

Factors Influencing Women's Continued Use of Fitness Apps based on Experiences and Expectations

Yuhan Wang¹, YoungHwan Pan²

¹ Student, Department of Smart Experience Design, Kookmin University, South Korea,
wyh6229@kookmin.ac.kr

² Professor, Department of Smart Experience Design, Kookmin University, South Korea,
peterpan@kookmin.ac.kr

Corresponding author: Younghwan Pan

Abstract: Fitness applications are well renowned for assisting users in enhancing their physical fitness, overall health, and appearance. Despite the tremendous growth in the number of fitness applications, there hasn't been much research on the female user base because men and women differ biologically. This paper qualitatively explores the benefits perceived by fitness app users from using health apps, factors that are detrimental to use, and suggestions for improving fitness apps. Semi-structured interview was used to allow users to share their experiences using their own words, and thematic analysis of the content of the conversation was used to understand the reason behind fitness apps use. Understanding consumer experiences and expectations can inform the design of wellness apps, hence, this study explored the drivers of fitness app use. Smartphone applications are designed to increase the likelihood of app use by supporting users in achieving their goals, and facilitating habit formation. The design should take into account the specific preferences of the target group for application experience, convenience, sense of accomplishment, and privacy security-related application features. The analysis revealed the reasons driving users to utilize fitness apps through these themes: usability, fun, convenience, privacy and security, achievement, and customization.

Keywords: Customization, Fitness App, Female, Privacy Security, UE(user experience), Usability

1. Introduction

With the development of smartphones and the promotion of national fitness, fitness applications have developed rapidly. It has been proved that fitness applications can improve people's exercise habits and physical health[1], but it is not perfect at present, and the differences between the features for women and men are not well valued in the design of fitness applications. The results showed that there were differences in sports type preference, self-efficacy, and sports performance prediction level between male and female athletes. There is also a big difference between the types of sports preferred by men and women. In women's sports, sports that can be mastered easily and have low difficulty in getting started are the most important drivers, followed by improving physique, appearance, and effect[2]. In previous research, it was found that app use-related satisfaction seems to be gender-specific. When using mobile media for physical activity, women found fun and goal-setting more important than men[3]. In previous studies, it was found that the social system within fitness apps also has some effects on usage, and these effects have gender differences[4]. There are also some differences between men and women in the competition and reward mechanisms set up in fitness apps[5]. While current research has found

Received: April 17, 2023; 1st Review Result: May 19, 2023; 2nd Review Result: June 26, 2023
Accepted: July 25, 2023

differences between men and women, there are few studies that focus on a single sex. As fitness apps rise, Women pay more attention to body image than men[6].

The purpose of this paper is to further understand the factors that affect users' continuous use of fitness applications, as well as their needs and expectations through the results of semi-structured interviews and post-analysis. This study got first-hand experience from the users. Through the problems reflected in the process of users using fitness applications, suggestions for optimization and improvement are put forward for relevant practitioners. Through this study, the ideas of female users and their needs can be better understood, and these suggestions can help fitness applications developers enhance their application's features.

This study focuses on women, so the following research questions were raised:

- (1) What factors can significantly influence the continued use of fitness apps by female consumers?
- (2) What are the expectations and requirements for fitness apps among female users?
- (3) How do female users feel after using the fitness app?

The first research question is planned to explore the factors within existing apps that affect female users' intention to continue using them, with the aim of improving the problems that arise within existing apps. The second question is planned to explore the expectations and requirements of female users with the aim of making plans for the future development of fitness apps. The third question is based on the actual experience of users. This research needs to explore the factors that affect the continued use of female users through the combination of practice and theory, meet the needs of users through research, and help the better development of fitness applications.

2. Conceptual Framework

The Technology Acceptance Model (TAM), published in 1989, quantifies how consumers accept technology[7]. Now, TAM has been applied to both qualitative[8] and quantitative[9] studies on fitness applications. It has the same thought as the previous sentence [10].

