International Journal of Internet of Things 2019, 8(2): 36-45
DOI: 10.5923/j.ijit.20190802.02

The Willingness to Adopt Fitness Wearables in Jamaica: A Study on Wearable Fitness Trackers in Kingston and St. Andrew

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Abstract Research by the Jamaica Health and Lifestyle Survey Group has found that there is a high incidence of non-communicable disease in Jamaica (NCD) such as diabetes and hypertension, and these diseases have become one of the main causes of death and disability in Jamaica. Being physically active is one of the primary ways to reduce the chances of developing NCDs, however there is concern that persons are not engaging in sufficient levels of physical activity. Wearable fitness trackers are seen as a promising tool to facilitate health interventions for physical activity. However, little is known about Jamaicans' behavioral intent towards using wearable fitness trackers. This research sought to investigate the adoption of wearable fitness trackers in Jamaica. This was achieved by examining the extent to which persons are willing to use wearable fitness trackers and the non-technical factors that affect this willingness. We used a quantitative cross-sectional survey approach, using quota sampling to select members of the sample population. The sample consisted of adult, 18 years and older, from Kingston and St. Andrew. We used ordinal regression and other statistical data association techniques for data analysis. A majority of respondents had a positive behavioral intent to user wearable fitness trackers. Facilitating conditions, performance expectancy, hedonic motivation, effort expectancy and privacy and security risks were found to be the significant factors that impacted behavioral intent. No associations were found between behavioural intent and age or sex.

Keywords Wearable Fitness Trackers, Physical activity, Technology Acceptance Model

1. Introduction

Being physically active is an important part of preventing chronic diseases. It has been established that persons who are more physically active have lower rates of serious medical illnesses such as coronary heart disease, high blood pressure and diabetes; and are have better overall health [37,41,8]. However, there are concerns globally that persons are not engaging in sufficient physical activity, as well as engaging in more sedentary behaviours such as watching television and using the computer [28,23,15]. Approximately 23% of adults world-wide do not meet the recommended levels of physical activity, with higher rates in high-income countries like the United States and countries in Western Europe [44]. This issue is also relevant to Jamaica where a health and lifestyle survey conducted by Jamaica Health and Lifestyle Survey [16], found that during the last fifty years the major cause of death and disability in Jamaica has changed from communicable and infectious diseases to chronic non-communicable disease conditions, and that this is largely rooted in lifestyle. Additionally, the study found that there is high incidence of chronic non-communicable diseases in the Jamaican population and this may be increasing; and more Jamaicans are reporting low levels of physical activity as compared to previous years, which is accompanied by a significant increase in overweight and obesity which is strongly associated with hypertension, diabetes mellitus and high cholesterol.

This problem not only affects individuals by reducing their quality of life, but also the country at large. Kruk [15], points out some of the effects of low physical activity levels and the resulting health problems on countries. These include loss of productivity due to persons not being able to participate in the workforce or not being able to perform optimally due to poor health; and resources being used to treat persons with these diseases that could be better used otherwise.

There is a large and growing market for wearable fitness trackers which are seen as a promising tool to facilitate health interventions for physical activity by providing users with the ability to self-monitor and self-regulate [19,31,12]. Self-regulation strategies such as self-monitoring, goal-setting, reinforcement and self-corrective actions have

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Published online at http://journal.sapub.org/ijit

been shown to increase physical activity participation in a variety of populations [31]. We therefore believe that these devices could be used in Jamaica to help to aid persons to engage in more physical activity. But for this technology to be implemented successfully, persons must be willing to use it. It is therefore important to understand whether or not persons are willing to adopt the technology and the factors that affect its adoption.

As with any new technology, user acceptance is an important aspect that needs to be understood. Lack of user acceptance has long been an impediment to the success of new information systems [13]. If users are not willing to use a new system or new technology, then it will fail to achieve its purpose. Hence, for wearable fitness trackers to be successfully used in Jamaica to facilitate increased physical activity levels among the population, it is important to understand its acceptance and the factors that affect this acceptance.

