Investigating adoption factors of wearable technology in health and fitness

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Abstract—Since the mid 2000’s wearable technology (WT) has been available for consumers to use for health and fitness purposes. WT fitness devices are small, easily portable and can be worn on clothing or any part of the body. These devices have an interactive display which allows its users to track and record their physical activities. With the advancement in technology for WT devices and the exponential consumer adoption rate, it is important to understand the various factors that would lead a consumer to adopt these devices for health and fitness purposes.

There are many international studies, focusing on using smart watches and smart wristbands, to test the devices’ features during physical activities. However, there is minimal research conducted from a South African consumer perspective around adoption of these devices. This research study uses the second generation of the Unified Theory of Acceptance and Use of Technology (UTAUT2) model to investigate the factors of adoption which would influence an individual’s behavioural intention towards using a wearable device, focusing on health and fitness purposes. The results from the study identify Performance Expectancy and Habit as important factors of adoption of wearable devices for health and fitness purposes. An important outcome of the results however, indicates that individuals did not enjoy using their wearable devices during physical activity and therefore Hedonic Motivation was not shown as an important contributing factor for the intention to adopt these devices.

Key words—wearable technology, adoption, UTAUT, health and fitness, South Africa

I. INTRODUCTION

In recent years, the idea of WT and the advancements in the technology that it brings has become increasingly popular among manufacturers to develop products in the healthcare industry [1, 2]. For instance, Smart Vest, which is a wearable garment, was designed to effectively monitor personal health factors such as heart rate, body temperature, pulse movements and galvanic skin responses by using wireless signals to transfer this information and the user’s location to the remote monitoring system [3]. An additional example of WT in the healthcare industry is MediWatch, which is worn on the user’s wrist and has been designed to measure blood pressure (BP) from the radial artery, using standardised medical methods, and pressure sensors which press against the skin over an artery to obtain pulses from that artery every 12-15 beats, to provide an accurate BP result to medical staff for analysis [4].

The technology innovations in the devices, have resulted in the transformation of the WT market with new products exceeding expectations through style and sophistication, with the purpose of being able to perform more operations with greater ease and efficiency than its predecessors [5]. Research suggests that the development of style and sophistication in wearable fitness devices have led to high levels of adoption as consumers are using the devices as fashion accessories rather than for their intended purposes, to track and record their physical activity data [6]. It is suggested that a consumer’s intention to use a wearable fitness device is positively affected by the more non-technical aesthetic design of the device [6].

Shih et al. [7] identified that most of the research conducted on WT activity trackers is focused on technical or device-related adoption challenges towards these devices. However, the analysis of the factors that lead to consumer adoption of WT devices for health and fitness purposes, nonetheless, is minimal. Only recently has several contributions been made in this regard [8–10]. The lack of reasons as to why consumers adopt certain WT devices for health and fitness purposes provides the framework for this research. While existing research focuses on international contexts, e.g. China [10], South Korea [9], and the USA [8], our study examines the South African context. The current focus is on individual use for health and fitness, as opposed to previous research on work-related tasks in organisations [11].

The objective of the research is to identify and understand the different factors which influence the adoption of WT devices for health and fitness purposes. Identifying these different factors could assist WT device manufacturers to determine the factors that are most significant to consumers. Thus, the results could give manufacturers a clearer understanding on specific areas to focus on, when developing their devices for health and fitness purposes. As a result, the research question has been recognised as follows: What are the factors that lead to the adoption of WT devices for health and fitness purposes?

The remainder of this paper is structured as follows. First, the conceptual and theoretical background will be presented. This includes our research hypotheses. Next, we discuss the research design that was used. This is followed by data analysis and a discussion of the results. Lastly, the conclusion summarises the research contributions.
II. BACKGROUND

The term wearable technology can be defined as any type of electronic and/or computer device that an individual can wear on their body [1, 12]. Examples of WT can be found in items of clothing, watches, glasses and jewellery [2, 13, 14]. There are two types of WT categories: 1) apparel and textiles, and 2) devices. Apparel and textiles make use of newer forms of disruptive technology where the electronic component tends to be tucked away underneath the garment [13, 15, 16]. WT devices interact with other forms of technology such as mobile devices and the internet of things (IoT) to transfer and process data between devices [1, 2, 12].

