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Consumers' Use of Smartphone Fitness Applications: Adaptation of the Unified Technology Acceptance and Usage Model-2 to Turkish Culture

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A B S T R A C T

This paper highlights technological changes and developments in the field of participation sports allow individuals to track their performances, provide feedback and be more motivated for physical movement through various features via smartphone fitness applications. These technological changes in the sports industry provide individuals with the opportunity to embody sports products or services at the same time. These concretization attempts allow marketers to be more user-oriented, especially in the field of smartphone fitness applications. In this context, the purpose of the research is to test the suitability of smartphone fitness applications by consumers in Turkish culture in line with the "Unified Technology Acceptance and Use Model-2" (UTAUT-2). A total of 385 ($\bar{X}$Age=34.63±10) participants, 226 ($\bar{X}$Age=34.35±10.72) female and 159 ($\bar{X}$Age=35.04±8.86) male, participated in the study. Participants were given a "Personal Information Form" and "UTAUT2 Fitness Smartphone App Scale", which consists of 7 sub-dimensions and 21 items developed in line with UTAUT-2 for smartphone fitness applications and in which the items are evaluated in a 7-point Likert type, is presented. The SmartPLS 4 program was used to test the model in Turkish culture.

Keywords: Smartphone apps, Fitness, UTAUT-2, Consumer behaviour

INTRODUCTION

Technological tools are central to consumers' daily lives due to their convenience and ease of use (Ruiz, Ruiz, Bocengra & Fernandez., 2022). In this process, which has culminated in the advent of the "Internet of Things" (Tiryaki & Önder 2022) from the concept of traditional internet browsers, users are now able to interact on a frequent basis in their daily lives in order to comprehend, adapt to and even direct technological changes. The academic field, on the other hand, has demonstrated a keen interest in this transformation and has endeavored to investigate and comprehend it. In the present era, the pervasive integration of computers, the internet and internet-based technologies into the lives of individuals in the new millennium has prompted researchers to undertake studies on the utilization and consequences of these technologies (Demir & Akbulut, 2017).

Significant and rapid changes in the field of technology have a considerable impact on the sports industry. In a study conducted in (2011) by Kwak & McDaniel was found that the internet-based sports business structure had developed rapidly and had increased in importance, particularly in the context of sports marketing initiatives. In their 2011 study, the researchers indicate that organizations in the sports industry have made a significant investment in their websites and emphasize that this investment generates substantial revenues. Similarly, Ha, Kang & Pil (2015) asserted that technology has transformed the perception of sports products and services, as well as consumption habits among sports fans. They also emphasized that the incorporation of sophisticated features in mobile phones provides a diverse range of service options. The profusion of technology-based options has facilitated the rapid and convenient engagement of sports fans with the event, enabling them to disseminate information and participate in the proceedings remotely, whether during or outside the event itself. The advent of these features serves to differentiate the product and service experience in the sports industry. Conversely, Kim, Rogol & Kim (2017) highlighted the significant influence of technological advancement in their research, asserting that technological products, such as mobile phones and tablets, have become integral components of consumers' daily lives. Additionally, the study emphasized the utilization of smartphone applications as a means of maintaining connectivity with one's surroundings, conducting online transactions and accessing various services.

In the present era, there exists a multiplicity of smartphone applications that are utilized on a daily basis by individuals. In contrast to traditional internet browser users, Jeong, Young & Chung (2022) found that individuals who use phone smart applications create a different social structure. Such applications, which can be created independently, can be easily aligned with the interests, needs and desires of individuals (Ruiz et al., 2022). To illustrate, in the context of spectator sports, fans engage in a more participatory process of information gathering about their team through smartphone applications, in contrast to the more passive consumption of information typically associated with traditional media. In contrast to traditional media, fans can access more specific and up-to-date information about their team through smartphone applications prepared by the clubs. This allows for a more efficient and goal-oriented process of information gathering. This process of technological change prompts managers and marketers to develop products and services that facilitate fan participation, rather than solely focusing on the production of services and content (Hwang, Yang, Williams & Pedersen, 2020).