Usually, a real-world user's experience of a fitness application helps determine the adoption and/or usage of a particular application. These user experience attributes include perceived aesthetics, perceived usability, perceived trustworthiness, and perceived usefulness. In the context of the Technology Acceptance Model (TAM)[11], these design attributes of user experience are conceptualized as user cognitive notions of functionality (usability and utility), aesthetics, and trustworthiness of a persuasive system.

User experience is the best practice that promotes improved quality of user interaction and perception with HCI systems and products and any related services[12]. The goal of this research is to find out the shortcomings of fitness applications and the needs of users through their personal experience of using fitness applications. This study also aims to find the value of fitness applications to users.

To achieve the study's objectives, this paper examined the factors that influence the use of fitness apps and whether they are used in combination with other technologies such as social media and gamification. The main objective of this study was to investigate which factors contribute to the long-term use of fitness apps by female users in a study of designing and using fitness apps. Many wearable devices and smartphone fitness applications have been developed to help people with fitness exercises. But the benefits of fitness are only seen if the user continues to use the product, rather than giving up shortly after purchasing [13].

This study chooses users' Experiences and Expectations as the starting point to study the Factors influencing women's continued use of fitness apps. Experiences represents how users actually feel after using the fitness app, and Expectations represents how users expect the fitness app to add content to the fitness app and improve existing issues with the fitness app after using the fitness app.

3. Literature Review

Women differs significantly from men not only in physiology and sports, but also in product selection and purchase. The Selectivity hypothesis theory (SHT) emphasizes that men and women are different when deciding to use or buy products[14]. When examining whether users' awareness of fitness apps is homogeneous, the study found that a sense of belonging, privacy risks, and security risks have a significant impact on female users[15].

Recent research has found that many users stop using these fitness apps a few months after they start [16]. Although fitness apps have been proven to improve physical fitness, whether they can be used continuously has become the focus of research. Because there are differences between men and women, this study focused on women. In the design and development of fitness applications for smartphones, the design of fitness application functions should meet the needs of users to achieve their goals, and promote the formation of user habits to increase the possibility of using the application. The design of related application functions such as education, motivation, gamification, and age and gender differences should be considered in software design[17].

In the social system of fitness applications, both men and women make upward comparisons, but men also make downward comparisons [4]. This fits with the self-enhancement strategy commonly used by men in previous studies when downward comparisons were made[5]. Because women are more sensitive to situational factors[18], when the size of the social network becomes larger, the upward comparison of female users will also increase[4]. Competition is one of the common strategies used by fitness apps to motivate users to exercise. The relationship between reward and social learning, when users use fitness apps, is stronger for women than for men. In the relationship between reward and competition, men were stronger than women[5].

There are some limitations in previous studies. Although researchers have explored the driving factors of using fitness applications, they rely on single measurement data and questionnaires, and false reports are common. The significant flaws common in these studies are that there is no independent study on women, and quantitative methods cannot directly express the thoughts of users, who are free to express their thoughts through interviews.

Furthermore, in a previous study, although the differences between males and females were found, these were not further studied. Therefore, this study summarized the differences found by previous researchers and conducted investigation and research to fill the gaps in previous studies.

4. Methods

4.1 Research Design

This paper adopts a qualitative research method, which is convenient to understand the subjective experience of users and suitable for detailed analysis of specific themes. Since this study is based on the Factors influencing women's continued use of fitness apps, when selecting the population, we focus on those who have experience in using fitness apps and hope to maintain long-term health. Semi-structured interviews were used in this study, and all interviews were conducted with the informed consent of users. After the analysis and summary of the interview content, the user is paid a return visit to verify the reliability and validity of the summary.

4.2 Participant Description

The largest number of participants were between the ages of 26 and 35, and interviews were completed in an average of 24 minutes. Twelve participants learned about the fitness apps they used in

the following ways: four of them used apps they found through their own search, four used apps that were recommended by we-media bloggers, three were recommended by friends, and one learned about them through advertisements.

None of them reported any chronic or underlying medical conditions. The interviews focused on user experience and participants were keen to share their insights into the use of fitness apps. Participants reported using fitness apps for different purposes. One participant used the fitness app mainly through the Apple Watch, while the others used the fitness app on Android phones iPhones, and mixed-use of tablets and TV screens.