There are many similarities between the functions and features of WT and mobile devices. However, WT differs from a mobile device with its unique ability to have a more personal relationship with its user through the use of psychological, behavioural and physiological sensors, to track, transfer and process information about its user and their environment [12, 16, 17]. The importance of having access to this personalised recorded data can lead to an increase in safety, efficiency and independence in the healthcare industry [2, 13, 14, 17, 18].

A. Types of WT

Currently the WT market consists of smart shirts, wristbands, smart glasses and smart watches [2, 14, 19]. Smart shirts are still a relatively new concept of WT and have not been made regularly available to the consumer market, as these products are currently being designed for new and innovative applications such as military and space exploration purposes with plans of future development into the public safety and healthcare industries [15].

Smart wristbands make up the largest part of the activity tracker market [20]. A smart wristband can be described as any wrist worn device that has the ability to regularly track and record a user’s physical activity and inactivity, with the ability to give the user feedback of this information on a mobile device [20, 21]. Smart wristbands present a much simpler user interface and are smaller in size when compared to smart watches [20, 21]. In addition, smart wristbands only display the user’s current activity and compares this activity with daily goals set to create a more enjoyable and competitive experience as well as to increase the physical activity of the user [20].

Popular smart wristbands in the consumer market consist of a range of Fitbit products, Nike’s Fuelband, and Samsung’s Gear Fit [14, 22].

Smart glasses can be used in the medical environment for training surgeons in hospitals where augmented reality can be used to simulate different operating scenarios for the surgeon to perform with the addition of the surgeon being able to access the internet for any helpful videos [2].

A smart watch can be described as any device with an integrated clock that can be worn on an individual’s wrist with the ability to store a user’s personal data through sensor technology and is also able to connect to other devices in close range using Wi-Fi and/or Bluetooth [23]. Smart watches have similar functionalities to wristbands in terms of storing personal data but differ to the wristband by enhancing its user’s personalised experience through the integration of the user’s mobile device [14, 19].

Other WT ideas are currently still in their development stages and have yet to reach the market. These consist of wearable garments that will have the ability to detect emotion and/or harness energy of its user [24, 25]. The healthcare industry is interested in fitness information about their patients. The use of WT devices allows for medical professionals to track their patients’ exercise routines and sleeping patterns. Patients can use WT devices to maintain a fit and healthy lifestyle, therefore avoiding any potential health problems that may occur [18].

B. Applications of WT for Fitness

The emergence of WT into the healthcare industry has resulted in many well-known sporting companies to develop their own WT fitness devices, to become the market leader with a competitive advantage over their rivals [26]. The goal of each WT manufacturer is to develop and advertise their product as the best “all-in-one” multi-purpose device for maintaining an individual’s healthy lifestyle [27]. In doing so, some WT manufacturers have included various persuasive techniques to encourage user interaction with their device. Device features include: the use of gamification techniques to provide virtual rewards for physical activity goals achieved and the use of social influence techniques to record and provide visible feedback based on the user’s physical activity [28–30].

Nike is one of these manufacturers that utilise the concepts and has designed a portable step counter with a receiver that can connect to the user’s iPod and can comfortably fit into any Nike shoe product. The result is that the user gains access to a personal training software programme that provides them with distance, speed and personalised training session goals [26]. Other WT manufacturers have designed their products with a simple display that restricts the amount of data shown to the user [27, 31, 32]. Such devices utilise sensing technologies (i.e. accelerometers and altimeters) to monitor and record its user’s physical activity with additional health and wellness features of tracking sleep patterns and logging food habits of its users [31, 32]. With a minimalistic display, these devices can represent the user’s physical activity data (i.e. step count, distance travelled, daily calories burned, etc.) through several infographics on the manufacturer’s device website and/or mobile application [33].

