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Effects of Content Characteristics and Improvement in User Satisfaction on the Reuse of Home Fitness Application

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Abstract: As the global fitness industry rapidly digitalizes, home fitness applications have emerged as a convenient solution for people to exercise anytime, anywhere. This study investigated the mediation effect of exercise satisfaction on the relationship between content characteristics and continuance intention to use home fitness applications. This study provided guidance for developing effective home fitness applications by analyzing which content characteristics can increase the continuance intention to use home fitness applications. The mediation effect of exercise satisfaction on content characteristics and continuance intention to use was examined using a structural equation model analysis, and 330 survey responses from individuals who have used home fitness applications for exercise were analyzed. The results confirmed that the enhancement of the content characteristics exerted a positive effect on exercise satisfaction and continuance intention to use. Additionally, the enhancement of exercise satisfaction characteristics positively affected the continuance intention to use. Further, exercise satisfaction was observed to exert a significant mediating effect on the relationship between the content characteristics and continuance intention to use home fitness applications. These findings suggest that it is essential to devote significant attention to enhancing content characteristics and exercise satisfaction in the development of home fitness applications.

Keywords: home fitness; fitness app; content characteristics; exercise satisfaction; continuance intention to use

1. Introduction

The Eurobarometer Sport and Physical Activity study conducted in 28 European countries identified lack of time as the most crucial barrier to participating in sports or recreational physical activities [1]. To overcome this barrier, home fitness has emerged as a viable alternative, garnering significant attention [2,3]. Home fitness, which allows for exercise without the constraints of time or location, offers a beneficial solution. However, being a solitary activity it could lead to a sense of boredom, potentially affecting the sustainability and effectiveness of the exercise.

Home fitness applications are perceived as a promising solution to mitigate these challenges. Research by Wang and Yoon found that home fitness application users demonstrated greater self-schema and exercise sustainability intentions than non-users [4]. Furthermore, Glynn et al. showed that individuals using home fitness applications exercised significantly more than those who did not [5].

This growing interest and reliance on home fitness applications coincided with a global event that further amplified its significance—the COVID-19 pandemic. As the pandemic altered people's lifestyles, it accelerated technological advancements in the non-face-to-face sector [6–8]. This societal shift, enforced by the global health crises, propelled the

fitness industry to further embrace digitalization, leading to a rapid expansion of the home fitness market [9,10]. According to Acumen Research and Consulting, the global home fitness content market is projected to grow at an average annual rate of 4.9%, increasing from $11.3 billion in 2021 to $17.3 billion by 2030 [11]. This connection between societal needs and the pandemic-induced lifestyle changes underlines the pivotal role home fitness applications now play in the global fitness industry.

In line with the increase in the home fitness population, the audience of the application market targeting this population has increased [12]. Home fitness applications encourage the on-the-spot learning of the right exercise regardless of time or place and require a relatively lower cost compared to offline exercise, and these factors have increased the popularity of home fitness applications among busy people. According to the State of Mobile 2022 report by data.ai, a mobile data analytics company, the use of fitness applications increased by 26% globally in 2021 compared to 2019, the year before the pandemic [13]. Particularly, the Korean mobile application market expanded at a growth rate of 40%, which exceeded the global average [13]. This indicates that the change to a lifestyle where health is managed through applications is occurring at a faster pace for Korean consumers.

In response to this change in the healthcare lifestyle, numerous companies have delved into the home fitness application market [14]. Consequently, competition among applications to secure profitability is becoming increasingly fierce. As the competition intensifies, researchers continue to explore ways to understand customer needs and identify factors that maintain user engagement with an application [15]. For example, Zhu et al. investigated the influence of the continuance intention to use of the users of mobile healthcare applications using the Theory of Consumption Values (TCV) and the Theory of Perceived Risk (TPR) [16]. Furthermore, Chiu and Cho employed the Extended Technology Readiness and Acceptance Model (TRAM) to investigate the differences between users and non-users in their intention to continue using a home fitness application [17]. In addition, Hwang and Ren investigated the effect of the technology acceptance model (TAM) on continuance intention to use, and Cho investigated the effect of the service quality of home fitness applications on continuance intention to use [18,19].