Technological changes in the field of participatory sports have attracted the attention of both marketers and academics. Mobile applications and other technological devices afford individuals the ability to more effectively monitor their performance development, receive feedback on their performance, and engage in physical movement through a range of features (Toker & Oc, 2022). Technological advancements in the domain of sports products have enabled individuals and the field of sports science to enhance the tangible experience of these products (Ruiz et al., 2022). Such embodiment initiatives have prompted marketers to adopt a more user-oriented approach, particularly in the context of exercise smartphone applications. In 2021, the sports technology market was dominated by health, physical activity and exercise applications, which accounted for 5.18% of the market. Of these applications, 35% of users practiced several times a week and 40% practiced four times a week (Ruiz et al., 2022). In 2021, the number of health and fitness apps available on the Apple and Google Play app stores exceeded 32,700. A recent study has revealed that one in five smartphone users have a health-related mobile application installed on their device. Nevertheless, the adoption rate of health and fitness apps (19%) remains comparatively low in comparison to social media (40%) and gaming apps (60%) (Ruiz et al., 2022). It is therefore evident that there is a need for researchers and marketers to develop a superior application, identify relevant factors and structure applications in a manner that encourages individuals engaged in health-related pursuits (Yuan, Wenjuan & Kanthawala, 2015). In accordance with this necessity, the field of online consumer behavior has begun to capture the interest of marketers and researchers. In a study conducted in various countries in 2016, over 20% of internet users made purchases online, with over 50% of US internet users doing so. This can be considered the beginning of a shift in consumer behavior (Şen, 2017).

It is crucial for the existing literature to identify the factors that influence the intention to use a technology product. The intention to use technology is identified as a significant indicator in the adoption of technology products (Binyamin & Hoque, 2020). The identification of factors influencing the intention to use technology will facilitate the development of a conceptual framework for understanding consumer behavior in the digital domain. Similarly, Yim, Byon, Baker & Zhang (2020) propose that millennial sports fans, who are adept at using technology, exhibit greater self-confidence than other fans. Yim et al. (2020) argue that after purchasing a product or service, individuals he emphasized that factors such as the speed of comparing prices with internet sites and the ease of obtaining information about products and services have altered consumption habits.

The impact of technological advancement on consumer behavior underscores the necessity for studies in this field to be conducted with due promptness. The growing prevalence of fitness applications is of particular significance for manufacturers engaged in marketing activities with respect to this domain. The utilization of technology and the degree of satisfaction it provides to the consumer is a significant factor in terms of increasing the frequency of use or preference of the relevant product. In order to gain a deeper insight into consumer behavior, the present study seeks to investigate the utilization of fitness-related smartphone applications within the context of the technology acceptance model, with a particular focus on consumer satisfaction. By enhancing the efficacy of such applications, manufacturers can potentially boost the engagement of individuals in physical activity, thereby fostering a greater commitment to healthy living (Dhiman Arora, Dogra & Gupta 2019).

Technology Acceptance Model

The acceptance and utilisation of technology by individuals represents one of the most developed and researched topics in the field of information systems. The behaviour of consumers in accepting technology-related innovations and the factors affecting this use have been tested with a variety of models in numerous studies. A number of studies have examined the acceptance and use of technology from a psychological and social perspective (Venkatesh, Thong & Xin 2012). Utilising the "Theory of Reasoned Action" (Fishbein & Ajzen, 1975), Davis (1989) developed the 'Technology Acceptance Model' (Cheng, Huang & Lai, 2020). Adapted from the Theory of Reasoned Action proposed by Fishbein and Ajzen in 1975, the Technology Acceptance Model, proposed by Fred D. Davis in 1986, is based on the theory that individuals in the work environment (Aksoy, 2020). This model has been employed to identify the factors influencing individuals' intention to utilize a range of technological products. The Technology Acceptance Model (TAM), initially proposed in 1986, is a theoretical framework that seeks to explain individuals' intention to utilize technology-based products. This is achieved by examining the concepts of perceived ease of use and perceived benefit (Şen, 2017).