Although individuals are aware of the benefits that regular physical activity can bring to their lifestyle, many of them tend to lack the motivation and/or support to continue such activities [34–36]. Research conducted by Lara and Labrador [35] suggests that the use of pedometers and accelerometers in devices which track and record physical activity of a user, has proven to be effective in increasing the motivation to maintain a healthier lifestyle. The consumer wearable device market has acknowledged this motivation as an opportunity to design and develop new wearable devices for fitness that utilise sensory technology [36].
C. The Unified Theory of Acceptance and Use of Technology

The evolving nature of technology has given rise to the advancements in wearable device technology, where devices such as watches and wristbands are no longer considered to only be used as a method of communication [37, 38]. The wearable device can appeal to a broad range of users in the information and communications technology (ICT) industry with their multi-purpose features which include; message notifications, mobile device connectivity for mobile application usage, fitness routines, personal health tracking of its users and location sensing capabilities with GPS [37, 38]. Research from Kim and Shin [38] suggests that all these features have led to the rapid increase in adoption of these devices. The wearable fitness device market will continue to expand at an ever-increasing growth rate with 91.6 million devices estimated to be sold in 2018 and 373 million devices estimated to be sold by 2020 [38].

The second generation of the Unified Theory of Acceptance and Use of Technology (UTAUT2) model will be used as the theoretical framework for this study. The first version of UTAUT focuses on employees and their adoption of technology within the workplace, while the UTAUT2 model has been changed to focus solely on consumer adoption of technology [39].

Research conducted by Venkatesh et al. [40], indicates that the original UTAUT model was defined with the purpose of outlining a general and globally acknowledged theory for a user’s acceptance and use of technology. Venkatesh et al. [40] explain that there were eight models (a mixture of both sociological and theoretical models) used to create the UTAUT model. According to Venkatesh et al. [40] the original UTAUT model contains four fundamental factors that establish adoption: performance expectancy, effort expectancy, social influence, and facilitating conditions with a further four moderating variables which are added in to moderate each adoption factor: gender, age, experience, and voluntariness of use.

Venkatesh et al. [39] also indicates that the UTAUT model has been involved in over 500 studies which deal with acceptance and use of technology and has proven to be superior to all the eight models that combined to form it. However, there are some sceptical academics who believe that this model is missing a few key variables [39]. After a thorough investigation, Venkatesh et al. [39] concluded that the UTAUT model needs to be changed in three ways: firstly, the model needs to consider new types of technology, secondly the number of factors of adoption needs to be increased and lastly the model needs to consider predictors of technology use. As a result, the UTAUT2 includes these conditions into the model by adding three new factors of adoption: hedonic motivation, price value and habit [39].

1) Performance Expectancy

According to the research conducted by Gao and Bai [41] the term performance expectancy can be defined as the user’s belief that use of a technology will make the actions of doing a task much simpler and more effective. Performance Expectancy can also be referred to as perceived usefulness, where the user believes that the use of technology will give them extra value that they would not normally have obtained from not using this technology [41]. Research from both Lai and Lai [42] and Zhou [43] has shown that performance expectancy has proven to have a positive effect on a user’s decision to adopt a certain technology. This leads to the following hypothesis:

- H1: The Performance Expectancy of wearable devices for health and fitness purposes will positively influence consumer’s behavioural intentions to use the technology.

2) Effort expectancy

Based on the research performed by Venkatesh et al. [39], the term effort expectancy can be defined as the amount of ease of use that comes with a certain type of technology. Oh and Yoon [44] explain that effort expectancy was compromised of elements from both the Technology Acceptance Model (perceived ease of use), the Innovation Diffusion Theory (ease of use) and the complexity from the model of PC utilisation. Research from both Gao and Bai [41] and Lee et al. [45] indicate that the ease of use of a device has played a significant role in determining the adoption of technology by a user. This leads to the second hypothesis:

- H2: The least amount of effort required to use a wearable device for health and fitness purposes will positively influence the consumer’s behavioural intentions to use the technology.

3) Social Influence

The term social influence can be defined as the degree to which an individual perceives that other individuals, who are important to them, to expect them to perform a certain behaviour [40, 41]. Research conducted by Martins et al. [46] and Unni and Harmon [47] shows that social influences can affect the user positively towards adopting a technology. This leads to the third hypothesis:

- H3: Social Influence will positively influence the consumer’s behavioural intention to use wearable devices for health and fitness purposes.

4) Facilitating Conditions

According to Oh and Yoon [44] the term facilitating conditions can be defined as a user has faith that they have the required resources and online assistance to use this technology. Research from Venkatesh et al. [39] and Wu et al. [48] indicates that there is a positive relationship between facilitating conditions and adoption of a technology, due to the fact that a customer is more likely to use a certain type of technology if they have more access to resources and support for that technology. This leads to the fourth hypothesis:

- H4: Facilitating Conditions will positively influence a consumer’s behavioural intention to use wearable devices for health and fitness purposes.