Recently, the characteristics of content have been gaining attention as a factor influencing the intention to reuse home fitness applications. These applications are evolving beyond simply providing workout routines, now incorporating various types of exercise content, such as yoga, meditation, and Tabata. They are also diversifying and refining their offerings to reflect users' varied tastes and tailor programs to specific fitness goals and body types [20]. Furthermore, recent advancements have seen the introduction of AI technology to create more personalized services, which are being integrated as part of the content in home fitness applications [21]. According to a text analysis of application review data by Lee et al., providing distinctive content is necessary to increase application usage [22]. In the same vein, Almaiah and Mulhem and Yang et al. have pointed out the importance of content as a precursor to increasing user reuse, emphasizing the need to sustain related research [23,24]. Additionally, Luqman et al. have noted the significance of analyzing various aspects of consumers' continuous intention to use applications, asserting that such analysis will serve as valuable data for related research [25]. This underscores the need for the present study.

Although previous studies have investigated home fitness applications from various perspectives, research specifically focusing on the content characteristics of the application is surprisingly limited, despite the acknowledged importance of these characteristics in enhancing the application usage. Recognizing this research gap, the present study aims to clarify the relationship between content characteristics, exercise satisfaction, and the intention to continue using home fitness applications. In doing so, we hope to contribute significantly to the field of home fitness research. Moreover, by shedding light on these connections, the goal of this study is not only to offer a guide that can help home fitness applications attract more participants but also to ultimately contribute to the promotion of people's health, underlining the enduring relevance and necessity of this research.

2. Literature Review

Content, as defined, is the "intellectual property that underlies a multimedia good or service" [24], and it is characterized by novelty, usefulness, playfulness, and diversity [26]. Novelty drives the download of mobile fitness applications, underlining the need for regular updates [27]. Usefulness is a user's belief in improving their life and work using a service, while playfulness is the enjoyment derived from using a system [28]. Diversity reflects varied topics, perspectives, and tastes in the content [29]. Satisfying consumers of home fitness applications is crucial for growth, as it influences future users [30,31].

Exercise satisfaction, influenced by content characteristics, is an individual's evaluation of the exercise environment and their positive emotional state towards it [32]. It consists of body satisfaction, psychological satisfaction, and life satisfaction [33]. Body satisfaction refers to an individual's contentment with their body [34]. Psychological satisfaction is the ability to maintain positive relationships, accept oneself, self-regulate behavior, and have control over one's surroundings, purpose in life, and motivation to realize potential [35]. Life satisfaction is an individual's positivity about their overall quality of life [36].

Continuance intention to use, influenced by exercise satisfaction and content characteristics, is the intention to continue using a service or product [37]. Playfulness, a content characteristic, positively affects this intention. Providing useful, interesting, and enjoyable information increases this intention. An application's failure to satisfy consumers due to low quality can negatively impact customer loyalty and retention [31]. Consumer satisfaction can be used as a proxy variable to measure application success [30]. Satisfaction can also be a major antecedent of customer loyalty [38]. A positive correlation exists between satisfaction and continuance intention to use [31]. Hence, measuring the exercise satisfaction of home fitness application users is important for operators. This leads to the proposed hypotheses on the relationship between content characteristics, exercise satisfaction, and continuance intention to use home fitness applications.

Based on these findings, this study proposes the following hypotheses:

H1. *Content characteristics of home fitness application will significantly affect exercise satisfaction.*

H2. *The exercise satisfaction of home fitness application users will significantly affect the continuance intention to use.*

H3. *Content characteristics (novelty, usefulness, playfulness, diversity) of home fitness application will significantly affect the continuance intention to use.*

H4. *Exercise satisfaction will have a significant mediation effect on the relationship between home fitness application content characteristics and continuance intention to use.*

The research model in <Figure 1> examines these relationships.

Figure 1. Research model.