[Table 1] Participant Demographics

Characteristic	Subcategory	Number
Gender	Female	12
Age (years)	18-25	1
	26-35	10
	36-45	1
Interview Duration (minutes)	Mean interview time	24
	Shortest interview	17
	Longest interview	34
Occupation	University student	10
	Other office-based workforce	1
	Start-up innovator	1
Highest Education	bachelor degree	3
	Master's degree	9
Smartphone Operating System	Android	1
	Apple	11

4.3 Data Collection

Data were collected between March and May 2023, and to ensure the validity of the interviews, the location was arranged in a quiet place, such as the respondent's office, Individual interviews guarantee the privacy of the interviewee. All interviews were conducted with the consent of the interviewees, and all interviews were authorized for research purposes. All recordings were also made with the consent of the interviewees and the recordings were saved as digital audio. In order to ensure the privacy and security of the interviewees, as well as the rigor of the research, all audio recordings were named with the interview order as the code. Respondents were aware that the recording would be used in the research and signed informed consent to conduct the interview.

4.4 Thematic Analysis

Thematic analysis is a common method for analyzing qualitative data, usually applied to a set of texts, such as interviews or transcripts. In this method, the researcher would scrutinize the data to identify emerging themes. The purpose of using thematic analysis in this study was to find themes that have not appeared in previous studies or have been ignored.

Through semi-structured interviews, users can freely express their ideas, and easy interviews can guide users to think deeply and explore their feelings in depth. All interviews were conducted in March 2023. The first few interviews were used to reflect on and improve the interview guidelines. The interviews were recorded digitally. Data saturation was judged by the repetition of clear concepts, and frequent themes that appeared in participant responses were evident and focused on the same point across 12 interviews. Themes such as usability, personalization, social attributes, convenience, and competitiveness were confirmed later in the analysis process. NVivo 10 was used for coding and analysis.

To participate in the interview, users were required to be at least 18 years old and have used a fitness app in the last three months. The aim is to combine the experience of the younger generation and the experience of the older generation. The researcher intends to find the respondents who are eligible for this study through snowball sampling. The selected interviewees were those who had fitness intentions and used fitness apps for more than six months on average. These people said that they will continue to keep fit in the future, and they also plan to continue to use fitness apps to help their fitness and sports. The purpose of the interview was to understand the problems encountered by current female users and their user needs and their expectations. All users used fitness apps at least two times a week on average.

5. Results

5.1 Theme

Six themes emerged from the use of fitness apps that influenced users' willingness to keep using them. These themes are Usability, Fun, Convenience, Customization, Achievement, and Privacy security.

These topics focus on expressing how a user feels after using a fitness app and how the design of a fitness app affects the user's usage mindset and behavior. The six topics covered negative experiences users had when using the fitness app, motivation to keep using it, problems they encountered during use, and features they wanted the app to improve during use. The six themes can be seen in [Table 2].

[Table 2] Themes Summarized after Semi-structured Interviews

Theme	Definition	Examples
Usability	Users can use the fitness app smoothly.	Because fitness was on my agenda, he would feel a little uncomfortable if he reminded me again and again. U01 I prefer to exercise on my own initiative, because I think it works best. For example, he reminded me that you should exercise today at this time, but I am in a particularly bad mood today, I don't want to exercise. Then I'll get mad at the fitness app, turn the reminder off, and probably not want to use the fitness app as much in the future. U02 Now the interface is too complex, I look a little bit irritated. U03 I will use convenient login, because it is very troublesome for me to fill out the information, and maybe I will give up using fitness applications because of this. U07 I have this feeling that when I open up, there are courses everywhere, in every section, that is, I might open up the home page and it has courses, and then I change to another screen and it has courses, but I don't know what the difference is between these sections and sections. There are classes everywhere. It's just chaos. U10
Fun	Users use fitness apps that allow them to have fun and find interesting fitness classes.	But if I want to exercise, if I want to find some training courses or more interesting sports, like dance. For example, aerobics, and boxing classes, I can find more comprehensive classes on non-fitness apps than on their fitness apps, which is the kind of tutorials I prefer. It's too boring because his plan is a whole cycle, but only those few classes, I don't think it's interesting. And then I turned to find some interesting videos, I think particularly happy courses, can bring me happiness. U02 Maybe I'll find it a little boring. Well, for me personally, I would find this format boring. U05
Convenience	The fitness app's lessons are easy for users to learn and the app's interface is easy to operate.	The fitness app lists all the actions and then has a detailed explanation, video explanation, and text explanation. For example, when I pull hard, the force feeling, can not find, or feel their actions are not quite right, you can according to his action in the software to explain a little contrast. U01 That's one of the things that I think is really good about this app. When I was working out at the gym myself, without this sound cue I would probably give up after the 13th session. I can actually do 15, but I think I can really do one more with voice prompts. U02