5) Hedonic Motivation

Based on the research performed by Venkatesh et al. [39] the term hedonic motivation can be defined as the user’s enjoyment which occurs when using the technology. Hsiao and Yang [49] show that hedonic systems are used by the user in
their leisure time for some sort of fun. These types of systems include: online games, amusement websites, shopping and mobile services. Hsiao and Yang [49] explain that these types of systems reflect an element of playfulness in the eyes of the user which result in positive effects towards adoption of technology. This leads to the fifth hypothesis:

- **H5:** Hedonic Motivation will positively influence a consumer’s behavioural intention to use wearable devices for health and fitness purposes.

6) **Price Value**

Venkatesh et al. [39] research indicates that within a consumer environment, the price value can be determined as the cost that the user must incur for using that technology. Suki [50] explains that if a user sees the perceived benefits of using the technology to be higher than the actual cost value of that technology, then the chances of adopting that technology increases. This leads to the sixth hypothesis:

- **H6:** The price value will positively influence a consumer’s behavioural intention to use wearable devices for health and fitness purposes.

7) **Habit**

Research conducted by Venkatesh et al. [39] indicates that the term habit can be defined as the user’s automatic behaviour due to their prior experiences with the device. Venkatesh et al. [39] continues by suggesting that the repetition of a single action causes an individual to have ingrained intentions which would then lead the way as to which technology an individual adopts. Venkatesh et al. [39] suggests that the greater the ability to perform an ingrained habit, the greater the chances of adoption for a technology. This leads to the seventh hypothesis:

- **H7:** Habit will positively influence a consumer’s behavioural intention to use wearable devices for health and fitness purposes.

### III. Research Design

We evaluated our hypotheses empirically, using a cross-sectional survey. The target population for this research consisted of individuals who were members of a sports club or gym in the Western Cape’s Atlantic Seaboard or within the Southern Suburbs, to obtain their assessment of their adoption factors towards WT for health and fitness purposes. The target population was not restricted to a certain gender or age but rather to specific areas (i.e. Atlantic Seaboard and Southern Suburbs). This target population was selected, as these areas are well-known for hosting many major running, cycling or swimming events, and the individuals who live in these areas are therefore the most appropriate to be involved in research with regards to health and fitness purposes. Data was collected from a stratified sample of individuals in the above areas who uses a WT device for health and fitness purposes, specifically members of either a sports club or a gym.

The questionnaire started by collecting general information about the individual (i.e. age, gender and user experience of a WT device). It was then split into seven different sections, as to relate to each variable in the UTAUT2 model as identified within the literature review. The adapted questions from Venkatesh et al. [39] are shown in Table I. The research instrument used an interval-level response format with a 7-point Likert scale ranging from Strongly Agree to Strongly Disagree.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Expectancy</td>
<td>I find a wearable device useful in my daily life</td>
</tr>
<tr>
<td></td>
<td>Using a wearable device helps me accomplish things more quickly</td>
</tr>
<tr>
<td>Effort Expectancy</td>
<td>Learning how to use a wearable device is easy for me.</td>
</tr>
<tr>
<td></td>
<td>My interaction with a wearable device is clear and understandable.</td>
</tr>
<tr>
<td></td>
<td>I find a wearable device easy to use.</td>
</tr>
<tr>
<td>Social Influence</td>
<td>People who are important to me think that I should use a wearable device</td>
</tr>
<tr>
<td></td>
<td>People who influence my behaviour think that I should use a wearable device</td>
</tr>
<tr>
<td></td>
<td>People whose opinions I value prefer that I use a wearable device</td>
</tr>
<tr>
<td>Facilitating Conditions</td>
<td>I have the resources necessary to use a wearable device</td>
</tr>
<tr>
<td></td>
<td>I have the knowledge necessary to use a wearable device</td>
</tr>
<tr>
<td></td>
<td>The wearable device that I use is compatible with other technologies that I use.</td>
</tr>
<tr>
<td></td>
<td>I can get help from others when I have difficulties using a wearable device</td>
</tr>
<tr>
<td>Hedonic Motivation</td>
<td>Using a wearable device is fun.</td>
</tr>
<tr>
<td></td>
<td>Using a wearable device is enjoyable.</td>
</tr>
<tr>
<td></td>
<td>Using a wearable device is very entertaining.</td>
</tr>
<tr>
<td>Price Value</td>
<td>Wearable devices are reasonably priced.</td>
</tr>
<tr>
<td></td>
<td>Wearable devices are good value for money.</td>
</tr>
<tr>
<td></td>
<td>At the current price, wearable devices provide good value.</td>
</tr>
<tr>
<td>Habit</td>
<td>The use of a wearable device has become a habit for me.</td>
</tr>
<tr>
<td></td>
<td>I am addicted to using my wearable device.</td>
</tr>
<tr>
<td></td>
<td>I must use a wearable device.</td>
</tr>
<tr>
<td></td>
<td>Using a wearable device has become natural to me.</td>
</tr>
<tr>
<td>Behavioural Intention</td>
<td>I plan to continue to use a wearable device frequently</td>
</tr>
<tr>
<td></td>
<td>I will always try to use a wearable device in my daily life</td>
</tr>
<tr>
<td></td>
<td>I intend to continue using a wearable device in the future</td>
</tr>
</tbody>
</table>

