This population group has specific features that distinguish them among younger users of technology: they usually have prior experience with smart gadgets and may have learned about them or have been exposed to those devices, are highly motivated to stay healthy and independent, and have the financial means to adopt technology (Dermody et al., 2021). Nonetheless, they can also encounter certain obstacles connected with the complexity of technology, physical constraints and inter-generational disparities in perceiving and using technology.

The need to encourage physical activity and exercise among the elderly community cannot be underestimated, especially with the increasing healthcare expenditure and the prevalence of age-related illnesses. Wearable technologies have never had a greater opportunity to facilitate health management, promote regular physical exercise, and eventually reduce medical expenses due to preventive care strategies (Obianyo et al., 2024). Such devices can be used to check vital signs and the level of activity and health measures regularly, and therefore, the early detection of potential health problems and the proactive control over health care.

The present study addresses a serious research gap by providing a comprehensive analysis of the acceptance and use of wearable sports devices among active seniors, linked through an integrative theoretical framework. The technology acceptance model (TAM) has been applied in most of the previous studies, but it has been demonstrated that it lacks the capability of capturing the complexity of personal attributes and psychological preparedness that influence technology use among older adults. The research has assumed a different dimension of combining the “Unified Theory of Acceptance and Use of Technology (UTAUT) and the technology readiness (TR)” concept to address the multi-faceted aspect of technology acceptance among this very population.

The UTAUT model incorporates performance expectancy, effort expectancy, social influence, and facilitating conditions as some of the key elements, and the TR concept adds the dimension of optimism, innovativeness, discomfort, and insecurity (Toader et al., 2024). Such an

interdisciplinary approach enables the process of active older adults using wearable sports devices to be revealed in more detail as it considers not only external technological conditions but also internal psychological predispositions. This broad theoretical framework will be adopted in the research, which will assist in contributing to the development of user-oriented technologies that will address the needs of the active aging population of the developing digitalized society in the best way.

2. Literature Review

2.1. Digital Transformation and Population Aging

Digitalization and aging combination is one of the most critical issues of the 21st century. The demographic patterns witnessed in the world suggest that by 2050, the world will have 22 percent of its population aged 60 years and above, which would mean a lot of transformations in terms of societies, aging, medical care, and the inculcation of technology (Grinin et al., 2023). Digital transformation has turned into an omnipresent fact of the contemporary world that creates opportunities and challenges for older people who must work in a highly digitized environment. Active aging is a powerful concept that rests on the premise of how older individuals can become independent, healthy, and live good lives by engaging in physical, social, and technology-related activities continuously (Erfani, 2023).

Active seniors are a group of older adults who are distinguished by an active attitude to health preservation and readiness to use new technologies and stay social and physically active. This population group has different traits that do not reflect the generalized view of older adults as someone who is not willing to use technology or is physically inactive. Studies have consistently shown that sustained physical activity in older people would help to improve cardiovascular health, increase cognitive ability, lower the chances of chronic conditions, and increase the overall quality of life (Ciumărnean et al., 2021). Nevertheless, to encourage and promote regular physical activity in older people, it is necessary to find new methods of work that will consider age-related challenges, including mobility issues, social isolation, and the absence of quick feedback about the positive changes in health (Rony et al., 2024).

2.2. Wearable Technology in Sports and Health

The market of wearable technology has grown as never before, and according to the forecasts, global revenues will reach over \$180 billion in 2025, and health and fitness devices are the most popular ones (Arora et al., 2025).

Examples of sports wearable devices are diverse and cover such technologies as wearable fitness trackers, smartwatches, heart rate monitors, and gear with sensors embedded in sports equipment. These gadgets are designed with features as simple as counting steps and measuring the heart rate, as well as features as complex as GPS tracking, sleep management, stress tracking, and even connection to full-featured health management systems.

The popularity of wearable sports devices relates to the fact that they offer instant and individual feedback that can encourage behavior change and help to reach the goals (Yang et al., 2021). Activity reminders, tracking progress, social sharing, and gamification elements have been found to be effective in promoting long-term physical activity in different demographic groups (Sousa Basto et al., 2025). In the case of older adults in particular, wearable devices have the potential to benefit by detecting falls, managing prescriptions, having the ability to raise an alarm, and monitoring health status in a continuous manner, which can bring relief to users and their families (Phuyal et al., 2024). However, wearable technology among older adults has its issues. The identified barriers in the research include the sophistication of devices, screen size, battery life, privacy, security concerns, and difficulties with installation and maintenance (Poyyamozhi et al., 2024).