<p>Customization</p>	<p>Users need to add functions and adjust modules according to their preferences.</p>	<p>I wish the calendar would be set up, set the period for each of my training sessions, and then the fitness app would remind me before the next one started. U01 My state yesterday is different from my state today, and the fitness app will customize the class according to my state. U02 I have my own functions that I want to customize. I like to make plans very much, so if I want to use this sports software, I hope I can have a section to make plans. For example, what did I eat today, and then how long did I exercise today? And how many calories did I burn today? I would love that kind of customization. U10 Diet records, or recommended recipes, can be used by fitness apps to alert me if I've eaten too many calories today. I think with that recipe, it makes me want to use the APP even more, and I might download it back. U12</p>
<p>Achievement</p>	<p>Users gained a sense of accomplishment by using the fitness app.</p>	<p>It works when I keep using it. U02 For example, during the holiday season, the fitness app launched a rabbit badge, I need to exercise during this time, I will get that badge, and then I will exercise during that time to achieve that goal, to get the badge. U04 I think it's important for me to document this kind of thing, that is, I want to have a clear understanding of what I've done before. The plan will datalize what you have done before. I think these data are a great motivation for me, and I will have a sense of achievement when I see these data. U10 I think that medal is very good, I may be for that medal, because I think it looks good, or it is very meaningful, I will run, and then I will push myself to complete the task. U12</p>
<p>Privacy security</p>	<p>Users have different definition standards for privacy information, and users question the privacy protection of the program.</p>	<p>I don't think so, this is just a record of the training, and many people will share their training on the online social platform. I feel like this is a note of mine. U01 It doesn't matter. Who wants to see something like me? Will anyone want to see it? Then please give him my data to analyze. U04 Do not feel that the violation is personal habits. I don't really like people to see me train, but myself I want to keep a record of the process. U07 I often use the software, so I trust it very much. But the fitness app, I don't use it too often, I don't have that deep understanding of it, and I don't open it every day to confirm it, and then I will feel insecure. U10</p>

Participants discussed negative experiences with fitness apps, which led users to reject the apps they used. Many participants reported turning off reminders in the apps, saying they felt anxious when they were reminded to exercise at inappropriate times. Participants also responded that with the increase of program functions, the operation interface became complex, making it difficult to search content, which led to users gradually losing interest in the fitness program they were using, and finally giving up using the program. Participants also explained that they thought the exercise courses provided by fitness programs were monotone in form, boring in content, and lack of exercise fun in the process of training. They would choose to use non-fitness applications to search for exercise videos that could bring them a more pleasant experience for training.

Participants also reported using the fitness app for collecting digital badges, awarding users achievement medals after completing the exercise tasks posted by the app. Some participants also reported that the fitness app could record all of their exercises, and these recorded exercises could have a positive impact on the participants. This sense of achievement drives users to get fit.

When it comes to privacy issues, many people said they were not concerned about fitness apps collecting personal information, but individual users also expressed distrust of fitness apps collecting users' personal information. At the same time, some users are worried about being harassed for posting content on the platform.

Participants described the convenience of using fitness apps to meet their fitness needs without going to specific locations such as gyms and playgrounds, and learning some free classes within the fitness app, which can save some costs of hiring trainers. Users expect their fitness applications to add some custom features such as diet records, the ability to make their own personal fitness schedules, fitness

diaries, and the ability to import their favorite music into fitness classes. The purpose of the custom function is to bring users a better experience, through their own adjustment, so that the fitness application is more suitable for their own operation logic.