The survey was implemented online using the Qualtrics platform. A pilot study was conducted to pre-test the survey, item wording, and flow. After minor modifications a survey link was distributed via email.

### IV. Analysis

The research instrument was available online to participants for a total of eight weeks to try and achieve the maximum number of responses as possible. During these eight weeks, a total of 153 participants answered the questionnaire. However, there were only 130 recorded responses who finished the entire questionnaire. To have an accurate representation of the data to analyse, the data needed to go through a process of ‘cleaning’ whereby irrelevant information collected (i.e. start date of the questionnaire, user’s IP address, the length of time to complete the questionnaire etc.) and unfinished responses were removed.
After the completion of the cleaning process, a total of 122 recorded responses were deemed to be acceptable for analysis.

### A. Demographic Profile

The following statistics represent some general information about the participants; age groups, gender, income levels and the number of exercise hours done per week. Figure 1 shows the age distribution from all the participants. The results show that most of the data was collected from younger individuals as the age category of 18 – 24 had the highest responses with 40.32%. A large portion of the data collected came from the middle-aged working-class age group categories (i.e., 30 – 49) with a total of 34.68%. The lowest number of participants came from the over 60 age group category with 2.42%. The remaining 22.58% of participants came from the 25 – 29 age group category (9.68%) and the 50 – 59 age group category (12.9%).

![Fig. 1 Sample Age.](image1)

Gender consisted of three categories; “Male”, “Female” and “Prefer Not to Answer”. Most of the participants (58.06%) consisted of females while the remaining participants were male as there were no participants who did not wish to withhold their gender.

Figure 2 shows the range of monthly income levels of the participants. The highest income level category was “More than R50 000” with 22.58%. This is due to many participants being employed with an age range between 30 – 49. A large portion of the income level was below R10 000 with a total of 36.29%. This could be due to most of the participants being in the age category range of 18 – 24. The lowest income level was in the range of R30 000 – R40 000 with 7.26% while only 8.87% of the participants preferred not to reveal their income levels. An income level range of R10 000 – R30 000 made up the remaining 25%.

![Fig. 2 Sample Income.](image2)

Figure 3 represents the different types of wearable devices that are owned by the participants. Over half of the participants use a wearable device for some form of fitness activity as 56.41% of the participants own either a smart watch or wristband. The results further indicate that it is likely that participants maintain a healthy lifestyle as 17.95% of the participants own a heart rate monitor which can be connected to a mobile device, as seen in the literature above. Only 2.56% of participants own a wearable garment as their wearable device. The remaining 25.65% of the participants own either a pacer (7.69%), a wearable garment (2.65%) or own another wearable device not mentioned in the research instrument (15.38%).

![Fig. 3 Sample Wearable Devices.](image3)

Figure 4 represents the number of hours per week that the participants do exercise related activities. More than half of the participants (52.42%) partake in exercise activities in the range of 4 – 10 hours per week which suggests that the participants are involved in a healthy lifestyle. The results further indicate that the participants are involved in leading healthy lifestyles as the lowest number of hours of exercise performed per week
was the “Less than 1h” category with a total of 5.65%. Just over one fifth of the participants (21.77%) are excessive health and fitness enthusiasts as they perform 11 or more hours of exercise per week. The remaining 20.16% of participants only participate in exercise activities between the range of 1 – 3 hours per week.