Wearable fitness trackers are relatively new and while there is extant literature, there are some gaps, particularly in terms of the factors that affect adoption. There is more research on wearable fitness trackers surrounding aspects such as their reliability and validity in measuring their respective metrics, their effectiveness, or the behaviour change techniques utilized, than there is surrounding acceptance and use. Shih et al, echoes this sentiment as he makes the point that existing research on the adoption of wearable fitness trackers focus mostly on the use and adoption challenges associated with technical- or device-related issues and respective workaround strategies, while little is known about how personal preferences and other individual characteristics, sex for example, affect use and adoption of wearable activity trackers [31]. Additionally, not much literature has been found on wearable fitness trackers in the context of developing nations such as Jamaica.

Therefore, this research seeks to examine the willingness of Jamaicans to use wearable fitness trackers and to understand the factors that affect this. In so doing, this research could potentially provide a starting point for the eventual successful introduction and implementation of the technology to address the issue of low physical activity levels among the Jamaican population.

The results from this research may form part of the basis on which wearable fitness trackers can be successfully implemented in Jamaica to facilitate increased levels of physical activity among the population. Additionally, this research may contribute to the gap in knowledge that exists in regard to the adoption of wearable fitness trackers and the non-technical factors that affect it, as well as the gap that exists in literature about wearable fitness trackers and technology adoption in developing countries such as Jamaica.

In this research, we employ a cross-sectional study to collect our data. From this data, we determine the level of willingness to use wearable fitness trackers. We also assess prominent user acceptance models in order to develop our own model, which we then use to analyze our data and determine what factors affect individuals' willingness to use wearable fitness trackers. Additionally, we also examine whether demographic variables such as age and sex have any effect on behavioural intent to use wearable fitness trackers.

2. Related Work

A. Wearable Fitness Trackers

Consumer wearable devices are a popular and growing market for monitoring physical activity, sleep, and other behaviours. A subset of consumer wearable devices used for monitoring physical activity- and fitness-related metrics such as distance walked or run, calories consumed, and in some devices heart rate and sleep tracking, are referred to as activity trackers or fitness trackers [20, 18]. Wearable fitness trackers are designed to be worn on the body, typically having a small and light form factor, to allow users to wear them on the wrist like a wristband or a watch. Alternatively, they can be attached to sports equipment such as running shoes, clothes, bikes, etc.

There are several different categories of wearable fitness trackers based on the type of activity or fitness metric that is measured. The components of physical activity that can be measured by current wearable fitness trackers include: total physical activity; duration, frequency, and intensity of physical activity; sleep and awake time; sedentary, light, moderate, and vigorous levels of physical activity during awake time; prediction of total energy expenditure, physical activity energy expenditure, and sleeping metabolic rate; classification of locomotive activities such as walking, jogging, running; characteristics of walking such as number of steps, stride, speed and distance; and posture such as lying, sitting and standing [29]. The main categories of wearable monitors for assessing physical activity as outline by [29] are (1) Pedometers - these register steps taken during walking and running; (2) Load transducers - these devices have been used to measure walking activity or loads held, lifted, or carried. Some can measure the acceleration of the foot and analyze patterns of movement, stride lengths, and frequency and estimate speed and distance of level walking and running; (3) Accelerometers - these are small, lightweight, portable, noninvasive, and nonintrusive devices that record motion in one or more planes and provide an indication of the frequency, duration, and intensity of physical activity; (4) Heart rate monitors - these are lightweight devices that have been used to predict physical activity energy expenditure based of the linear relationship of heart rate to energy expenditure; (5) Combined accelerometer/heart rate monitors - accelerometers and heart rate monitors have been combined to improve the accuracy and precision with which energy expenditure can be predicted; (6) Multiple sensor systems - devices which integrate multiple sensors. The combination of signals from these sensors enables the assessment of activity type and intensity [3].