In order to ensure the validity of the research results, after the theme analysis and induction, the respondents were invited to verify the final themes, and the summarized themes indeed conformed to the ideas of the respondents. After verifying results, the respondents affirmed the factors affecting their continuous use intention and their needs and expectations.

6. Discussion

6.1 The State of Fitness Apps

This section discusses the design of the fitness application and the user experience. The primary purpose of users using fitness applications is to maintain their physical health, and the second is that fitness applications can bring convenience to users. The most used function by users is the course and exercise of fitness applications. At present, there are generally too many advertisements in fitness applications, the similarity of fitness courses is too high, and there is no obvious label between paid courses and free courses. It is difficult for users to distinguish which courses they need, unable to choose courses they need, and the program does not plan the page and layout well, which makes it difficult for users to achieve the purpose of using fitness apps.

6.2 Thematic Analysis

Some of the themes that emerged in this study are consistent with previous studies, such as Privacy Security[1], Usability[2][3], and Achievement[5]. There were also new themes such as Fun, Convenience, and Customization which were not present in previous studies.

Usability mainly focuses on two parts. The first part is the reminder function in the fitness application. All the interviewees shut down the reminder function of the fitness application, because it made them anxious and eventually gave up in using the fitness application. Through interviews, the researchers learned that users use fitness programs for the purpose of actively improving their physical fitness and getting a better figure. Users can not only get physical improvement through exercise, but also get a psychological sense of achievement. Previous studies have also demonstrated that fitness apps should be designed with usability in mind[19][20].

The inability to exercise is mostly affected by passive factors. When users are unable to exercise, they tend to have a strong sense of reluctance when receiving the prompts from the program, causing them to reject it. Even though the purpose of the fitness application exercise reminders is positive, the results show that it brings users a very negative experience. Therefore, designers in the design of applications, not only need to consider the design of the program function, but also need to understand the user's psychological feelings.

The second part is the fitness application. With the increase of functions, the content of the program is becoming more and more rich, which also leads to the operation interface becoming more and more complex. Users could not quickly find the content they were looking for, and they did not classify the content after it was increased, which made it difficult for users to choose. Another user was attracted by the new content and forgot his exercise plan after entering the fitness application. The inability of users to quickly find what they want to search for caused users to gradually lose interest in the fitness app they are using and finally give up using the app. With the increase of the number in users, rich functions meet the needs of different users. But designers also need to better partition modules based on feature usage.

Nowadays, more and more users choose to find and learn fitness courses on non-fitness apps, mostly

because they cannot find their favorite courses on fitness apps. Most users do not pursue the top figure and strong sports ability instead, they simply want to exercise to ensure that they are full of energy, or because they have recently gained weight, they want to reduce their weight, and the design of fitness courses is too professional, which users find difficult to learn, and the content of the course is homogenized, so the design of fitness courses should be more diversified. Meeting the needs of different users and designing more gamification content in the program to increase the interest of users will be more attractive to users.

Users want to add some functions to the existing fitness applications to facilitate their use. These features are typically already developed and used in other types of applications, such as food tracking, fitness diaries, fitness programs, and so on. Because the existing functions are not enough to meet users' satisfaction, users need to use multiple applications at the same time to meet their own fitness plan, losing the convenience of using applications. In addition, some users have proposed to customize courses in the program to facilitate a better practice.

An interesting phenomenon was found in the interview. Although the participants used the social platform in the application to watch the content published by others, almost no one shared their own status. Watching the status of others will develop an comparison with their current status, creating an implicit competition relationship just to motivate themselves. From the interviews with participants, it was found that learned that although most users are not concerned about the collection of private information such as height and weight by the program, they are worried about being harassed by others if they share their photos on social platforms. Previous studies have also found that users have different perceptions of privacy security[21].