2.3. Technology Acceptance Theories

Technology Acceptance Model (TAM) was extensively adopted in the application of technology adoption in various contexts and target populations. As per TAM, two primary aspects of the perceived usefulness and ease of use define the technology acceptance and influence the attitude towards the use of the technology and, ultimately, the behavioral intentions and real use (Alyoussef, 2022). Despite TAM being very predictive in diverse studies, its critics have berated the concept as being too simplistic and have demanded more accommodating models that do not leave out other ideas that influence the acceptance of technology (Aronow et al., 2013). The Great Leap Forward in the theory of technology acceptance is UTAUT, which has implemented the elements of 8 significant technology acceptance models (Lee et al., 2025).

UTAUT identifies four critical factors of technology acceptance, including “performance expectancy (how much people think that the technology will help them to achieve the performance), effort expectancy (how much ease is associated with the use of the technology), social influence (how much people think that other relevant individuals feel that they ought to use the technology), and facilitating conditions (how much people believe that there exists organizational and technical infrastructure to support the use of technology).” Research has also shown that UTAUT

describes it more than its precursor models and when it comes to explaining the variability in behavioral intentions to use technology. However, critics have mentioned that UTAUT may not be adequate to reveal the psychological peculiarities of people that influence their willingness to use technologies and accept them, including older adult groups that may have various attitudes and concerns about technology (Anderson & Johnson, 2020).

2.4. Technology Readiness and Older Adults

The concept of TR deals with the psychological peculiarities of people that influence the process of adaptation and use of technology. TR has four dimensions: optimism (the positive attitude towards technology and its possible usefulness), innovativeness (the desire to be among the first ones to use new technologies), discomfort (the feeling that it is impossible to get a grip on technology and it overloads the individual), and insecurity (the fear and suspicion of technology and its inability to work efficiently) (Zhao et al., 2025). It has been identified that, in general, older adults may exhibit different TR scores than younger groups, as, on average, they have less optimism and innovativeness and more discomfort and insecurity (Tams & Dulipovici, 2024).

Nevertheless, active seniors can be considered a unique group of older adults with a more favorable technology readiness profile, that is, the willingness to adopt technology and the reduced extent of technology-related anxiety (Ramírez-Correa et al., 2023). The combination of TR and models of technology acceptance has demonstrated potential in better comprehension of technology adoption among older adults (Ma et al., 2021). Research has shown that the TR dimensions may substantively moderate the associations between the UTAUT constructs and technology acceptance outcomes, indicating that individual psychological preparedness is a critical moderator in the adoption of technologies (Dadhich et al., 2023).

2.5. Wearable Technology Adoption Among Older Adults

Recent evidence on wearable technology application among the older adult population has indicated the existence of certain promising opportunities and challenges. Researchers have found out that there has been a developing need for older adults to utilize wearable devices in the health monitoring context, particularly in the aspects of monitoring their heart rate, tracking their activity, and utilization of the wearable devices during emergencies (Teixeira et al., 2021). However, the adoption rate remains relatively low among older adults as compared to the younger ones, meaning that there exist some significant barriers to acceptance and use.

One of the key drivers is the possible health-related benefits, and the older adults are less opposed to the concept of receiving an improvement in the form of devices with specific positive health outcomes (Moore et al., 2021). The social aspect also plays a crucial role, and the suggestions of the healthcare professionals and family members as well as peers influence significantly the adoption decision-making (Jacob et al., 2022). Nonetheless, issues regarding privacy, the complication of devices, and the need to carry out maintenance remain some of the hindrances to mass adoption.

2.6. Research Gap

Although the popularity of wearable technology among older people is increasing, there are still numerous gaps in existing literature. First, most of the previous research has been based on simplified technology acceptance models like TAM, which might not be sufficient to explain the complex psychological and contextual variables which affect the adoption of technology among older adults.