Some wearable fitness trackers may work on their own while some work with an accompanying mobile device app or computer program. The three common models, as outline by [25] are: (1) Tracker only - data is collected by the tracking device and the data stays on the device. The device fully handles processing and displaying the data. This is not common of modern wearable fitness trackers. An example of this model is an old style pedometer. The tracker is typically not connected in any way and the data stored within them is private and not shared with any third parties who do not have physical access to the device. The device's display is used to show all of the data and statistics captured; (2) Tracker and mobile device - data is collected using the wearable tracking device. The data is then transferred to an app that runs on the mobile device. The app is then responsible for aggregating, analyzing, and embellishing the data, such as adding mapping, and presenting of the information to the user. This model is used by some modern self-tracking devices. Many of the wearable tracking devices do not have full function information displays. Instead, they often just use a number of LEDs to indicate essential status information only. (3) Tracker and the cloud - the wearable tracking device collects data and then the data is transferred directly to a cloud service, either directly from the tracker or from the accompanying mobile device, which is responsible for storing, processing, and presenting the data back to the user. In some instances, the tracking device or accompanying mobile app may also be able to perform limited processing and displaying of data to the user. However, the user can log onto the cloud service to review the processed information.

B. Behaviour Change Techniques

An activity tracker can provide feedback and offer interactive behaviour change tools via a mobile device, base station, or computer for long-term tracking and data storage. Studies [19,12] have shown that wearable fitness trackers utilize several behaviour change techniques typically used in clinical behavioural interventions, that have been shown to increase physical activity, most commonly self-monitoring and self-regulation techniques. Wearable fitness trackers are typically capable of tracking activity (e.g., step count) and other physiological information (e.g., heartbeat rate), and providing data visualization in ways that allow users to gauge progress and gather incremental feedback. The data can also be shared with other users in a social media platform. The goal is typically twofold; the data visualization will provide enhanced awareness so that users are in tune with their most up-to-date activities, and the social sharing platform will provide additional support to motivate the individuals to keep up with personal activities [31].

1) Self-Regulation: Self-regulation is defined as, among other things, the ability to start and stop activities based on situational demands, to adjust the intensity, frequency, and duration of actions in various settings, and to cease performing a desired action without external interference or influence [5]. Self-regulation strategies, such as self-monitoring, goal-setting, reinforcements, and self-corrective actions have been shown to increase physical activity participation in a variety of populations [31]. These strategies are in line with self-regulation theory posits that self-regulation consists of a series of steps which includes self-monitoring, self-evaluation of progress made towards a goal and self-reinforcement for the progress made [22]. Wearable fitness trackers enable self-monitoring towards daily or longer-term goals (such as a goal to walk a certain distance over time) and can be used to compare against one's peers or a broader community of users, both of which are advantageous mediators to increasing walking and overall physical activity [20].

2) Goal Setting and Feedback: A key variable in self-regulation, goal setting [31], has been shown to be an effective strategy for changing behaviour, and if incorporated into technology could be an effective way to encourage behaviour change [35]. The first step to accomplishing a task typically requires identifying a clear goal and the appropriate actions to achieve that goal [31]. [10] developed the goal setting theory that established the effect of setting goals on performance. Goal Setting Theory describes how individuals respond to different types of goals, and thus how to set goals to motivate behaviour. [10] found that people give the highest levels of effort and performance to the highest or most difficult goals. They also found that goals that were specific and difficult consistently led to higher performance than simply encouraging persons to do their best, because doing your best is not specific enough, and is too subjective and therefore difficult to judge if the goal has been attained.

In Human Computer Interaction, the design field of persuasive technologies has emerged to explore the potential for changing people's behaviours in desirable ways. Building from the concepts of goal setting theory, researchers have experimented with design concepts and prototypes that include goal-setting and feedback mechanisms [31]. This is also true for wearable fitness trackers, which implement goal-setting and feedback in a variety of ways. Some systems may represent users' data activity in the form of a simple bar chart, others utilize gamification concepts such as the concepts of levels, scores, or badges for achievement, to motivate the users, and others utilize creative and unique methods.

In general, the positive effect of providing feedback to enhance user self-awareness and the sense of self-efficacy is well established. Furthermore, persons tend to prefer positive feedback to negative feedback, which is why most persuasive technologies share positive representations of physical activity data with their users [31].

3) Social Interaction: Another effective behaviour change technique that is used in persuasive technology, including some wearable fitness trackers, is social interaction or social support. In addition to visualizing and making an individual aware of their physical activity, some activity trackers have incorporated the ability to share an individual's activity, performance, and experience with their peers. There are two popular types of social comparison strategies that emphasize either competitive or cooperative aspects of sharing group data. Support for cooperative mechanisms is based on social psychology theories that have suggested that when individuals develop a strong identity with a group, they are more committed to the group goal and its success, and as a result, they tend to care more about the collective outcome and contribute more [31].