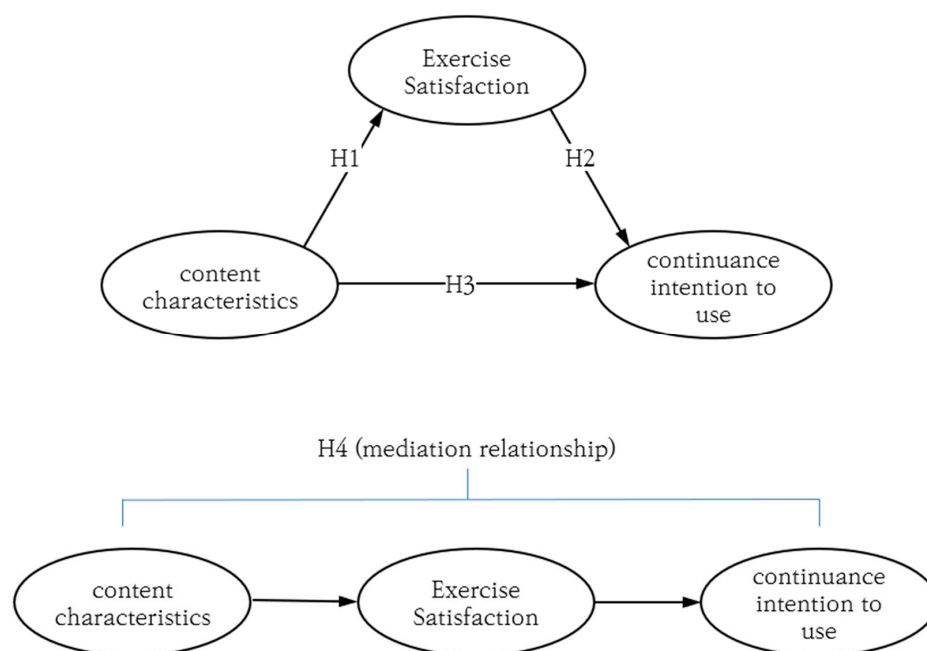## 3. Materials and Methods

The following <Figure 2> is a visual representation that generally illustrates the experimental design of our study. This figure presents the sequence of our methodological approach which includes sampling and data collection, measures, demographic analysis, confirmatory factor analysis, and structural equation modeling.
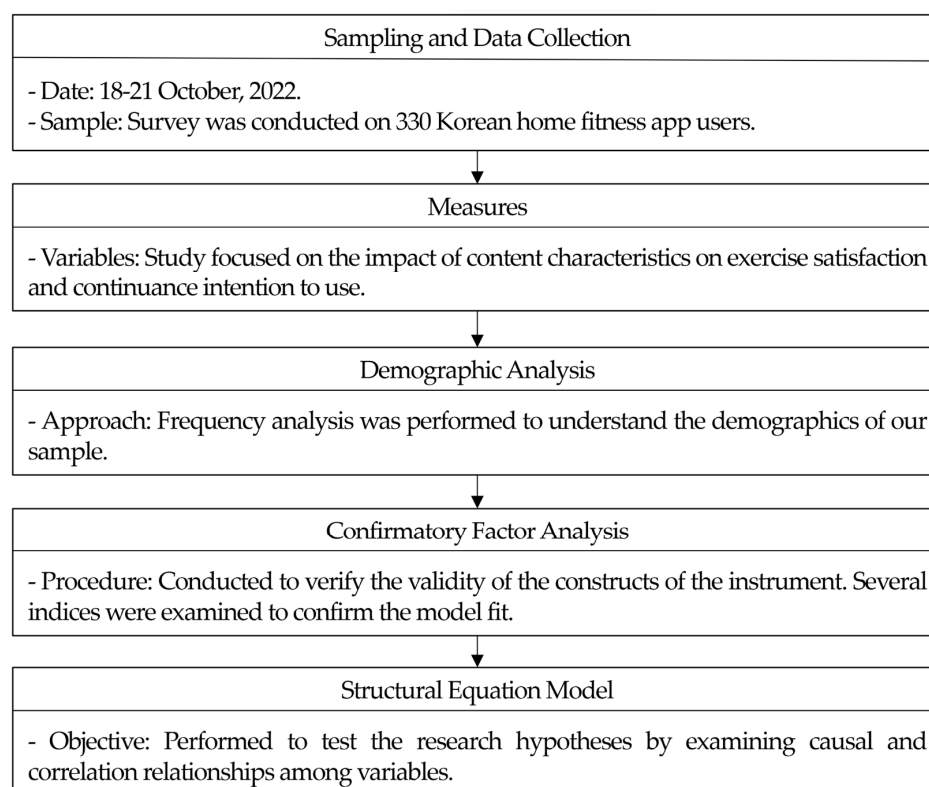

Figure 2. Overview of the Research Design Process.