2) Hypothesis Testing

The structural model was tested to estimate the path coefficients, which calculates the strength of the relationships between constructs. The coefficients of determination ($R^2$) values indicate that the model explains approximately 79 percent of the variance for behavioural intention.

Hair et al. [51] suggests that a significance test should be conducted to measure and determine whether each factor within a model is either significant or not. Bootstrapping with 5,000 samples [51] was used to test the significance of the structural paths (hypotheses). The PLS path modelling estimation, including path coefficients and p-values, is shown in Fig. 3. The results of hypothesis testing are summarised in Table II.

<table>
<thead>
<tr>
<th>H</th>
<th>P-Value</th>
<th>Level of Significance</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>0.002</td>
<td>***</td>
<td>Supported</td>
</tr>
<tr>
<td>H2</td>
<td>0.441</td>
<td>*</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H3</td>
<td>0.948</td>
<td>*</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H4</td>
<td>0.111</td>
<td>*</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H5</td>
<td>0.392</td>
<td>*</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H6</td>
<td>0.821</td>
<td>*</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H7</td>
<td>0.000</td>
<td>***</td>
<td>Supported</td>
</tr>
</tbody>
</table>

The most noteworthy outcome from the significance test is that “Effort Expectancy”, “Social Influence”, “Facilitating Conditions”, “Hedonic Motivation” and “Price” are not considered to have a positive relationship with “Behavioural Intention” as hypothesised. The second most noteworthy outcome from the significance test is that neither “Facilitating Conditions” nor “Habit” had a positive relationship with “Usage Behaviour” which opposes the research conducted by
Venkatesh et al. [39] and thus, does not satisfy the framework of the UTAUT2 model outlined in Section 2.3.2. Finally, the outcome of the significance test indicates that “Behavioural Intention” has a positive relationship to “Usage Behaviour”.

V. DISCUSSION

The UTAUT2 framework formed the basis for this research study to understand the adoption factors of WT for health and fitness purposes. Factors such as Performance Expectancy and Habit were discovered to be statistically significant whereas the remaining factors were recognised to be statistically insignificant. The failure of the other factors could be due to the number of responses received, as the number of responses received (122) was well below the approximated sample size of 384 participants for a 95% confidence level and a confidence interval of 5.

A. Performance Expectancy

Performance Expectancy was determined to be an important factor for this study as it resulted in being a statistically significant contributor to Behavioural Intention. The relationship of “PE -> BI” yielded a p-value of 0.001. Due to the outcome of the significance test, the ability to perform tasks much simpler and more effective, to allow an individual to be more productive, is thus determined to be an important factor for adopting WT for health and fitness purposes. These results suggest that individuals are mainly interested in how well the devices can perform each activity (i.e. GPS location, speed, distance, heart rate etc.). Other studies [e.g. 8, 10, 41] related to WT have also found Performance Expectancy to be a significant factor towards adoption, which further illustrates the importance of this factor for this study.

B. Effort Expectancy

Effort Expectancy was identified to be an insignificant factor to contribute towards Behavioural Intention for this study as the relationship of “EE -> BI” generated a p-value of 0.381. The ability to use a type of technology easily has proven to be an unimportant factor for adopting WT for health and fitness purposes. Other studies [e.g. 8, 10, 41, 45] have found Effort Expectancy to be a significant factor for adopting WT technology which contradicts the results from this study as Effort Expectancy was deemed to be an insignificant factor for adopting WT for health and fitness purposes, in our context.

![Fig. 5 Results of Model Analysis.](image-url)
C. Social Influence

Although research conducted by Martins et al. [46] and Talukder et al. [10] proved that Social Influence is an important factor of adoption as it was significant in contributing to Behavioural Intention. The results in Table 9 suggest otherwise, as the relationship of “SI -> BI” produced a p-value of 0.878. The outcome of the results revealed that Social Influence is not considered to be an important factor for adoption as it was proven to be statically insignificant. Thus, an individual’s choice to use a wearable device for health and fitness purposes is not influenced, in any way, by their family and friends but is more of a personal choice for them as most of the participants use a smart watch for physical activities and they also do six or more hours of exercise per week.