For competitive group mechanisms, there have been numerous attempts at integrating social networking platforms with motivating physical exercises [31].

In general, social comparison provides users with a way to compare their performance that provides stimulating challenges, encouraging teamwork, and supporting complement group goals and accountability [31].

C. Wearable Fitness Trackers and Physical Activity

The popularity of wearable fitness trackers has risen as they have become more affordable, unobtrusive, and useful in their application [20]. An internet survey found that 10% of Americans 18 years and over report ownership of a modern activity tracker [11]. These wearable devices have been adopted by individuals seeking to enhance their personal fitness through increased personal health surveillance and social connections with others using the devices. These devices are being adopted not only by the younger age groups (25- to 34-year-old) who use them for fitness enhancement, but also by older groups (55- to 64-year-old) who use them to improve overall health [11].

There have been studies seeking to establish empirically any effect of these devices on physical activity. A variety of monitoring devices have been studied and analyzed for their persuasive influence on practices and behavior [36]. [10] looked at the use of simple pedometers for measuring and motivating activity and concludes that pedometers are a practical, accurate, and acceptable tools for measuring and motivation in physical activity and may be of practical importance in the war on obesity. Based on a quantitative synthesis of literature, [9] found results that suggest that the use of a pedometer is associated with significant increases in physical activity and significant decreases in body mass index and blood pressure, although whether these changes are durable over the long term is undetermined. [34] found that providing data about people’s physical activity, through the use of wearable activity trackers, increases their consciousness about activity help them to maintain their physical activity levels, at least in the short term. [44] did a systematic review of interventions that used wearable activity monitoring devices and found that the interventions studied demonstrated the ability of wearable activity monitoring devices to increase physical activity and decrease weight. He concluded that the studies provide preliminary evidence suggesting that wearable activity monitoring devices can increase physical activity and decrease weight significantly [44]. [36] sought to look at the long-term benefits and practices surrounding the use of wearable fitness trackers over long periods. Although many people who use wearable activity monitors eventually stop using them, their findings suggest that some segment of the population, despite changing goals and practices over time, continue to derive value and motivation from them even after many months or years of use. Participants reported achieving goals such as weight loss or increased fitness, and talked about changes to their routine and activity levels that they believed were long term and durable.

Though research is still ongoing in this area, these findings are a positive sign for the effectiveness of wearable fitness trackers in encouraging increased physical activity levels among users and providing positive health outcomes.

D. Considerations for Wearable Fitness Trackers

When it comes to the adoption of wearable fitness trackers, as with any technology, there are certain factors that must be taken into consideration.

1) Cost: When it comes to commercial technology, cost can be considered as a factor that can potentially affect adoption. Earlier research on technology acceptance focused on technology in an organizational context, which is one of the reasons that prompted [39] to propose an extension to the UTAUT model, which focuses on technology acceptance in a consumer context. In developing the model, called UTAUT2, [39] pointed out that in consumer contexts, unlike workplace contexts, users are responsible for the costs associated with the purchase of devices and services, and such costs are not only important, but can dominate consumer adoption decisions. This is supported by research such as [40] who, in their research on how price, brand and store information affects consumer perception and willingness to purchase, found that price had a negative effect on perceived value and willingness to buy. Thus cost is a factor that should be considered when it comes to the adoption of wearable fitness trackers as it may affect whether or not persons are willing to adopt wearable fitness trackers [27].