3.1. Sampling and Data Collection

The study was conducted as an online survey from 18 to 21 of October 2022 using convenience sampling with non-probability sampling. To fit the context of this study, the respondents were Korean users who have utilized home fitness applications (Nike Training Club, Fitbit, 8fit, Freeletics, Howfit, 300Fit, etc.) for exercise. The questionnaires were created based on the tools used previously, which have been validated for this purpose. All surveys were filled in by the respondents themselves after obtaining informed consent before the survey, and a total of 330 responses were used for analysis.

3.2. Measures

The research tool used in this study is a questionnaire, and the operational definitions and questions constructed for the research model analysis are as follows. First, the content characteristics of a home fitness application were defined as "the characteristics of an fitness application's content that enables users to participate in exercise at any location and time, free from conventional constraints". In this study, content characteristics were categorized into novelty, usefulness, diversity, and playfulness; we modified and supplemented them to fit this study, and composed 3, 4, 4, and 4 questions for novelty, usefulness, diversity, and playfulness, respectively [24,39–41]. Second, exercise satisfaction was defined as "satisfaction as an exercise effect that can be felt by users of home fitness", and it is categorized into body satisfaction, psychological satisfaction, and life satisfaction. In this study, exercise satisfaction was modified and supplemented based on the scales developed by previous studies, and consisted of 4, 4, and 4 items for body satisfaction, psychological satisfaction, and life satisfaction, respectively [33,42,43]. Third, continuance intention to use was defined as the "users" intention to use home fitness content again after having used it. In this study, continuance intention to use was modified and supplemented to fit this study, and it consisted of three questions [19,44,45]. Lastly, to understand the demographic status of the survey subjects, a total of 36 items, including gender, age, duration of application use, frequency of use, duration of exercise, and purpose of exercise, were included. All items were measured on a 5-point Likert scale, except for demographic variables. The questionnaire is shown in <Table 1>.

Table 1. Scheme of the questionnaire design.

Variable		Item (N)	Number of Questions	Sources
background variable	demographic variables	Gender (1) Age (1) Purpose of exercise (1) Duration of use (1) Frequency of use (1) Workout duration (1)	6	-
Independent variable	content characteristics	novelty (3) usefulness (4) diversity (4) playfulness (4)	15	Yang et al. [24] Eighmey [39] Lai and Turban [40] Parra-López et al. [41]
Mediator variable	exercise satisfaction	body satisfaction (4) psychological satisfaction (4) life satisfaction (4)	12	Kim [33] Hackman and Oldham [42] Hackman and Lawler [43]
Dependent variable	continuance intention to use	continuance intention to use (3)	3	Cho [19] Dick and Jain [44] Lu et al. [45]
Total		36	36	-

3.3. Data Processing Methods

We identified the demographics of our sample using frequency analysis in JASP 0.14.1.0. To verify the validity of the constructs of our instrument, we conducted a confirmatory factor analysis (CFA). The parameter estimation was performed using the maximum likelihood (ML) method, and several indices such as the Comparative Fit Index (CFI), Turkey-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Squared Residual (SRMR) were examined to confirm the model fit. This process ensured that the factor loadings of all items met a satisfactory standard, confirming their validity.

The variables were then calculated by averaging the items that secured validity through CFA to generate the main variables. The validity and theoretical validity of the construct among each instrument composed of these variables were examined using a measurement model analysis. We also assessed the fit of the measurement model and confirmed that all fit indices met the fit criteria. Additionally, the discriminant validity of the measurement model was examined by comparing the correlation coefficient r and $\sqrt{AVE}$ of the variables comprising the measurement model. The correlation analysis was conducted to examine the correlation status and confirmed that there was no multicollinearity problem. Lastly, a Structural Equation Model analysis was conducted to test the research hypotheses, as this method is suitable for testing causal and correlation relationships among variables [46].

4. Results

A frequency analysis was conducted to examine the demographic status of the respondents to the survey conducted for this study. The results of the frequency analysis are shown in <Table 2>.

