The Influence of Incentive-based Mobile Fitness Apps on Users' Continuance Intention with Gender Moderation Effects: A Quantitative and Qualitative Study

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Abstract

Background: A survey conducted by Mckinsey and Company reported that as of May 2022, as many as 26% of Indonesians had started to actively engage in physical activity, 32% had regular physical activity, and 9% exercised more intensely. The industrial revolution 4.0 made fitness applications used to track people's sports performance develop rapidly. Even so, public interest in using mobile fitness applications (MFA) for a long time is still relatively low.

Objective: This study aims to determine the effect of incentives on fitness applications (self-monitoring, social support, platform rewards, and external influence) on users' continuance usage intention by using the gender moderation effect.

Methods: This study used a quantitative approach with an online questionnaire involving 379 valid respondents and a qualitative approach with 30 respondents who were interviewed. Quantitative data were processed using the covariance-based structural equation modeling. Qualitative data is processed using thematic analysis. MFA included in the object of this research include Apple Fitness, Strava, Nike Run Club, Fita, and all MFA used as sports or physical activity companions for their users.

Results: The results of data analysis show that three incentives namely self-monitoring, platform rewards, and external influence except social support have an effect on the perceived usefulness of application users. In addition, gender has also been shown to influence user behavior to increase their physical activity. This research shows that women are more likely to be motivated to exercise because of social and external features, while men pay more attention to tracking features and challenges or rewards.

Conclusions: This research can contribute to the field of mobile health to provide guidance for fitness application developers in developing their application features.

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Abstract

Background: A survey conducted by Mckinsey and Company reported that, as of May 2022, as many as 26% of Indonesians had recently started to engage actively in physical activity, 32% undertook regular physical activity, and 9% exercised intensely. The fourth industrial revolution encouraged the rapid development of fitness applications used to track people's sports performances. However, public interest in using these mobile fitness applications for any length of time is still relatively low.

Objective: This study aimed to determine the effect of incentives on the use of fitness applications (self-monitoring, social support, platform rewards, and external influence) and the moderating effect of gender on users' continuance usage intention.

Methods: The study used a mixed-methods approach. Quantitative data were collected through an online questionnaire and qualitative data from interviews with 30 respondents. The quantitative data, collected from 379 valid responses, were processed using covariance-based structural equation modeling. The qualitative data were processed using thematic analysis. The mobile fitness applications included in this research included all apps used as sports or physical activity companions, such as Apple Fitness, Strava, Nike Run Club, and Fita.

Results: The results of the data analysis show that three groups of incentives, namely, self-monitoring, platform rewards, and external influences, with the exception of social support, affect the perceived usefulness of these apps. Gender was also shown to moderate user behavior in relation to physical activity. The study showed that women were more likely to be motivated to exercise by social and external factors, while men paid greater attention to the tracking features of the app and to challenges and rewards.

Conclusions: This research contributes to the field of health promotion by providing guidance for fitness application developers.

Keywords**:** incentive, fitness, mobile fitness apps, gender, continuance intention, Indonesia

Introduction

The World Health Organization (WHO) [1] explains that regular physical activity is a key factor in the prevention and management of non-communicable diseases. The Global Status Report on Physical Activity [2] reported that 1.4 billion individuals over the age of 18 do not meet the levels of physical activity recommended to promote and protect health. In 2016, it was reported that, globally, 23% of all men and 32% of all women aged 18 years and over were not sufficiently physically active to stay healthy [1]. This means that approximately one in three women and one in four men are not sufficiently active and do not meet the global recommendation of at least 150 minutes of moderate-intensity physical activity or 75 minutes of high-intensity physical activity per week [3]. In August 2022, Mckinsey and Company [4] released the results of another survey done with 1,041 Indonesian respondents where 26% of respondents had started to engage actively in personal training, 32% had been playing sports regularly, and 9% of respondents had increased the intensity of their sports or

fitness activities. These data indicate that the level of Indonesians' interest in and awareness of sports, fitness, and personal training is significantly better than the global average. This conclusion is supported by the increased use of mobile fitness apps (MFA) in Indonesia, with a total of 29 million users in 2022 [5].