Second, little research has been done specifically on active seniors as a specific group of people with characteristics and patterns of technology use. Third, there is a sparse literature that has combined several theoretical perspectives to offer a comprehensive description of technology acceptance processes in older adults. The current research will fill these gaps, as it introduces a new integrative model based on UTAUT and Technology Readiness that would give a more holistic view of the acceptance and use of sports wearable devices by active seniors.

The narrow choice of the study population (active seniors) and the multi-theoretical framework make the study a novel contribution to the literature on technology acceptance and an invaluable source of advice on how to develop user-friendly wearable technologies that the significant population group of active seniors will use.

3. Hypotheses and Data Collection

3.1. Hypotheses

Based on the identification of the research gap in the current literature review, this study investigates the association between technology readiness, the Unified Theory of Acceptance and Use of Technology (UTAUT), acceptance intention, and use behavior among active seniors using sports wearable devices in South Korea. Technology Readiness (TR) was divided into: Positive TR: optimism and innovativeness Negative TR: discomfort and insecurity UTAUT consisted of: Performance Expectancy, Effort

Expectancy, Social Influence, and Facilitating Conditions. The research hypotheses are presented below:

- H1: Positive TR → (+) Performance Expectancy
- H2: Positive TR → (+) Effort Expectancy
- H3: Positive TR → (+) Social Influence
- H4: Positive TR → (+) Facilitating Conditions
- H5: Negative TR → (-) Performance Expectancy
- H6: Negative TR → (-) Effort Expectancy
- H7: Negative TR → (-) Social Influence
- H8: Negative TR → (-) Facilitating Conditions
- H9: Performance Expectancy → (+) Acceptance Intention
- H10: Effort Expectancy → (+) Acceptance Intention
- H11: Social Influence → (+) Acceptance Intention
- H12: Facilitating Conditions → (+) Acceptance Intention
- H13: Acceptance Intention → (+) Use Behavior

3.2. Research Subjects and Data Collection

The study targeted adults in their 50s and 60s with experience using smartwatches or smart bands. A purposive sampling method was used, and data was collected via online surveys administered through smartphones. Data collection period was June–August 2024 and Valid responses analyzed: revealed total of 315 participants.

Table 1: Demographic Characteristics

Variable	Category	Frequency (%)
Gender	Male	159 (50.5%)
	Female	156 (49.5%)
Age	50s	157 (49.8%)
	60s	158 (50.2%)
Education Level	Middle School	4 (1.3%)
	High School	54 (17.1%)
	University	203 (64.5%)
	Graduate or higher	54 (17.1%)
Monthly Income	None	8 (2.6%)
	≤ 1M KRW	15 (4.8%)
	1–2M KRW	24 (7.6%)
	2–3M KRW	59 (18.7%)
	3–4M KRW	69 (21.9%)
	4–5M KRW	47 (14.9%)
	≥ 5M KRW	93 (29.5%)

3.3. Measurement Tools and Analysis Methods

A total of 44-item questionnaire was developed using validated scales. Most items were measured using a 5-point Likert scale. TRI 2.0 (Parasuraman & Colby, 2015): Optimism (4 items), Innovativeness (4 items), Discomfort (4 items), Insecurity (4 items)

UTAUT (Venkatesh et al., 2003): Performance Expectancy (4 items), Effort Expectancy (4 items), Social

Influence (4 items), Facilitating Conditions (4 items).

Acceptance Intention & Use Behavior was Based on Venkatesh et al. (2003), Kim & Moon (2016), and Jung et al. (2022).

The data obtained was analyzed using SPSS 28.0 and AMOS 24.0. Frequency analysis was used to describe the participants' demographic characteristics. Confirmatory factor analysis (CFA) assessed the validity of the measurement model, while Cronbach's alpha evaluated internal consistency. Pearson correlation analysis was conducted to examine relationships between variables and to check for multicollinearity. Finally, structural equation modeling (SEM) was employed to test the research hypotheses and evaluate model fit using indices such as RMSEA, TLI, and CFI.

4. Results

4.1. Validity and Reliability

To ensure content validity, the questionnaire was reviewed by one professor of business administration, one professor of physical education, and one Ph.D. in leisure studies. Confirmatory factor analysis (CFA) was conducted to assess convergent and discriminant validity. The composite reliability (CR) values ranged from .848 to .962, and the average variance extracted (AVE) values ranged from .585 to .864, exceeding the recommended thresholds (CR > .70, AVE > .50). Model fit indices also met acceptable levels ($\chi^2 = 1393.303$, $df = 695$, RMSEA = .057, TLI = .901, CFI = .902). In addition, Cronbach's alpha values ranged from .740 to .922, confirming strong internal consistency

reliability.