In this study, CFA was conducted to confirm the validity of the constructs of the instrument used in this study (Table 3). For the analysis, parameter estimation was conducted using the maximum likelihood method, and the CFI, TLI, RMSEA, and SRMR were examined to confirm the model fit. The results revealed that the factor loadings of all items comprising the factor were at least 0.516, confirming its validity. The variables were calculated by averaging the items that secured validity through CFA to generate the main variables, and the validity and theoretical validity of the construct among each instrument composed of these variables were examined using the measurement model analysis. The analysis of the fit of the measurement model revealed that all the fit indices (CFI, TLI, RMSEA, and SRMR) met the fit criteria [47]. The factor loadings, Cronbach's α, construct reliability (CR), and average variance extracted (AVE) of the measurement model were calculated. All of Cronbach's α values exceeded the recommended threshold level of 0.6 [47]. The CR value of the measurement model was above 0.7 and the AVE value was above 0.5, indicating convergent validity [48]. To examine the discriminant validity of the measurement model, the correlation coefficient r and $\sqrt{AVE}$ of the variables comprising the measurement model were compared as shown in <Table 4>, and the correlation coefficient r < $\sqrt{AVE}$ between the instruments was examined to ensure the discriminant validity of the measurement model. In addition, the Pearson product-moment correlation analysis conducted to examine the correlation status revealed that the value of the correlation coefficient was lower than 0.85, confirming that there was no multicollinearity problem [49].

Table 2. Descriptive tables of demographic variables (N = 330).

Individual-Level Variables		N	Percent
Gender	Male	102	30.9
	Female	228	69.1
Age	≤19	38	11.5
	20–30 years old	122	37
	31 to 40 years old	94	28.5
	41 to 50 years old	50	15.2
	51 years and older	26	7.8
Purpose of exercise	For fitness	161	48.8
	For diet	144	43.6
	For rehabilitation and disease prevention	19	5.8
	For body profile	2	0.6
	Other	4	1.2
duration of use of home fitness application	Less than 3 months	118	35.8
	More than 3 months to less than 6 months	103	31.2
	More than 6 months to less than 1 year	60	18.2
	More than 1 year to less than 2 years	30	9.1
	More than 2 years	19	5.7
Number of times you used home fitness application in a week	Less than once a week	37	11.2
	1–2 times per week	138	41.8
	3 to 4 times per week	127	38.5
	5 to 6 times per week	18	5.5
	7 or more times per week	10	3
Duration of one home fitness application workout	Less than 20 min	38	11.5
	Less than 30 min	122	37
	Less than 45 min	94	28.5
	Less than 1 h	50	15.2
	More than 1 h	26	7.8
	Total	330	100

Table 3. Extracted composite reliability and average variance.

		Measurement	Estimate	S.E.	t (***)	Cronbach's α	CR	AVE
Content characteristics	novelty	This home fitness application has new information.	0.675			0.894	0.934	0.780
		This home fitness application is constantly updated.	0.68	0.106	9.954			
		This home fitness application is novel.	0.700	0.114	10.158			
	usefulness	This home fitness application is worth participating in.	0.684					
		Exercising with this home fitness application is easy to understand.	0.624	0.103	9.761			
		This home fitness application is well organized.	0.678	0.113	10.474			
		This home fitness application is adapted to the level of the participants.	0.641	0.123	9.989			
	diversity	The home fitness application is available in a variety of formats (e.g., customized programs for different fitness levels, programs with or without equipment).	0.700					
		The home fitness application offers diverse disciplines (e.g., yoga, muscle training, and meditation).	0.665	0.097	10.38			
		This home fitness application reflects diverse exercise goals (e.g., weight loss, strength training, and body shaping).	0.708	0.097	10.929			
		This home fitness application is designed for different tastes.	0.690	0.094	10.709			
	playfulness	Using this home fitness application is enjoyable and fun.	0.676					
		You will be able to relax while using this home fitness application.	0.747	0.109	11.187			
		This home fitness application gives me a sense of accomplishment.	0.645	0.092	9.959			
		This home fitness application helps me relax.	0.595	0.099	9.291			
Exercise satisfaction	Body satisfaction	I feel lighter after I start exercising with this home fitness application.	0.727			0.923	0.950	0.864
		Since I started exercising with this home fitness application, other daily physical activities are easier than they used to be.	0.777	0.083	13.316			
		I feel less tired in my daily life since I started exercising with this home fitness application.	0.728	0.088	12.492			
		My muscles feel more toned since I started exercising with this home fitness application.	0.728	0.084	12.499			
	Psychological satisfaction	My life has become more enjoyable since I started exercising with this home fitness application.	0.758					
		I feel more confident about my health since I started exercising with this home fitness application.	0.792	0.076	14.756			
		I feel more positive about my health since I started using this home fitness application.	0.737	0.074	13.592			
		I feel a sense of accomplishment since I started exercising with this home fitness application.	0.711	0.070	13.06			
	Life satisfaction	I feel more confident in everything I do since I started exercising with this home fitness application.	0.751					
		Since I started exercising with this home fitness application, I have been sleeping better.	0.689	0.074	12.252			
		Since I started exercising with this home fitness application, I have gotten into a regular routine.	0.711	0.073	12.668			
		Since I started using this home fitness application, I have been eating better.	0.678	0.071	12.038			
continuance intention to use		This home fitness application is a necessary tool to exercise.	0.516			0.698	1.00	1.00
		I intend to use this home fitness application frequently.	0.980	0.344	5.759			
		I am willing to use other similar applications similar to this home fitness application.	0.530	0.134	7.722			