The model posits that the behavioral use of a technology is influenced by individuals' behavioral intention towards that technology product. Behavioral intention can be defined as the strength of the intention to perform a specific behavior (Binyamin & Hoque, 2020). An individual's intention to utilize technology is predicated on their attitude and perception towards said technology. In accordance with the "Technology Acceptance Model", the perceived usefulness and perceived ease of use of a technology influence the user's attitude towards it. The attitude towards use and the perceived benefit serve to determine the behavioral intention to use. Behavioral intention is a key determinant of actual use (Dal, 2021). The Technology Acceptance Model (TAM) is a model that measures individuals' intentions and desires to use technology based on three fundamental elements. The Technology Acceptance Model-1 has been the subject of criticism on the grounds of its limited number of variables. Over time, the model has been developed by the addition of different variables, which have then been tested in a variety of studies (Barbosa, Fernandez, Pedrogosa & Carrion 2021).

In this study, the 'Unified Technology Acceptance and Use Model-2' (UTAUT-2), which is one of the models used to measure the intention to use technology, will be employed.

The reason for employing this model is that, in contrast to other models, it places the consumer at the center of the analysis (Venkatesh et al., 2012). Venkatesh et al. (2012) highlighted that previous models were developed to examine technology acceptance and usage intention. In contrast, this novel model underscores the necessity to assess technology products that have been developed with significant financial investment to serve consumers from a unique perspective, one that incorporates consumer content. Yuan et al. (2015) investigated the factors influencing the continued use of health apps. The combined technology acceptance and usage model, which is consumer-oriented, was employed in the study to identify the factors influencing the use of fitness applications and their impact on health, intention to use, and continuity of use (Yuan et al., 2015). Toker & Oç (2022) developed a model for the utilization of technology products in their research, which focused on motivation, exercise type and content in sports. Within this model, 'UTAUT-2' was employed to identify the content-awareness features in sports technology products and the adaptation of users' perception of innovation. In their study on the use of smartphone applications in sports centers for health and consumer satisfaction, Barbosa et al., 2021) employed the UTAUT-2 model, which is consumer-oriented.

In this study, the UTAUT-2 model was employed to examine the factors influencing consumer usage intentions and behaviors with regard to smart exercise applications. The use of this model was deemed appropriate. In the study conducted by Venkatesh, Thong & Xin (2012), the UTAUT2-2 model was employed. He set out the objectives of developing the model as follows:

- The objective was to define three new subdivisions derived from the previous study in order to reveal consumers' adaptation to technology.
- The second objective was to improve the relationship between the existing factors of

the Technology Acceptance and Use Model-1 and to create a more comprehensive framework.

- To identify the relationship between consumer factors and technology with regard to the new sub-sections.

Venkatesh et al. (2012) developed the Unified Technology Acceptance and Use Model-2 by restructuring and expanding upon the Unified Technology Acceptance and Use Model (1). The findings of studies conducted in the field of social sciences have led to the questioning of the accuracy of the Unified Technology Acceptance and Use Model (Ruiz et al., 2022). It has been suggested that the model is not as reliable as previously thought (Tiryaki, 2022). In the creation of the Unified Technology Acceptance and Use Model-2, the 'voluntariness of use variable' present in the Unified Technology Acceptance and Use Model was removed, and 'hedonistic motives' were incorporated into the new model to indicate use. The objective was to ascertain whether price value affects the decision to use the product, and whether quality and economic price influence this decision. Additionally, the intention was to identify whether habit variables act as an antecedent and influence repeated behavior (Venkatesh et al., 2012).