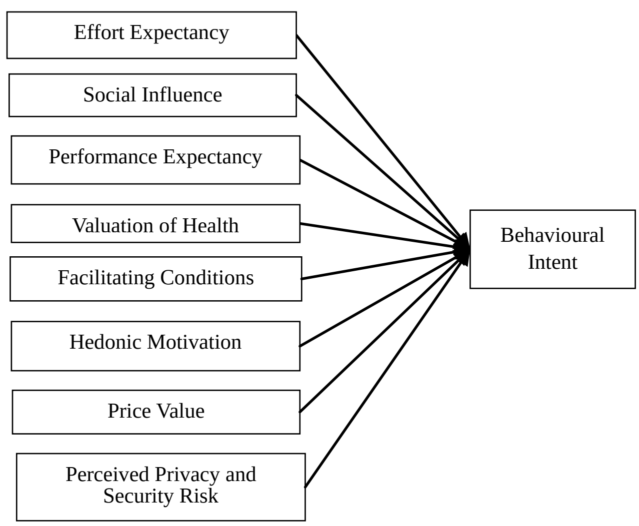

Figure 1. Proposed model

2) Security and Privacy: When looking at the acceptance of wearable devices, privacy and data security concerns are key factors that must be considered [2,24]. This is because wearable fitness trackers by their very nature necessitate, at the very least, awareness about privacy and security. These devices measure and store information related to physical activity, fitness and health such as calories burned, blood pressure, heart rate, number of steps taken and sleep rhythm, with interest in integrating other features such as GPS tracking [29,42]. Additionally, these devices are interconnected with other devices and integrate aspects of social media to allow the sharing of information with other users. To make matters worse these devices are used and worn on the go, with their applications run in the background, constantly drawing in new information about a user whether or not they are actively using it at that time [2]. When sensor data involves health-related sensitive information, the combination of such information and social networks has the potential for generating heretofore unseen security/privacy concerns and vulnerabilities [42]. These devices have brought with them questions of controlling, accessing and interpreting personal data. Individuals are no longer the most authoritative source on data about themselves [17]. In addition, few people will read the privacy policies that are associated with their wearable. Failure to do so results in the user being unaware of how their wearable device stores, manages and protects personal information [2]. Concern of privacy and security of data could potentially impact person's willingness to use wearable fitness trackers. If people are not in control of the collection and sharing of their personal health information collected using mobile health (mHealth) devices and applications, privacy concerns could limit their willingness to use and reduce potential benefits provided via mHealth [4]. Data security is therefore a pertinent issue that must be considered when dealing with wearable fitness trackers, a point echoed by [2].

E. Technology Acceptance

Studies investigating technology acceptance and usage are crucial for predicting user adoption [6]. The most commonly used models in the area of technology acceptance, particularly wearable technology are TAM, TAM2 and UTAUT and UTAUT2, both the original versions and various extensions. TAM postulates that perceived usefulness and perceived ease of use are two major determinants of a person's intention to use a system and by extension their actual use of a system. However, some point to weaknesses such as being too simplistic, not addressing the impact of social factors on behaviour, and the fact that intention may not always lead to behaviour [33]. TAM2 tries to address some of these issues by including more concepts and trying to address the acceptance and use of systems both in a voluntary and non-voluntary context. UTAUT was developed to create one unified model by incorporating key concepts from eight models, including TAM. UTAUT explains much of the variance in behavioural intent and usage behaviour [39], but some argue that it excludes certain constructs and includes other constructs and relationships that might not be applicable to all contexts [43]. UTAUT was extended to be used in a consumer context by including some new relationships and new constructs such as price value and hedonic motivation.

F. Conceptual Model

UTAUT 2, apart from incorporating key constructs from other models such as TAM, also incorporates constructs which are relevant to the context of this research, particularly the addition of constructs such as price value which makes the model more relevant to a commercial context. The underlying model (UTAUT) is also found to be relatively strong in accounting for users' behavioural intent and actual behaviour [39]. Additionally, UTAUT2 has been successfully applied to a diversity of fields, including mobile banking, education, e-commerce and most recently to healthcare [6]. We therefore chose this model as a basis for our own model. However, UTAUT 2 lacks constructs to capture some important considerations in the context of wearable fitness devices, namely concerns about privacy and security and consumers' perception about their health. Hence we proposed an extension of UTAUT 2 to include constructs which address privacy and security concerns, as well as consumers' health value, constructs such as price value and hedonic motivation.

1) Performance Expectancy

[39] defines performance expectancy as the degree to which using a technology will provide benefits to consumers in performing certain activities. Performance expectancy, has consistently been shown to be the strongest predictor of behavioural intent [39]. In the current context, performance expectancy will be defined as the expected health benefits an individual hope to gain from using a wearable fitness tracker.

2) Effort Expectancy

Effort expectancy is the degree of ease associated with consumers' use of technology [39]. Studies have shown that effort expectancy is an important determinant of user adoption and usage behaviour [39,1]. In the context of this study effort expectancy will be the ease associated with using wearable fitness trackers.