D. Facilitating Conditions

Facilitating Conditions was identified to be the lowest insignificant factor to contribute towards Behavioural Intention for this study as the relationship of “EE -> BI” yielded a p-value of 0.137. This factor was also found to be insignificant by Talukder et al. [10]. The outcome of the results opposes research conducted by Venkatesh et al. [39] which found Facilitating Conditions to be an important factor of adopting any type of technology. However, due to Facilitating Conditions having the lowest insignificant value, the possibility of more participants responding may have changed the p-value for the relationship of “FC -> BI”. The possibility of this outcome may have resulted in Facilitating Conditions to be determined as an important factor of adoption of WT for health and fitness purposes as research conducted by Venkatesh et al. [39] explains that an individual is more likely to use a type of technology if they have more access to resources for that technology.

E. Hedonic Motivation

Another outcome from the significance test is that the factor Hedonic Motivation was identified as not being an important factor for this study. The results determined Hedonic Motivation to be an insignificant contributor towards Behavioural Intention as the relationship between “HM -> BI” generated a p-value of 0.686. This factor was also found to be insignificant by Talukder et al. [10]. The results contradict research conducted by Hsiao and Yang [49] which found Hedonic Motivation to be a significant factor of adoption for a type of technology. The results also conflict with the research of Millington [54] and Wright and Keith [14] which explains that smart watches and smart wristbands have been designed to be more user friendly and interactive to get users to be more motivated in doing physical activity. The outcome of these results suggests that users of wearable devices are not enjoying their experiences when using these devices for health and fitness purposes as justified in research conducted by Patel and O’Kane [55] which explains that users were distracted during their exercise routine.

F. Price Value

Price is not considered to be an important factor for adoption as it was proven to be statically insignificant as the relationship between “P -> BI” produced a p-value of 0.623. The results suggest that an individual purchases a wearable device for its features and not for its high price value as most of the participants are working class individuals who are able to afford the high prices of wearable devices. This factor was also found to be insignificant by Talukder et al. [10]. The outcome of Price opposes the research conducted by Suki [50] which stated that Price will be a statically significant contributor towards Behavioural Intention as consumers will purchase wearable devices within their budget. Other factors, beyond price, influencing the perception of value should be investigated, as previous research in the South African context has shown a significant effect of perceived value on the intention to adopt technology [56].

G. Habit

Out of all the factors, Habit was identified to be the most statistically significant factor which contributed to Behavioural Intention as the relationship between “H -> BI” yielded a p-value less than 0.01 (0.000). The greater the ability to continuously perform an ingrained habit, the greater the chances of adopting a technology, thus Habit is an important factor for this study and was also found to be significant in research conducted by Venkatesh et al. [39] and Talukder et al. [10]. These results suggest that individuals tend to be dependent on their devices for ever day use as well as daily physical activities. However, the outcome of the results of this research study, contradicts the validity results of the re-evaluated research model as the results of the discriminant validity test determined that the factor of Habit should be removed from the model as it was invalid.

VI. Conclusion

The objective of the research was to identify the factors which influence the adoption of WT devices for health and fitness purposes. Identifying these different factors could assist WT device manufacturers to determine the factors that are more significant to consumers which could give them a clearer understanding on specific areas to focus on when developing their WT devices. Our study focused on individuals in South Africa, a developing country. As far as we are aware there is limited research on WT within this context.

The results of the analysis suggest that only Performance Expectancy and Habit were determined to be significant factors, and thus, are deemed to have a positive effect on an individual’s behavioural intention to adopt WT for health and fitness purposes. These results suggest that when individuals consider purchasing these devices for physical activity, they are mainly interested in how well the devices can perform each activity with accurate user feedback. Due to the devices many performance features, individuals tend to be dependent on their devices for ever day usage as well as daily physical activities.

The research for this study investigated adoption factors of WT for health and fitness purposes at a high level without examining specific types of wearable devices. Therefore, further research could be narrowed down to a more specific focus on two or three of the most popular WT devices for health and fitness purposes to compare the different adoption factors between each device.
The research also only considered individuals who were members of either a sports club or gym. For future research, it is suggested to not only include individuals who are part of either a sports club or a gym, but a broader sample who use wearable devices for health and fitness purposes. The outcome will allow the research to establish a broader idea of consumer adoption factors that manufacturers should focus on when developing their WT devices.

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REFERENCES