Table 2: CFA Results and Reliability for Each Construct

Construct	CR	AVE	Cronbach's α
Optimism	.920	.742	.809
Innovativeness	.885	.659	.846
Discomfort	.848	.585	.804
Insecurity	.851	.590	.822
Performance Expectancy	.911	.721	.817
Effort Expectancy	.927	.760	.870
Social Influence	.850	.591	.778
Facilitating Conditions	.849	.599	.740
Acceptance Intention	.962	.864	.922
Use Behavior	.926	.760	.875

Finally, the present author could conclude that all constructs demonstrated strong reliability (Cronbach's $\alpha > .7$) and good convergent validity (CR > .70, AVE > .50), supporting the adequacy of the measurement model.

4.2. Correlational Analysis

In this study, Pearson's product-moment correlation analysis was conducted to examine the relationships among the measured variables. As all correlation coefficients were below .80, multicollinearity was not considered a concern (See Table 3 on the next page). The analysis revealed significant positive correlations among key variables, including optimism, innovativeness, performance expectancy, facilitating conditions, acceptance intention, and use behavior. Conversely, discomfort and insecurity showed negative correlations with most variables.

Table 3: Pearson Correlational Result

	1	2	3	4	5	6	7	8	9	10
1. Opt	1									
2. Innov	.343**	1								
3. Discomf	-.185**	-.286**	1							
4. Insec	-.157**	-.179**	.451**	1						
5. PerfExp	.549**	.299**	-.141*	-.083	1					
6. EffExp	.294**	.492**	-.283**	-.095	.421**	1				
7. SocInf	.303**	.372**	-.025	-.038	.508**	.384**	1			
8. FacilCond	.363**	.568**	-.283**	-.124*	.457**	.622**	.471**	1		
9. Intention	.540**	.364**	-.194**	-.176**	.668**	.394**	.423**	.478**	1	
10. Behavior	.504**	.468**	-.225**	-.158**	.672**	.507**	.515**	.594**	.690**	1

4.3. Model Fit and Hypothesis Testing

To simplify the measurement model, this study employed item parceling, combining four dimensions of technology readiness into two factors: positive TR

(optimism, innovativeness) and negative TR (discomfort, insecurity). Item parceling was chosen to reduce model complexity and increase estimation reliability. Model fit indices ($\chi^2 = 1613.833$, $df = 707$, RMSEA = .052, TLI = .905, CFI = .907) indicated that the structural model had a good fit to the data (See Table 4).

Table 4: Model Fit of the Research Model

χ^2	df	p	RMSEA	TLI	CFI
1613.833	707	.000	.052	.905	.907

Structural equation modeling (SEM) was conducted to test the hypotheses. Positive technology readiness significantly influenced performance expectancy ($\beta = .935$), effort expectancy ($\beta = 1.475$), social influence ($\beta = .869$), and facilitating conditions ($\beta = .793$), supporting H1 through H4. In contrast, negative technology readiness showed no significant effect on any of the four UTAUT variables, and H5 through H8 were rejected.

Among the UTAUT variables, performance expectancy ($\beta = .795$) and facilitating conditions ($\beta = .467$) had

significant positive effects on acceptance intention, supporting H9 and H12. Acceptance intention also significantly influenced use behavior ($\beta = 1.166$), supporting H13. However, effort expectancy and social influence did not significantly affect acceptance intention, resulting in the rejection of H10 and H11.

In summary, the study confirmed that positive technology readiness significantly impacts all four UTAUT factors, while negative readiness does not. Among the UTAUT components, only performance expectancy and facilitating conditions influenced acceptance intention, which in turn strongly predicted use behavior. These findings highlight the critical role of individuals' positive attitudes toward technology (See Table 5 on the next page).