Habit:The behaviors exhibited by individuals are involuntary, resulting from prior experiences that have been learned and internalized.

(Tiryaki & Önder, 2022). Individuals may exhibit varying degrees of habituation based on the duration of their experience with the technology product (Venkatesh et al., 2012).

Hedonistic Motives: This refers to the extent to which the individual believes that the technology product in question is enjoyable (Tiryaki & Önder, 2022). Although there is considerable variation in the way hedonistic motives are defined in different studies, there is a general consensus that they refer to the perception of pleasure (Binyamin & Hoque, 2020). This factor plays a role in individuals' search for innovation, particularly during the initial encounter with technology. The utilization of the technology product over time may result in a search for innovation and information. This pursuit may have a lesser effect on the utilization of the technology product based on hedonistic motives (Venkatesh et al., 2012).

Effort Expectancy: This is the belief that individuals can perform their desired behavior with the least effort when using a technology product that they are willing to use (Venkatesh et al., 2012). Research indicates that consumers are more inclined to utilise technology products that necessitate minimal effort (Binyamin & Hoque, 2020).

Performance Expectation: The capacity to continue the behavior subsequent to the utilization of the targeted technology product is defined as the degree of expected gains (Venkatesh et al., 2012). Previous research indicates a strong correlation between performance expectancy and behavioural intention (Zuiderwiik, Jansen & Dwivedi, 2015).

Social Influence: This can be defined as the degree to which individuals perceive that important figures believe they should adopt a new system (Tiryaki & Önder, 2022). Those who can provide social influence may include former colleagues, family members, relatives, or friends. Previous research has investigated social influence within the scope of subjective factors and social factors (Binyamin & Hoque, 2020).

Facilitating Conditions: Facilitating situations are defined as situations that may occur in the environment that may facilitate or complicate the use of technology (Barbosa et al., 2021). The intention to use is positively affected when individuals are familiar with or have knowledge about the technology product (Barbosa et al., 2021). The concept of price value is closely linked to the perceived benefits that consumers derive from a product and their willingness to pay for these benefits. In the context of smartphone applications, there are three principal categories of pricing: free, paid, and premium, which encompasses high-featured paid options (Yuan et al., 2015).

Behavioral Intention and Usage Behavior Relationship: Behavioral intention can be defined as the probability that an individual will perform a given behavior. It is a strong determinant of behavior (Tiryaki, 2021). It is frequently demonstrated in research that behavioral intention is the most significant factor influencing individuals' use of technology products (Barbosa et al., 2021). In the Technology Acceptance Model, intention to use is found to explain approximately 40% of actual use (Dal, 2021). The extant literature indicates that it is appropriate to employ the causal relationship between individuals' intentions, beliefs, and actual behaviors as a conceptually dependent variable in the investigation of the intention to utilize a technology product or service (Tiryaki, 2021). An individual's favorable intention towards a technology product or service will result in a favorable response towards that product or service that there is a robust correlation between behavioral intention and consumer satisfaction (Barbosa et al., 2021).

In this context, the purpose of the research is to test the suitability of smartphone fitness applications by consumers in Turkish culture in line with the UTAUT-2.

METHOD

A quantitative research method was used in this study. The aim was to adapt the UTAUT-2 scale and the frequency of use scale to the Turkish culture, and the relevant literature was reviewed to determine the sample size. According to the International Test Commission (2018), the sample size that can adequately reveal the psychometric structure of a scale is at least 200 participants. The age range of the participants in this study was determined by considering the validity and reliability studies of the scales used in the study (Dhiman at al., 2019; Barbosa et al., 2021) (Büyüköztürk, Cakmak, Akgün, Karadeniz & Demirel, 2019). Furthermore, in adaptation studies in the literature, the demographic characteristics of the sample group are expected to be the same as the target group of the original scale (Erkuş, 2007; Çapık, 2018). For this reason, the original studies (Dhiman at al., 2019; Barbosa et al., 2021) were used as the basis for determining the relevant sample group for the current study and the criterion sampling method, one of the purposive sampling types, was used. Accordingly, the sample size for this study was determined to be 324 participants aged 18 years and older who use fitness smartphone applications.