MFA use several types of incentives, which include self-incentives, peer incentives, and platform incentives [6–9]. In the MFA context, self-incentives involve a self-monitoring system in which users monitor and track their own behavior [10,11]. Peer incentives are focused on social support, which includes informational, emotional, and material support, or the protection provided by fellow users of the application [12]. In the context of MFA, platform incentives are usually in the form of rewards or awards resulting from gamification features [13]. Users who collect a large number of rewards are usually considered to have a higher status on the MFA and feel more satisfied with their use of the application [14,15].

According to Zhu et al. [81], very few studies have examined the role played by gender differences in the use of health and fitness applications. Yin et al. [24] stated that achievements in sports motivate men more, while social relationships motivate women more. Previous research on MFA has explored the design [16], evaluation [17,18,84,85], and user adoption [19] of MFA. In addition, several studies have discussed continuity in the use of MFA [20–23]. Chiu et al. [21] integrated expectation–confirmation theory with the investment model to analyze the continuous use of MFA. However, research investigating the various types of MFA incentives has been shown to have several limitations [22,24], as the effects of each incentive have mostly been explored separately [25–27]. Based on Mckinsey and Company's 2022 survey [4] among Indonesian citizens, their intention to continue using their personal training and fitness apps reached 87%. The market analysis and demographics of this study apply only to fitness application users in Indonesia.

This research adopted the self-determination theory (SDT) and the expectation confirmation theory (ECT). SDT is explained by Ryan and Deci [28] as a theory that states that there are three main psychological needs that drive human behavior: autonomy, relatedness, and competency. If these psychological needs are met, intrinsic motivation will increase and make it easier to maintain certain behaviors [28]. Teixeira et al. [29] show that SDT can be applied to behavioral interventions that relate to exercise or physical activity. While SDT has the ability to predict the intensity of a behavior based on the influence of incentive factors [24], ECT is generally used to predict the continuity of a behavior [21]. The combination of SDT and ECT was chosen to analyze the relationship between the incentive factors that affect the use of MFA and continuity in using the application. Thus, the research question is: How do the incentives promoted by mobile-fitness apps influence users' continuance usage intention? This research can provide guidance for MFA developers by helping them evaluate their applications.

Methods

Research Model

The model used for this research is based on two theories and one moderating effect, namely, SDT, and ECT, with the moderating effect of gender. Significant studies reporting on the use of these two theories include those by Yin et al. [24], Huang and Ren [22], Chiu et al. [21], and Li et al. [30]. Yin et al. [24] found that incentives are compatible with SDT in motivating users' physical activity behaviors. SDT that proposed by Yin et al. [24] is the theoretical basis for this research because it analyzes incentives in MFA collectively and uses gender as a moderating variable. The relationship between perceived usefulness and incentives was also analyzed in Huang and Ren (2020). This research suggests that technology functions in MFA such as self-monitoring, self-regulation, and goal attainment have an indirect effect on continuance intention through perceived usefulness. We refer to Chiu et al. (2021) and Li et al. (2018) that found users' continuance usage intention was significantly predicted by ECT. Therefore, our research model, which includes 9 variables and 13 hypotheses, can be seen in Figure 1.