Table 5: Results of Hypothesis Testing

Hypothesis	Path	β	S.E.	t-value	p-value	Result
H1	Positive TR → Performance Expectancy	.935	.139	6.702	< .001	Accepted
H2	Positive TR → Effort Expectancy	1.475	.194	7.616	< .001	Accepted
H3	Positive TR → Social Influence	.869	.134	6.467	< .001	Accepted
H4	Positive TR → Facilitating Conditions	.793	.144	5.528	< .001	Accepted
H5	Negative TR → Performance Expectancy	.000	.050	0.002	> .05	Rejected
H6	Negative TR → Effort Expectancy	-.036	.062	-0.578	> .05	Rejected
H7	Negative TR → Social Influence	.081	.066	1.221	> .05	Rejected
H8	Negative TR → Facilitating Conditions	-.025	.058	-0.440	> .05	Rejected
H9	Performance Expectancy → Acceptance Intention	.795	.074	10.709	< .001	Accepted
H10	Effort Expectancy → Acceptance Intention	-.017	.087	-0.194	> .05	Rejected
H11	Social Influence → Acceptance Intention	.036	.077	0.477	> .05	Rejected
H12	Facilitating Conditions → Acceptance Intention	.467	.142	3.294	< .01	Accepted
H13	Acceptance Intention → Use Behavior	1.166	.074	15.687	< .001	Accepted

5. Discussions

Academically, the study contributes to the technology research on acceptance by developing and confirming a new theoretical framework that is specifically useful to interpret the acceptance of technology in an aging society by active seniors. The combination of TR dimensions and the UTAUT model is a valuable improvement of the current theory of technology acceptance, which has limitations about the application of existing models to the older adult population (Yang et al., 2025).

The proposed integrative model also adds to theoretical knowledge by revealing the interaction between the individual psychological features comprising the technology readiness with the external forces, including the performance expectancy, effort expectancy, social influence, and facilitating conditions, to determine the adoption intentions and actual use behaviors. This is multi-dimensional, hence gives a more detailed and comprehensive account of the processes of technology acceptance than the traditional models, which are more utilitarian based (Huang et al., 2024).

Moreover, the study will help to develop a new area of study called geotechnology because the study will produce empirical data on which factors can affect the use of technology among active seniors. The results contribute to the state of knowledge by showing that active seniors are a particular demographic group with a unique profile of technology acceptance, which cannot be compared with younger adults and less active older adults. Such a contribution is especially significant in the context of societies all over the world trying to address the issues and opportunities of demographic aging and heightened digitalization. The study also contributes to theoretical knowledge by shedding light on the timing of technology acceptance, including initial intentions to adopt and long-term use behaviors.

The longitudinal approach fills a significant gap in literature, whereby adoption intentions have received much attention, but the post-adoption behaviors and long-term use trends have not been sufficiently addressed (Miller & Anderson, 2019). The study of intention and behavior together thus gives a more comprehensive view of the technology acceptance process and also offers a great insight

into the development of the theory and its application in practice.

The practical significance of the research given finds many facets and solves some of the most crucial issues of society related to the rapid aging of the population and digitalization. First, the research can be of great help in terms of guiding the development of specific measures to minimize digital exclusion among active seniors. The knowledge of the definite technologically readiness profiles of active older adults can also help policymakers, health professionals, and developers of technologies to create interventions that can support everyone to overcome psychological challenges and use the existing strengths and motivations (Genge et al., 2023). Second, by exploring the attitudes of active seniors regarding the meaning and usefulness of wearable sports devices, the results can encourage broader and substantial use of the technologies. The study brings out specific elements that contribute to the perceived usefulness and ease of use, and this can be of practical use to the device manufacturers and software developers who are interested in producing a product that would satisfy the needs and preferences of older adult users more. Such user-centered design has the potential to result in better product design, user experiences, and finally, penetration in the market of this significant demographic group (Berg et al., 2021).

The results of the study also bear significant importance in terms of health promotion and care delivery to older people. The research gives evidence-based reasons why wearable devices can be used in health monitoring, promoting physical exercise, and improving the quality of life of older adults, thus showing that the integration of wearable technology into healthcare and wellness programs can be effective in the context of older adults. These insights can guide healthcare providers in the development of specific interventions that can be based on wearable technology to promote preventive care and chronic disease management, and healthy aging efforts (Adeghe et al., 2024). Lastly, the study would be able to establish a baseline of market segmentation strategies that are specific to the active senior's demographic. Being aware of the factors that affect technological acceptance in this age group can help businesses to create more effective marketing strategies, positioning strategies, and customer support services.

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