3) Social Influence

Social influence, the extent to which consumers perceive that important others (e.g., family and friends) believe they should use a particular technology, has been proven to be a significant predictor for the acceptance and use of technologies within different contexts [39]. Consumer adoption of a high technology product is influenced not only by one's attitude toward the product but also by socialization forces associated with the desire to follow referent group norms [21]. The expectations and perceptions of important others contribute to the social factors that affect an individual consumer's decision making and perception towards a specific behaviour [21]. Social influence has been proven to be a significant predictor for the acceptance and use of technologies within different contexts [39], including health care, mobile banking, education, and e-commerce [6].

4) Facilitating Conditions

Facilitating conditions refer to consumers' perceptions of the resources and support available to perform a behaviour [39]. It reflects perceptions of external constraints on behaviour that encompass resource and technology facilitating conditions [21]. The facilitation in the environment that is available to each consumer can vary significantly across application vendors, technology generations, mobile devices, etc. [39]. In the context of this study, facilitating conditions represents the resources and support available to consumers when using a wearable fitness tracker. This could include, among other things, the knowledge an individual possesses to use a wearable fitness tracker, help available once the individual has trouble using the device and the technological infrastructure available to support the device (e.g. internet access, mobile device such as a smartphone). A consumer who has access to a favorable set of facilitating conditions is more likely to have a higher intention to use a technology [39].

5) Hedonic Motivation

Hedonic motivation is defined as the degree to which an individual believes using technology-based services is fun [21], and it has been shown to play an important role in determining technology acceptance and use [39]. Consumer technology adoption theories emphasize the hedonic or entertainment aspect of using technology, with the experiential aspect of technology use mentioned as a significant determinant of behavioural intent [21]. Research has suggested that consumers always distinguish between enjoyment and usefulness when considering whether or not to purchase or use a product, and this may drive the consumers' decision whether to purchase or use the product [30]. In IS research, such hedonic motivation has been found to influence technology acceptance and use directly [39]. Wearable fitness trackers that incorporate behaviour change techniques that include social interaction or that use interactive elements such as game elements can provide enjoyable experiences to users. In the context of the current study, hedonic motivation is defined as the degree to which an individual believes using a wearable fitness tracker is enjoyable.

6) Price Value

An important difference between a consumer use setting and the organizational use setting is that consumers usually bear the monetary cost of such use. Costs is therefore a consideration when individuals are deciding whether or not to adopt a technology [39]. But it is not the only factor. Consumer perceptions of cost, quality and value are considered important determinants of shopping behaviour and product choice, and are usually conceptualized together to determine the perceived value of products or services [38]. [39] found price value to be a predictor of behavioural intent to use a technology and therefore included it in the UTAUT2 model as a construct. They define price value as consumers' cognitive tradeoff between the perceived benefits of the applications and the monetary cost for using them. The price value is positive when the benefits of using a technology are perceived to be greater than the monetary cost and such price value has a positive impact on intention. Hence, we also include price value as a construct in the proposed model.

7) Perceived Privacy and Security Risk

Wearable devices create a vast amount of personal data which needs to be protected [2]. This concern could potentially impact person's willingness to use wearable fitness trackers. If people are not in control of the collection and sharing of their personal health information collected using mobile health (mHealth) devices and applications, privacy concerns could limit their willingness to use and reduce potential benefits provided via mHealth [4]. As such data security becomes a significant factor to take into account when modelling user acceptance of wearable fitness trackers, a point echoed by [2].

We include the construct perceived privacy and security risk in our proposed model, which we define in our own context of the adoption of wearable fitness trackers, as the belief that an individual's data not being securely stored or transmitted or is at risk of being accessed by an unauthorized party. This is based on [26] definition of data security as data being securely stored and transferred, and data privacy as data only being accessed by the people who have authorization to view and use it.