In order to adapt the UTAUT-2 Fitness Smartphone App Scale and the Frequency of Use and Consumer Sub-Satisfaction Scale to Turkish culture, participants were presented with the Personal Information Form, the UTAUT-2 Fitness Smartphone App Scale which were accompanied by an information note (Information and Consent Form) regarding the content and purpose of the research. The necessary permissions were obtained from Dhiman et al. (2019) for the UTAUT-2 Fitness Smartphone App Scale via email.

1. ***The Personal Information:*** Form is provided below for reference. The researcher devised this instrument to determine the personal characteristics (age, gender, sports experience, etc.) of the participants in the study.

2. ***The UTAUT-2 Fitness Smartphone Application Scale:*** The scale was developed by Dhiman at al. (2019) with the objective of determining the factors affecting the participants' use of smartphone applications. The scale comprises 27 items and nine sub-dimensions. The sub-dimensions are indicated by the number of items, as follows: Performance Expectancy (3), Effort Expectancy (3), Social Influence (3), Facilitating Conditions (3), Hedonic Motives (3), Price Value (3), Behavioral Intention (3), Self-Identity (3) and Personal Innovativeness (3). Dhiman et al. (2019) employed the existing UTAUT-2 model, extending his research with the sub-dimensions of self-identity (3) and personal innovativeness (3). However, as these concepts (self-identity and personal innovativeness) were not included in the current research as the original UTAUT-2 model does not incorporate these subsections and does not represent the area of interest of the present research, it was excluded from the scale. Although the UTAUT-2 model originally included a price value sub-heading, in the research conducted by (Toker & Oc, 2022) and (Barbosa et al., 2021) the price value from the UTAUT-2 model was not included due to the fact that smartphone applications can be used free of charge. In this study, "Price Value" was not included in the research due to fitness apps can be used free of charge. The scale employed in the present study consisted of 21 items and seven sub-dimensions, namely Performance Expectancy (3), Effort Expectancy (3), Social Influence (3), Facilitating Conditions (3), Hedonic Motives (3), Habit (3), and Behavioural Intention (3). The Cronbach alpha values for all sub-dimensions are above 0.70. The scale employs a 7-point Likert format, with 1 indicating strong disagreement and 7 indicating strong agreement.

The most crucial phase of adaptation studies is the translation from the target language to the source language, otherwise known as face validity. Accordingly, the standard procedure proposed by Brislin (1986) for the translation-back translation method was adhered to. The scale was translated from English to Turkish by three academic members who have field knowledge and proficiency in the English language. Subsequently, the three translations were provided to two experts, one of whom was an information technology expert and one of whom was a sports science expert, along with the original text of the scale. They were then asked to select the most appropriate expressions from the translations for use in the original scale. Following this process, the Unified Technology Acceptance and Use Model-2 scale was finalized in Turkish.

The adapted Turkish scale was then provided to two referees with expertise in the field of English, who translated it back into English. The original text of the scale was then compared with the translated text to determine the most appropriate version. Following the completion of the translation process, a pilot study was conducted to ascertain the language comprehensibility of the scale. To this end, the Turkish version of the scale was finalized in accordance with the feedback received from 50 individuals who utilize fitness smartphone applications.

The scales were transferred to the digital domain via Google Form and administered to participants aged 18 years and over, residents of Istanbul, who utilize fitness smartphone applications. The convenience sampling method was employed, which refers to the type of sample that the researcher can reach. This method was selected for ease of delivery, speed and cost-effectiveness.