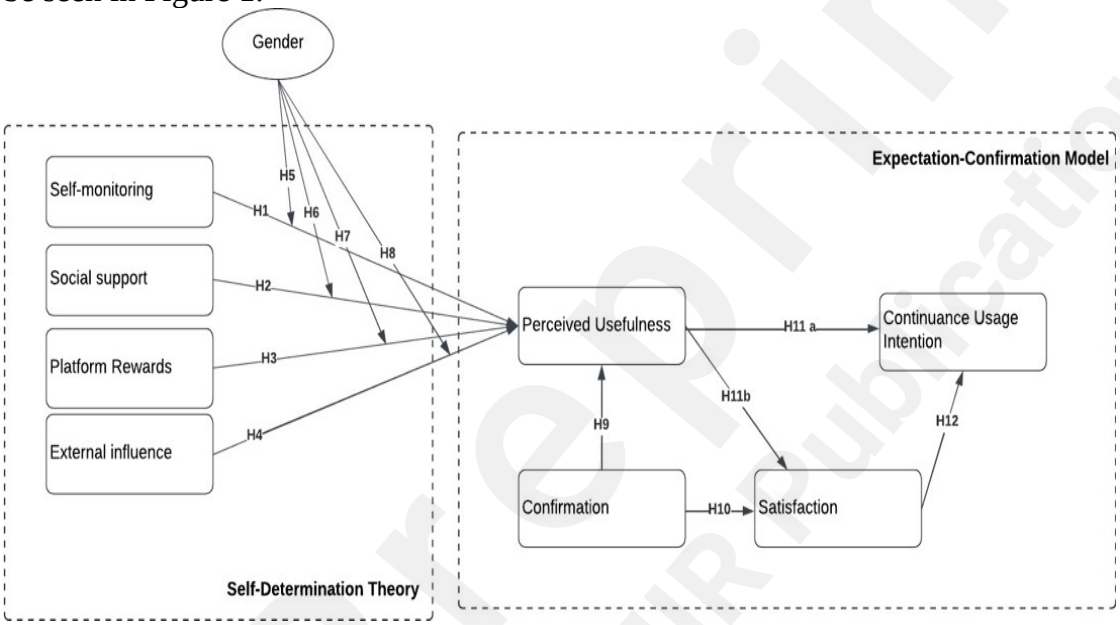

Figure 1. Proposed conceptual model

Self-monitoring (SM) is classified as one of the self-incentives in MFA, and it includes managing and tracking one's own behavior [24]. These actions enable users to observe their own progress and evaluate their performance against previously set goals [31]. Perceived usefulness (PU) refers to the extent to which a person feels that technology can improve his or her performance of certain tasks [32]. The task in this study is identified as increasing the user's physical activity, while for MFA users, PU means that using MFA will contribute to their increasing their personal training [33,34]. Bhattacherjee [35] argues that when users confirm their initial expectations of the main functionality of a mobile application, they will begin to perceive the application as useful for improving their task performance and thus continue to use it. Huang and Ren [22] measured PU relating to the effectiveness and performance of physical activities through the use of four technological functions of the MFA, one of which is SM. We therefore examine the following hypothesis:

H1: Self-monitoring has an influence on perceived usefulness.

Social support (SS) is classified as one of the peer incentives in MFA [24]. Online social support is seen as an important factor affecting the physical and mental health of individuals, such as sports promotion and increased well-being [36,12]. Humans have a tendency to behave in ways that are consistent with people in their own social networks, and this can be exploited in the context of mobile health (mHealth) [26]. Chen et al. [37] conducted research on social incentives by developing the HealthyTogether application, which allows users to participate in physical activities together and send messages to one another. These authors showed that users significantly increased their physical activity when using HealthyTogether, compared to when they were exercising alone [37]. Edney et al. [6] built the Active Team application, which is a fitness application with social and gamification functions. The primary outcome of their study was a change in the total daily minutes of moderate to high physical activity at three months, as measured objectively using an accelerometer [6]. Therefore, we propose the following hypothesis:

H2: Social support has an influence on perceived usefulness.

The rewards platform includes gamification elements, such as badges, points, and leaderboards [24]. The gamification element in MFA can provide two types of information: (1) user physical activity (PA) progress and (2) a comparison of PA with that of other users [38]. From this information, MFA users can observe their progress and feel greater satisfaction when they recognize their own personal training competence. This leads to higher user competency satisfaction and increased behavioral motivation [13,39]. Yin et al. [4] found that platform rewards (PR) have a positive relationship with users' physical activity. This finding is supported by Planggar et al. [13] and Huang and Ren [22], who analyzed the effect of the goal attainment technology function of MFA, in which users can set their own goals, which are then achieved by undertaking physical activities. These achievements are then categorized as PR. Huang and Ren [22] also found that this technology function had a positive effect on PU. Therefore, we propose the following hypothesis:

H3: Platform rewards have a positive influence on perceived usefulness.