7. Conclusions

This study explored the feelings of fitness application users through semi-structured interviews and found that different users had certain commonalities in their feelings after using fitness apps. This article summarizes and describes the real feelings of users through six themes: Usability, Fun, Convenience, Privacy and Security, Achievement, and Customization. In terms of usability, users encountered many problems, mainly from the confusing interface which was difficult to use, to the repeated reminders from the application, which seriously affected the users' mood. Female users always like to look for courses that make them happy. The purpose of fitness is to stay healthy, but the happy process cannot be missing for them. If the fitness application can protect the users' information security, it will increase the users' trust and favorability of the fitness application. Some users choose to use fitness applications because the it can bring them convenience and can provide them with online guidance anytime and anywhere, reducing the impact of time and space on fitness. Many female users said that the sense of achievement drove them to fitness or directly became their fitness purpose. Many users expressed the hope that they could customize the fitness application by themselves, make the interface of the fitness application more consistent with their operation logic, and also hope that they could add some functions to make their own fitness plan. In the future, fitness app developers can improve their fitness apps according to the above six themes to improve the continuous use intention of female users.

There are some limitations to the study. This study only investigates Chinese respondents and the sample includes a small subset of homogeneous users. Therefore, it is likely that not all results and perceptions are present in this study. The results of this study may not be generalizable to other countries. Future studies should include more from a variety of races, ethnicities, cultures, genders, ages, and other conditions. Participants discussed the applications they were most familiar with, which would highlight program bugs they encountered and any program-related issues. However, participants had mixed use of fitness apps, and participants had to discuss all the fitness apps they recalled using, so users may have memory bias when recalling. Other researchers can study a different target population and utilize a

different data gathering and analysis procedures for future studies and try more methods as they do their research.

8. Further Research

Future research is planned to focus on specific types of exercise, such as running, jumping rope, and strength training. Researchers may consider monitoring their interaction with the application and changes in the user experience. Playability helps users to use applications for a long time, so gamified applications are a complementary research area. Researchers need to consider whether their existing designs are intuitive and easy to manipulate to meet consumer fitness goals. It is also worth considering to increase the competition between users, and combine the data recorded by social applications and the data recorded by fitness applications to create a competitive opportunity for users, and stimulate the motivation of users through the mechanism of the competition to help users achieve their fitness goals. In addition, continuous use of the application can be optimized by further understanding how users use the application.

References

- [1] M. J. Stork, E. G. Bell, M. E. Jung, Examining the impact of a mobile health app on functional movement and physical fitness: pilot pragmatic randomized controlled trial, *JMIR mHealth and uHealth*, (2021), Vol.9, No.5, e24076.
DOI: <https://doi.org/10.2196/24076>
- [2] K. Oyibo, J. Vassileva, Gender preference and difference in behavior modeling in fitness applications: A mixed-method approach, *Multimodal Technologies and Interaction*, (2020), Vol.4, No.2, 21.
DOI: <https://doi.org/10.3390/mti4020021>
- [3] S. Klenk, D. Reifegerste, R. Renatus, Gender differences in gratifications from fitness app use and implications for health interventions, *Mobile Media & Communication*, (2017), Vol.5, No.2, pp.178-193.
DOI: <https://doi.org/10.1177/2050157917691557>
- [4] M. Sun, L. .C. Jiang, G. Huang, Improving body satisfaction through fitness app use: Explicating the role of social comparison, social network size, and gender, *Health Communication*, (2022) Vol.38, No.10, pp.1-12.
DOI: <https://doi.org/10.1080/10410236.2022.2054099>
- [5] K. Oyibo, J. Vassileva, Investigation of persuasive system design predictors of competitive behavior in fitness application: A mixed-method approach, *Digital health*, (2019), Vol.5, 2055207619878601.
DOI: <https://doi.org/10.1177/2055207619878601>
- [6] D. A. Frederick, J. R. Garcia, A. N. Gesselman, K. P. Mark, E. Hatfield, G. Bohrnstedt, The Happy American Body 2.0: Predictors of affective body satisfaction in two US national internet panel surveys, *Body image*, (2020), Vol.32, pp.70-84.
DOI: <https://doi.org/10.1016/j.bodyim.2019.11.003>
- [7] F. D. Davis, Perceived usefulness, perceived ease of use, and user acceptance of information technology, *MIS quarterly*, (1989), Vol.13, No.3, pp.319-340.
DOI: <https://doi.org/10.2307/249008>
- [8] A. K. Yarbrough, T. B. Smith, Technology acceptance among physicians: a new take on TAM, *Medical Care Research and Review*, (2007), Vol.64, No.6, pp.650-672.
DOI: <https://doi.org/10.1177/1077558707305942>
- [9] L. Briz-Ponce, F. J. García-Peñalvo, An empirical assessment of a technology acceptance model for apps in medical education, *Journal of medical systems*, (2015), Vol.39, pp.1-5.
DOI: <https://doi.org/10.1007/s10916-015-0352-x>
- [10] J. Cho, M. M. Quinlan, D. Park, G. Y. Noh, Determinants of adoption of smartphone health apps among college