The first page was the info form, the second the consent form. Those participants who gave their approval to both forms proceeded to complete the scales as part of the research process. Once the required number of participants was reached, the scale was removed from the publication and transferred to Smart Pls 4.

In order to examine the psychometric properties of the Turkish form of the UTAUT-2 Fitness Smartphone Application Scale a descriptive research method was employed which enables statistical inference to be made over the target population. The research was designed as a cross-sectional study, which involves the collection of data from a specific group over a defined period of time. In order to make a general judgement about the universe from the research methods, the survey model, which refers to the process of screening a group of samples or samples to be taken from the universe, was employed.

Prior to analysis, the data set was subjected to a comprehensive examination to identify and exclude erroneous data, blank and missing data, and extreme values, in order to ensure the integrity and reliability of the research results.

While PLS-SEM does not require a normal distribution condition, this does not indicate that it should be the preferred method when the data are normally distributed (Hair, Risher, Sarstedt & Ringle, 2019; Sarstedt, Ringle & Hair, 2021). Accordingly, for the present data set, the calculation of the arithmetic mean, standard deviation, kurtosis, and skewness coefficients was conducted. The kurtosis-skewness coefficients fell within the range of +2 to -2, indicating that the data align with the criteria for a normal distribution (George & Mallery, 2019).

In order to adapt the measurement model to Turkish culture, the following were analysed: convergent validity, discriminant validity and the goodness of fit values of the construct. The factor loading, average variance explained (AVE) and composite reliability (CR) values for convergent validity, Cronbach's alpha and rho_c values for convergent validity and reliability, and the Fornell-Larcker (1981) criterion for discriminant validity were examined. Additionally, the SRMR, NFI and R2 values were analyzed to assess the goodness of fit of the measurement model. The Smart PLS 4 software was employed for the related analyses, with a significance level of 0.05 for the data.

RESULTS

Table 1. UTAUT-2 Factor Loading Values for Smartphone Fitness Measurement Model

Measurement Items Sub-Dimensions	Items	$\bar{X}$ score	sd	Factor Loading
Behavioral Intentions	1	4,39	0,28	0,959
	2	4,01	0,26	0,966
	3	4,06	0,24	0,970
Performance Expectancy	1	4,85	0,41	0,912
	2	4,81	0,29	0,958
	3	3,52	0,35	0,938
Effort Expectancy	1	5,27	0,48	0,880
	2	5,43	0,40	0,916
	3	5,58	0,39	0,922
Social Influence	1	3,52	0,35	0,938
	2	3,44	0,24	0,971
	3	3,53	0,30	0,953
Hedonic Motives	1	4,95	0,27	0,964
	2	4,91	0,22	0,976
	3	4,62	0,29	0,958
Facilitating Conditions	1	6,09	0,65	0,761
	2	6,10	0,59	0,804

	3	5,54	0,52	0,855
Habits	1	3,70	0,48	0,877
	2	2,40	0,42	0,907
	3	3,19	0,46	0,888

Table 1 shows the scores, standard deviations and factor loadings of all items in the measurement model.

Table 2. Smartphone Fitness Applications Measurement Model Sub-Dimensions, Items, Rho_c, Alpha Coefficients, CR and AVE Values

Measurement Items Sub-Dimensions	rho_c	Cronbach's Alpha	CR	AVE
Behavioral Intentions	0.976	0,96	0,98	0,93
Performance Expectancy	0.955	0,92	0,96	0,88
Effort Expectancy	0.932	0,89	0,93	0,82
Social Influence	0.968	0,95	0,97	0,91
Hedonic Motives	0.977	0,96	0,98	0,93
Facilitating Conditions	0.849	0,75	0,85	0,65
Habits	0.920	0,87	0,92	0,79

When analyzing Table 2, it can be seen that the Cronbach's alpha values, which indicate the internal consistency coefficients of the scales in the measurement model, vary between 0.75 and 0.96. Within the convergent validity of the measurement model, the average variance values (AVE) were above 0.50, the composite reliability (CR) values were between 0.85 and 0.98 and the rho_c values, another composite reliability criterion, were between 0.849 and 0.977.