External influence (EI) is one of the extrinsic motivations identified in SDT, which means that behavior is motivated through influences that do not depend on personality [40]. Huang [25] proposed this variable to explain how physical activity can be promoted through external factors. One example is when companies provide incentives to fitness app users as part of their corporate social responsibility initiative [25]. Several studies discuss EIs and physical activity. One example of the EIs referred to in this study is the name or "image" of a sponsorship organizer of an activity [41]. Pyun [42] explains that sponsorship that gives a good impression to customers or users will produce behavior that tends to be positive. In the context of sporting activities, Huang [25] explains that sponsor characteristics play an important role in participation in a sporting activity. Therefore, because MFA is a tool that can measure a person's physical activity, we intend to explore the following hypothesis:

H4: External influence has an influence on perceived usefulness.

Mao et al. [7] explained that incentives for MFA are not always equally effective for women and men. This is because women and men have different ways of thinking [24]. Yin et al. [24] conducted research that assumed that gender would influence the effectiveness of self-monitoring (SM) incentives, making them more effective for men than for women. This assumption was based on the belief that men generally pay more attention to their own achievements than women [43]. Surprisingly, Yin et al. [24] show that gender does not affect the effectiveness of SM in MFA. This finding relates to the concept of self-regulation, which is strongly driven by self-efficacy [45]. Individuals who decide to use MFA are generally believed to have high self-efficacy in carrying out physical activities [24]. Therefore, we plan to test the following hypothesis:

H5: Gender influences the relationship between self-monitoring and perceived usefulness in MFA users.

With regard to social support (SS), Yin et al. [24] explain that SS is one of the factors that most helps to fulfill the relatedness needs described in SDT. Wang et al. [9] explain that social ties and commitment are more important for women than for men in shaping their attitudes toward the sharing of information. In considering gender, Yin et al. [24] found that women tend to be more influenced by their relatedness needs than men. Women are also believed to be driven more by collective goals, such as pleasure or interpersonal harmony [47,48]. In the context of health applications, Kimbrough et al. [49] found that women are usually more affected by environmental conditions and social relationships than men. Thus, we propose the following hypothesis:

H6: Gender influences the relationship between social support and perceived usefulness among MFA users.

Men tend to pay more attention to themselves and tend to be more independent than women [43,44]. Men also tend to focus more on completing or achieving individual goals that demonstrate their performance and abilities [43,44]. In connection with these two studies, Vilela and Nelson showed that men tend to be more motivated by their own achievements than women when using information system products [52]. This is due to the general behavioral characteristics of men, who are generally more aggressive, pragmatic, and self-oriented in their behavior relative to women [52]. When specifically applied to incentives and continuance usage, Yin et al. [24] also found an influence between gender and the effectiveness of platform reward (PR) incentives. They assumed that this is caused by the behavioral characteristics of

men, who generally make decisions more rationally and pay greater attention to their own behavior. Thus, we propose the following hypothesis:

H7: Gender influences the relationship between platform rewards and perceived usefulness among MFA users.

Sun and Zhang [50] state that women have a higher awareness of the environment than men. Lin et al. [53] and Li et al. [30] also found that men tend to be less easily influenced by external advice or support. Similarly, Venkatesh et al. [54] concluded that women tend to be more influenced by external influences (EI), while men are usually less affected by external facilitation in their use of technology. This was confirmed by Josefsson et al. [55], who showed that men participate in challenges organized by the community to compete, while women participate for social and autonomy reasons. Hence, we propose the following hypothesis:

H8: Gender influences the relationship between external influences and perceived usefulness among MFA users.

Confirmation (CON) refers to the perceived level of conformity between the information system product or service expectation and actual performance [35]. Bhattacherjee [35] explains that perceived usefulness refers to the individual's perception of the anticipated benefits from the use of information technology (IT) products or services. ECT implies that confirmation of a user's expectations has a positive effect on their perception of the perceived usefulness of an IT product or service [21, 56, 57, 58]. According to cognitive dissonance theory [59], IT users may experience psychological conflict if their initial expectations are not confirmed by their actual use experience [60]. Conversely, if users' initial expectations are confirmed or met, they may display higher investment behavior and reduce their preference for alternative applications [21]. Hsu et al. [61] state that the confirmation of expectations is positively related to the perceived quality of the IT products or services used, with the result that users tend to ignore the quality of alternatives. Therefore, we propose the following hypothesis:

H9: Confirmation of expectations has an influence on perceived usefulness.