χ^2 = 63.932 (p < 0.001), df = 18, χ^2/df = 3.552, CFI = 0.972, TLI = 0.956, RMSEA = 0.088, SRMR = 0.037, *** p < 0.001.

Table 4. Discriminant validity and correlation matrix.

	Content Characteristics	Exercise Satisfaction	Continuance Intention to Use	$\sqrt{\text{AVE}}$
content characteristics	1			0.883
exercise satisfaction	0.820 ***	1		0.929
continuance intention to use	0.693 ***	0.727 ***	1	1

*** $p < 0.001$.

To verify the research hypotheses proposed in this study, structural model analysis was conducted, and the results are shown in Table 5.

Table 5. Hypothesis testing results.

		Hypothesis	Estimate	S.E	t	*p*	β	Result
Direct effect	H1	content characteristics → exercise satisfaction	0.541	0.099	5.46	0.000 ***	0.485	Accepted
	H2	exercise satisfaction → continuance intention to use	0.445	0.137	3.251	0.001 **	0.295	Accepted
	H3	content characteristics → continuance intention to use	1.105	0.095	11.671	0.000 ***	0.82	Accepted
Indirect effect	H4	content characteristics → exercise satisfaction → continuance intention to use	0.598	0.116	5.146	0.000 ***	0.398	Accepted

** $p < 0.01$, *** $p < 0.001$.

First, we analyzed the direct effect and found that the effect of content characteristics on exercise satisfaction was β = 0.485 (*p* = 0.000 ***) with a *p*-value of less than 0.001, indicating that research hypothesis H1 was accepted, implying that the content characteristics of home fitness applications positively affected exercise satisfaction. The effect of exercise satisfaction on the continuance intention to use was β = 0.82 (*p* = 0.001 **) with a *p*-value of less than 0.01, indicating a significant positive effect. This implies that higher exercise satisfaction results in a higher continuance intention to use. Therefore, the research hypothesis H2 is accepted. The effect of content characteristics on continuance intention to use was β = 0.398 (*p* = 0.000 ***) with a *p*-value of less than 0.001, indicating a significant positive effect. Therefore, the research hypothesis H3 is accepted. In addition, the results of the indirect effect estimation conducted to verify the mediation effect of exercise satisfaction in this study revealed that β = 0.398 (*p* = 0.000 ***), which is less than 0.001, indicating a significantly positive effect. This implies that exercise satisfaction has a significant mediation effect on the relationship between content characteristics and continuance intention to use. Therefore, the research hypothesis H4 was also accepted.

5. Discussion and Implications

This study analyzed the relationship between content characteristics, exercise satisfaction, and continuance intention to use via a survey of individuals that have exercised using home fitness applications using structural equation modeling. The purpose of this study is to understand how content characteristics influence user satisfaction and continued use of home fitness applications, with the ultimate aim of promoting health and well-being.

Firstly, the content characteristics of home fitness applications were observed to exert a significant positive effect on exercise satisfaction, leading us to accept Hypothesis 1. This is consistent with the study of Kim et al. [50], which reported that the content characteristics of airline smartphone applications positively affect customer satisfaction, and the study of Cui et al. [51], which reported that application characteristics, such as informativeness and ease of use, positively affect customer satisfaction. In addition, Kim et al. suggested that the quality and quantity of content provided by an application play an important

role in increasing user satisfaction [52]. Therefore, to increase user satisfaction, content developers of home fitness applications should strive to increase the content characteristics (i.e., novelty, usefulness, diversity, and playfulness) presented in this study. In addition, it is necessary to create and provide content that enhances the credibility of the information from the perspective of the customer who received the content.