Table 3. Fornell-Larcker Criterion for Smartphone Fitness Apps Measurement Model

	BI	EE	FC	H	HM	PE	SI
BI	0,965						
EE	0,474	0,906					
FC	0,401	0,590	0,807				
H	0,788	0,371	0,301	0,890			
HM	0,726	0,594	0,471	0,650	0,966		
PE	0,734	0,615	0,479	0,637	0,733	0,936	
SI	0,585	0,315	0,270	0,682	0,556	0,530	0,954

Table 3 shows that the relevant values meet the Fornell-Larcker criterion, with the other variables in the same row and column being equal to or greater than the values in the other variables

Figure 1 illustrates the structure of the model developed for smartphone fitness applications in line with UTAUT-2

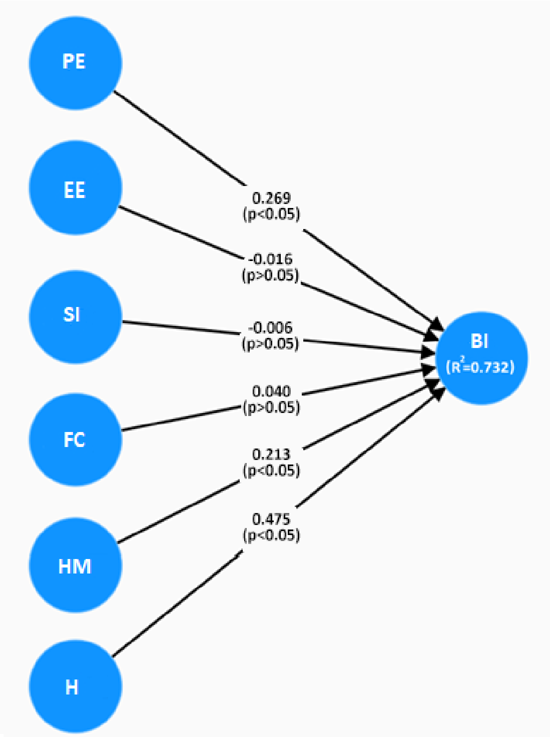

Figure 1. UTAUT-2 Smartphone fitness applications measurement model (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, FC= Facilitating Conditions, HM=Hedonistic Motives, H=Habbit)

The findings obtained from the analyses conducted to determine the goodness of fit of the model indicate that the model is at an acceptable level (SRMR=0.066, NFI=0.87). Performance expectancy (β=0.269, $p<0.05$) hedonic motivation (β=0.213, $p<0.05$) habit (β=0.475, $p<0.05$) were found to be statistically significant in explaining behavioural intentions. On the contrary, it was found that Effort expectancy (β=-0.016, $p>0.05$) social influence (β=-0.006, $p>0.05$) facilitating conditions (β=0.040, $p>0.05$) were statistically insignificant. As illustrated in Figure 1, the partial least squares regression analysis revealed that the measurement model sub-dimensions explained 73.2% of the behavioural intention to use smartphone fitness applications.

DISCUSSION AND CONCLUSION

The objective of this study is to evaluate the efficacy of the measurement model developed for fitness smartphone applications within the context of UTAUT-2, with a particular focus on its applicability within the Turkish culture.

Partial least squares regression is a statistical method that is employed to predict a set of dependent variables from a set of independent variables. Smart PLS is the preferred method within the scope of this research due to its suitability for analysing complex models comprising multiple constructs and indicators, its efficacy in small sample groups and its frequent use in the field of social sciences, particularly in recent years (Purwanto & Sudargini, 2021).