Chiu et al. [21] proposed that confirmation of user expectations affects satisfaction with the application, as well as its perceived usefulness. Satisfaction (SAT) can be interpreted as an individual's evaluation of their initial experience with a product or service [35]. Chiu et al. [21] explain that before downloading an application, users generally have expectations of it, based on detailed information received from the application provider and on ratings and reviews from other users. After using the application, the user gains experience and evaluates the performance of the application based on previously established expectations. In line with the ECM, Chiu et al. [21] assume that users' perceptions of post-use benefits and the confirmation of previous expectations determine their satisfaction in using IT products and services. Therefore, we propose the following hypothesis:

H10: Confirmation of expectations has an influence on satisfaction.

Perceived usefulness refers to the user's perception of the benefits expected from using an IT product or service [60,63]. Bhattacherjee [35] explains that expectations based on the user's direct experience have an important role in forming their IT continuance usage intention (CUI). Chiu et al. [21] state that many studies done in various contexts (e.g., Dehghani et al. [64]; Nascimento et al. [65]; Oghuma et al. [58]) empirically support a positive relationship between perceived usefulness and intention to continue using the application, or CUI. Wu et al. [62] show that when users find the mHealth application useful, they show a higher level of satisfaction and tend to use it continuously. Thus, we define the following hypothesis:

H11a: Perceived usefulness has an influence on continuance usage intention.

Chiu et al. [21] state that perceived usefulness also has a strong and positive impact on satisfaction (SAT). They state that the more benefits users receive from health and fitness applications, the greater their satisfaction [21]. When a user has used an application for an extended period of time, the user will evaluate the performance of the application and form either a confirmation or a disconfirmation of expectations [61]. Disconfirmation of expectations affects user satisfaction and creates negative perceptions of the usefulness of fitness and health applications. Conversely, users' positive perceptions of usefulness increase their satisfaction with an application. Therefore, we propose the following hypothesis:

H11b: Perceived usefulness has an influence on satisfaction.

Satisfaction can be identified as a significant factor influencing consumer behavior [21]. Bhattacherjee [60] strengthens this definition by explaining that user satisfaction is an important determinant of post-adoption behavior relating to IT products or services. In other words, users with higher levels of satisfaction will have greater levels of use of IT products or services than those who are less satisfied [21]. Wu et al. [62] confirm that satisfied users are more likely to continue using an app, as dissatisfied users can easily switch to other technologies at no additional cost. The relationship between satisfaction and continuance usage intention (CUI) has been identified as one of the strongest relationships in the ECM [63]. Therefore, we propose the following hypothesis:

H12: Satisfaction has an influence on the continuance usage intention of MFA users.

Research Procedure

This study used a mixed methods approach that integrated a quantitative approach, based on a questionnaire, with a qualitative approach, using interviews. The only inclusion criterion for respondents in this study was that they were MFA users. We modified the questionnaire that has been established in previous studies. Prior to distributing the questionnaire, a readability test was conducted to validate how easily the questionnaire could be understood by the respondents. The readability test was carried out both face-to-face and virtually, using Google Meet, with eight people who met the research criterion, namely, who were MFA users. This readability test was carried out between the 5th and 10th of February 2023. The authors then used the results of the readability test to refine the research instrument.

Once the research instrument had been improved, the next stage of the research was a pilot study conducted from 20 to 25 February 2023. This stage aimed to measure the validity and reliability of the research instrument and was carried out by distributing the questionnaire to 31 selected research respondents. The results of the pilot study were used to check the value of Cronbach's Alpha (CA), which, in this pilot study, was 0.832, well over the required CA value of > 0.7.

We distributed the questionnaire online through various social media platforms, such as WhatsApp, Line, Twitter, Instagram, and Telegram. These social media platforms are widely used by Indonesian people. The questionnaire distribution was carried out between February 27th and March 20th. Table 1 provides a demographic summary of the respondents. Of the respondents, 75% were between 17 and 25 years of age, 72% were women, 25% were privately employed, and 51% lived in Greater Jakarta.