Secondly, exercise satisfaction was observed to exert a significant positive effect on continuance intention to use, thus confirming Hypothesis 2. This result is consistent with the study of Lim and Jeon, which observed a positive relationship between satisfaction with application use and continuance intention to use [53]. Similarly, Jeon et al. analyzed the relationship between satisfaction and continuance intention to use for application users and suggested that customer satisfaction should be enhanced to increase continuance intention to use [54]. In addition, they argued that content quality is important as a way to improve satisfaction. This implies that to strengthen the continuance intention to use of a home fitness application, it is necessary to create content that users want and improve the quality of the content so that the positive evaluation of the application can be sustained.

Thirdly, content characteristics of home fitness applications were observed to exert a significant positive effect on continuance intention to use, leading us to accept Hypothesis 3. These results are similar to the findings of Pae, who suggested that the continuance intention to use of application users is influenced by content quality, which consists of content diversity, and accuracy [26]. In addition, Yang et al. suggested that to keep users engaged in home fitness exercises, it is necessary to differentiate the content of the application from those of other competitors and provide content that customers really want, which can be fun and enjoyable [24]. The results of this study indicate that it is necessary to enhance the content characteristics of home fitness application users to increase their continuance intention to use, and it is necessary to prepare application development strategies by focusing on enhancing content characteristics, such as novelty, playfulness, usefulness, and diversity.

Finally, exercise satisfaction was confirmed to mediate the relationship between home fitness application content characteristics and continuance intention to use, thus accepting Hypothesis 4. This is consistent with the study of Cho and Han, which observed that exercise satisfaction exerted a significant mediation effect on the relationship between media content characteristics and continuance intention to use [55]. These results suggest that it is necessary to strengthen content characteristics as a factor that affects continuance intention to use home fitness applications and to enhance user satisfaction.

The results of this study demonstrated that it is essential to satisfy content characteristics (novelty, usefulness, diversity, playfulness) to increase the continuance intention of home fitness application users. Application operators should develop content that can increase consumer satisfaction and continuance intention to use. In addition, it will be necessary to communicate with various consumers to identify their needs regarding content, so that continuous improvement and development can be made. By doing so, the benefits and convenience offered by these applications can be maximized, allowing users to fully experience and leverage the unique advantages they provide.

The limitations of this study and suggestions for further research are as follows: First, this study did not categorize the type of content of home fitness applications as a research object. Currently, various content services, such as yoga, muscle training, and running, are provided in-home fitness applications. If follow-up research distinguishes these types, differentiated activation strategies can be derived for each type. Second, this study acknowledges a limitation in the sample size used for quantitative analysis. Due to various constraints, including the nature of online surveys used for data collection, the total number of home fitness application users who participated in the study might not be sufficiently representative of the broader user population. This may affect the generalizability of our findings. Future research is encouraged to employ strategies to increase sample size, such as reaching out to a wider demographic or using multiple data collection methods, to improve the representativeness and robustness of the results. Third,

this study analyzed the factors that lead to the continuance intention to use of home fitness application users using quantitative analysis. However, if re-analyzed through qualitative research methods such as focus group interviews, it would be possible to formulate more effective strategies to increase the reuse of home fitness applications, based on a deeper understanding of users.

6. Conclusions

This study, conducted via structural equation modeling, examined the relationship between content characteristics, exercise satisfaction, and continuance intention in the context of home fitness applications. The findings suggest that content characteristics significantly influence exercise satisfaction and continuance intention to use. Furthermore, exercise satisfaction was found to mediate the impact of content characteristics on continuance intention. These findings underscore the pivotal role of fulfilling content characteristics such as novelty, usefulness, diversity, and playfulness, in elevating the continuance intention of users. This study's implications extend beyond just application design, as it provides empirical evidence for the importance of strategic content development in the home fitness industry, thereby emphasizing the need for continuous research and innovation to enhance user engagement and satisfaction in the era of digital fitness.

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