- students, *American journal of health behavior*, (2014), Vol.38, No.6, pp.860-870.
DOI: <https://doi.org/10.5993/AJHB.38.6.8>
- [11] H. Van der Heijden, Factors influencing the usage of websites: the case of a generic portal in The Netherlands, *Information & management*, (2003), Vol.40, No.6, pp.541-549.
DOI: [https://doi.org/10.1016/S0378-7206\(02\)00079-4](https://doi.org/10.1016/S0378-7206(02)00079-4)
- [12] <https://www.usability.gov/what-and-why/user-experience.html>, Apr 17 (2023)
- [13] A. I. Canhoto, S. Arp, Exploring the factors that support adoption and sustained use of health and fitness wearables, *Journal of Marketing Management*, (2017), Vol.33, No.1-2, pp.32-60.
DOI: <https://doi.org/10.1080/0267257X.2016.1234505>
- [14] J. Meyers-Levy, The influence of sex roles on judgment, *Journal of consumer research*, (1988), Vol.14, No.4, pp.522-530.
DOI: <https://doi.org/10.1086/209133>
- [15] Y. Zhu, R. Wang, R.Zeng, C. Pu, Does gender really matter? Exploring determinants behind consumers' intention to use contactless fitness services during the COVID-19 pandemic: a focus on health and fitness apps, *Internet Research*, (2023), Vol.33, No.1, pp.280-307.
DOI: <https://doi.org/10.1108/INTR-07-2021-0454>
- [16] P. Esmailzadeh, The influence of gamification and information technology identity on postadoption behaviors of health and fitness app users: empirical study in the united states, *JMIR serious games*, (2021), Vol.9, No.3, e28282.
DOI: <https://doi.org/10.2196/28282>
- [17] Y. Yang, J. Koenigstorfer, Determinants of fitness app usage and moderating impacts of education-, motivation-, and gamification-related app features on physical activity intentions: cross-sectional survey study, *Journal of Medical Internet Research*, (2021), Vol.23, No.7, e26063.
DOI: <https://doi.org/10.2196/26063>
- [18] W. Pan, J. Peña, Looking down on others to feel good about the self: the exposure effects of online model pictures on men's self-esteem, *Health communication*, (2020), Vol.35, No.6, pp.731-738.
DOI: <https://doi.org/10.1080/10410236.2019.1584780>
- [19] K. Oyibo, J. Vassileva, Relationship between perceived UX design attributes and persuasive features: a case study of fitness app, *Information*, (2021), Vol.12, No.9, 365.
DOI: <https://doi.org/10.3390/info12090365>
- [20] Z. Huang, Z. Y. Tian, Analysis and design for mobile applications: A user experience approach, *Design, User Experience, and Usability: Theory and Practice*, International Conference of Design, User Experience, and Usability, pp.91-100, (2018)
Available from: https://link.springer.com/chapter/10.1007/978-3-319-91797-9_7
- [21] A. Balapour, H. R. Nikkhah, R. Sabherwal, Mobile application security: Role of perceived privacy as the predictor of security perceptions, *International Journal of Information Management*, (2020), Vol.52, 102063.
DOI: <https://doi.org/10.1016/j.ijinfomgt.2019.102063>