8) Valuation of Health

The value an individual place on his health is an important consideration and as such, we are proposing the inclusion of a construct to reflect this called valuation of health. [6] in his proposed extension to the UTAUT 2 model included the addition of such a construct named consumers' valuation of health. [6] believed that consumers' valuation of their own health was crucial as he anticipated that a consumer's assessment of his or her own health was an important factor in predicting usage intention of health-related smartphone apps. We define valuation of health as the extent to which an individual believes that it is important to follow a healthy lifestyle in order to improve or maintain good health. We hypothesize that:

3. Methodology

Given the stated aim of this research, a quantitative research method was employed, using a cross-sectional study. A questionnaire survey was used as the data collection instrument due to the relative rapid turnaround time in data collection [14]. The questionnaire was based on instruments used in previous similar studies and adapted based on this context.

Quota sampling, a form of non-probability sampling, was used in this study. Quota sampling involves the selection of subjects into various groups (e.g. sex and age), usually based on census data, in order to ensure representativeness [32]. A sample size of 119 persons was used, consisting of males and females 18 years or older from Kingston and St. Andrew. The sample was stratified based on Sex, using information from Statistical Institute of Jamaica, resulting in 57 males and 62 females.

The survey for this study was based on a combination of elements from related survey instruments developed and used in similar studies. The instrument is composed of questions adapted from previous IS surveys used to measure the constructs included in our conceptual model. We modified the constructs of these other instruments to make the questions more relevant to the context of wearable fitness trackers. The questionnaire consisted of questions regarding the constructs in our proposed model as well as demographic and other related data. Items used to measure constructs used a five-point likert scale to gauge persons' opinions.

A pilot survey was first conducted in order to identify and address any issues that may have arisen in conducting the survey as well as to ensure the appropriateness and validity of the survey instrument. After reviewing the results of the pilot and adjusting the instrument as was necessary, the adjusted instrument was distributed to members of the sample population. In line with the Quota Sampling technique, members within the defined quotas were selected using convenience sampling. This method was chosen due to limited access to the population, the need for the relatively quick turnaround time with which the data needed to be collected and the lack of a suitable sampling frame. The questionnaires were distributed to participants online through the use of Google Forms.

After receiving the responses, the data was downloaded, coded and statistical analysis was performed. The assessment of behavioral intent to use wearable fitness trackers and the various constructs was conducted using ordinal regression.

4. Results

Our first research question was 'To what extent are Jamaicans (in Kingston and St. Andrew) willing to use wearable fitness trackers to aid in increasing physical activity levels?'. As such the study examined the behavioural intent of persons to use wearable fitness trackers by measuring responses to a five point likert scale question asking how strongly they agreed with the statement that they intend to use wearable fitness trackers in the future. Just over 50% of the respondents agreed that they would be willing, while another significant amount, 28%, strongly agreed that they would be willing. 17% indicated that they were not sure and three percent (combined) indicated that they would not. These findings show that a majority of the respondents are willing to use wearable fitness trackers. This finding, if extended to the population under study and in response to the first research question, would suggest that most Jamaicans (in Kingston and St. Andrew) are willing to use wearable fitness trackers.

Participants' responses to their intent to use wearable fitness trackers in the future were disaggregated by sex, age group and experience levels and examined. We conducted the Kruskal-Wallis Test to test for an association between age and behavioural intent. The result ($p = .765$) indicated that there was no statistically significant difference between the responses of persons based on age group. This suggests that there is no association between age group and behavioural intent. We then looked for an association between sex and behavioural intent. We conducted the Mann-Whitney U Test which yielded a statistically insignificant result ($p = .242$) indicating no association. We finally checked for an association between experience level and behavioural intent by conducting the Kruskal –Wallis test. This yielded a statistically significant result ($p = .013$) which indicates that there is a statistically significant difference in the responses between at least two of the groups of prior experience levels. We then looked at the pairwise comparison of the results which showed that there was a statistically significant difference between the responses of persons with no experience using wearable fitness trackers and those with less than three years using them. Persons with less than three years' experience, tended to be more willing to use wearable fitness trackers than those with no experience. Of interest is the fact that the persons with experience at the other experience levels tended to be more willing to use wearable fitness trackers than those without, even though there was no statistically significant difference between any of the other experience levels and those without experience.