In the field of adaptation studies, the validity, reliability and goodness of fit criteria of the measurement model are typically subjected to examination (Sarstedt et al., 2021). Three conditions are expected to be met for convergent validity (Hair et al., 2019). The first of these is that each item in the measurement model must have a value of 0.50 or above. According to the current findings, the factor loading of all items is above 0.75, thus meeting this condition. The second condition is that the CR and Cronbach's Alpha values should be higher than 0.70 (Tavakol & Dennick, 2011).

Upon analysis of the findings, it was determined that Cronbach's Alpha values were 0.75 and above, while CR values were 0.85 and above. Additionally, it was established that AVE values should exceed 0.50, as proposed by Fornell and Larcker (1981).

In all sub-dimensions, the associated AVE values exceed 0.65. Furthermore, the composite reliability criterion, denoted as rho_c, exhibited a range of values between 0.849 and 0.977. The value of .70 and above indicates that the relevant structure provides internal consistency as a whole (Hair, Hult, Ringle, et al., 2021). The Fornell-Larcker (1981) criterion is a method used to evaluate discriminant validity within the scope of SEM (Structural Equation Modelling). This entails a comparison of the square root of the average variance extracted (AVE) of each construct with the correlations between that construct and all other constructs in the model. Upon examination of Table 3, it becomes evident that the constructs within the model satisfy the requisite condition. In terms of the goodness of fit of the model, values below 0.08 for the SRMR are indicative of a good fit, while a value of 0 indicates a perfect fit (Sarstedt et al., 2021). The results demonstrate that the model exhibits a good fit level, with an SRMR value of 0.066. Conversely, while the NFI value exceeding 0.90 is deemed an appropriate fit criterion (Hooper, Coughlan & Mullen, 2008; Çakır, 2019), a value exceeding 0.80 indicates an acceptable fit. The findings demonstrate that the model is nearly at the optimal fit level (NFI=0.87) and meets the acceptable fit level condition, although it does not meet the optimal fit level condition. This study is comparable to the original study and lends support to the original measurement model (Dhiman et al., 2019).

The findings demonstrate that each sub-dimension in the measurement model accounts for 73.2% of consumers' behavioural intention to use fitness apps in line with the UTAUT-2 model (Figure 1). In simpler terms, the current model provides an explanation of the factors influencing user behaviour and offers valuable insights into the motivations behind the use of smartphone fitness apps (Ringle, Sarstedt, Mitchell & Gudergan, 2020).

In conclusion, the measurement model developed for the assessment of fitness smartphone apps within the scope of UTAUT-2 is validated and reliable for the Turkish cultural context.

LIMITATION AND FUTURE STUDIES

The sample size of the study is constrained by the number of participants that the researcher is able to recruit. As a consequence of the adaptation of the measurement model to Turkish culture, the findings of the present study offer only limited insight into the model. The utilisation of free fitness app applications by the sample group resulted in the exclusion of the price value sub-dimension from the model. In future studies, it would be beneficial to expand the sample group and limit it to participants using paid apps in order to gain a deeper understanding of the effect of the price value dimension on the model. Furthermore, it would be advantageous to employ a variety of research methods and techniques, such as interviews and open-ended questions, in new studies to expand the current model with new dimensions and gain insight into cultural differences.

Author Contributions

The conceptual framework of the research was created by G.D. while A. G. was responsible for data collection, analysis and conceptual relations with research data. The final version of the research was checked and edited by G.D.

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Institutional Review Board Statement

The research was conducted in accordance with the Declaration of Marmara University, after receiving approval from the Ethics Committee of the faculty of Health Sciences Marmara University on 06.06.2024 (Approval No.: 2024/ 26-06).

Informed Consent Statement

Informed consent was obtained from all subjects involved in this study.

Data Availability Statement

Datasets are available through the corresponding author Aykut Gümüş upon reason-able request.

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Conflicts of Interest

The authors Aykut Gümüş and Gökalp Demir unequivocally assert that this research was undertaken while devoid of any commercial or financial affiliations that might be perceived as potential conflicts of interest.

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