The third research question was 'What is the association between performance expectancy, effort expectancy, social influence, facilitating conditions, price value, security concerns and hedonic motivation and the behavioural intent of Jamaicans to use wearable fitness trackers to aid in increasing physical activity levels? '. As such, our conceptual model set out to measure the impact of these eight independent variables on behavioural intent to use wearable fitness trackers. In response to the research question it was found that effort expectancy, facilitating conditions, performance expectancy and hedonic motivation were all found to be positively associated with behavioural intent. This means that behavioural intent to use wearable fitness trackers tends to increase as these constructs increase. Security concerns was found to be negatively associated with behavioural intent meaning that an increase in security concerns is associated with a decrease in willingness to use wearable fitness trackers.

5. Conclusions

This research investigated the behavioral intent of Jamaicans to use wearable fitness trackers. In doing so, we examined the relationships between behavioural intent, and the demographic variables age and sex, as well as prior experience with wearable fitness trackers. We also assessed the impact of technology acceptance factors such as performance expectancy, effort expectancy and social influence on the behavioural intent of persons to use wearable fitness trackers. The aim of the study was to determine the extent to which Jamaicans were willing to use Wearable fitness. Our intention was to get an indication as to how willing persons were to use wearable fitness trackers in order to aid in increasing their physical activity levels and thereby their overall health.

From the study, it was revealed that an overwhelming majority, about 80%, of persons from our sample were willing to use wearable fitness trackers. Another 18% were uncertain and 3% were not willing. These findings suggest that a majority of persons are willing to use wearable fitness trackers. This is a promising sign that Jamaica could be a prime target for the introduction and use of wearable fitness trackers on a wider scale, provided there is adequate planning and preparation in terms of introduction and implementation.

In assessing the impacts of age and sex, we found that there was no statistically significant difference between males and females in their reported willingness to use wearable fitness trackers. We also did not find any statistically significant difference among persons of different age groups in their willingness to use wearable fitness trackers. This success that there is no association between both variable and behavioural intent. Prior experience with wearable fitness trackers was also assessed against willingness to use wearable fitness trackers. Based on the results, it was found that there was a statistically significant difference ($p = .013$) between persons with no prior experience and persons with less than three years' experience in their reported behavioural intent. Those with less than three years' prior experience had more positive responses in terms of their behavioural intent. Even though there was not a statistically significant difference among the other experience levels, the results generally showed that persons with more prior experience with wearable fitness trackers tended to be more willing to use them. This does suggest that persons with prior exposure to wearable fitness trackers seem to be more willing to use them in the future.

After assessing eight technology acceptance factors and their impact on behavioural intent, it was found that the most significant factors were performance expectancy, perceived privacy and security risks, facilitating conditions, hedonic motivation and effort expectancy ($p = 0.048$, $p = 0.005$, $p =$ $p = 0.028$ and $p = 0.014$ respectively). Of these factors, the most significant was perceived privacy and security risk, which suggests that persons are most concerned with the safety and security of their data. As it relates to facilitating conditions, there appears to be ample support available in terms of infrastructure and technology available to support wearable fitness trackers. Jamaica has a high mobile penetration rate of 113 per 100 persons as at 2016 (World Bank, n.d.-a). This was evidenced when almost 100% or respondents indicated they had a smartphone when asked to indicate what mobile devices they owned. Additionally, 45% of the population of Jamaica are internet users meaning that they have access to the internet (World Bank, n.d.-b). Keeping in mind that not all wearable fitness trackers necessarily require internet access, this suggests that infrastructure should not be an impediment to the use of wearable fitness trackers. What must therefore be provided is other support in terms of assistance and knowledge.

Security concerns were found to be a significant factor in behavioural intent, which suggests that privacy and security is an important issue to persons. This means that any efforts to introduce wearable fitness trackers should put emphasis on addressing issues of privacy and security with users.

The significance of performance expectancy and hedonic motivation, suggests that while persons are willing to use wearable fitness trackers because they expect that it will be beneficial to them, there is also some expectation that the devices should be fun and enjoyable to use.

Wearable fitness trackers are seen as a promising tool to facilitate health interventions for physical activity, by providing users with the ability to self-monitor and self-regulate [19,31,12] behaviour change techniques which have been shown to be effective in encouraging persons to increase their physical activity levels [31,35]. The high levels of willingness to use wearable suggests that there is potential for the introduction of wearable fitness trackers in Jamaica in order to aid persons in increasing their physical activity level and by extension improve their health.

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