Table 1. Respondents' demographics

Variable		Number of Respondents	Percentage
Age	17 - 25 years old	286	75.46%
	26 - 35 years old	74	19.52%
	36 - 45 years old	14	3.69%
	> 45 years old	5	1.31%
Gender	Women	274	72.2%
	Men	105	27.8%
Occupation	Student	201	53.03%
	Employee of State Owned Enterprise	8	2.11%
	High school student	15	3.95%
	Privately employed	95	25.06%
	Unemployed	19	5.01%
	Enterpreneur	23	6.06%
	Other	13	3.43
	Housewife	2	0.52%
	Civil servant	3	0.79%
Domicile	Greater Jakarta	195	51.5%
	Java island	137	36.1%
	Outside of Java island	47	12.4%

After collecting both the quantitative and qualitative data, we processed the quantitative data using covariance-based structural equation modeling (CB-SEM). Using CB-SEM, data processing is carried out in several stages: specification and identification of the research model, estimation of the research model, testing the feasibility of the research model, modification of the research model, and hypothesis testing.

To validate the quantitative data results, we also collected qualitative data by conducting semi-structured interviews with 30 respondents. The interviews were conducted both offline and online and took around 30–45 minutes each. The qualitative data analysis was carried out thematically on the basis of the defined hypothesis.

Research Instruments

The instruments this study used were an online questionnaire and semi-structured interview questions. The questionnaire first asked questions regarding the demographics of the respondents and it then presented statements representing the research model being tested. Each of the eight variables in the study was covered by three or four measurement items, and each indicator was represented by a statement to which participants responded on a Likert scale of 1 (disagree) to 5 (strongly agree). Appendix A in the supplementary file describes the questionnaire used in this study, and a list of the interview questions is available in Appendix B.

Results

The factor loading values of all variables and indicators met the standard of > 0.7 [83]; thus, the model feasibility test could be carried out. This study yielded average variance extracted (AVE) values all above 0.5 and Cronbach's Alpha (CA) and Composite Reliability (CR) values above 0.7 [83]. Table 2 presents the AVE, CA, and CR values.

Table 2. AVE, CA, and CR values

Variable	AVE	CA	CR
SM	0.968	0.705	0.920
PR	0.773	0.927	0.872
EI	0.865	0.816	0.834
SS	0.638	0.854	0.835
CON	0.975	0.763	0.885
PU	0.709	0.888	0.848
SAT	0.669	0.889	0.889
CUI	0.640	0.812	0.842

Then, we tested the structural model with the goodness of fit (GOF) criteria, which included the relative chi-square (CMIN/df), goodness of fit index (GFI), root mean square error of approximation (RMSEA), root mean square residual (RMR), normal fit index (NFI), comparative fit index (CFI), and Tucker–Lewis index (TLI) [83]. The GOF values are presented in Table 3, and the values for R^2 can be seen in Table 4.

Table 3. GOF values

GOF index	*Cut-Off Value*	Values	Description
CMIN/df	< 2	1.956	*Good fit*
GFI	≥ 0.9	0.900	*Good fit*
RMR	≤ 0.05	0.048	*Good fit*

GOF index	*Cut-Off Value*	Values	Description
NFI	≥0.9	0.913	*Good fit*
CFI	≥ 0.9	0.955	*Good fit*
TLI	≥ 0.9	0.948	*Good fit*
RMSEA	≤ 0.08	0.050	*Good fit*

Table 4. R^2 values

Variable	*R-square*	*Effect Size*
PU	0.349	*Weak*
SAT	0.511	*Medium*
CUI	0.714	*Strong*

This study used a two-tailed significance test so the condition for accepting the hypothesis was a p-value <.05 [83]. Table 5 describes the results of hypotheses 1–4 and 9–12, which show that only one hypothesis was rejected.

Table 5. Hypotheses testing results

Hypothesis		Estimate	Lower	Upper	p value	Description
H1	SM —> PU	0.319	0.244	0.394	.001	Accepted
H2	SS —> PU	0.060	-0.019	0.143	.123	Rejected
H3	PR —> PU	0.136	0.044	0.219	.007	Accepted
H4	EI —> PU	-0.101	-0.166	-0.033	.006	Accepted
H9	CON —> PU	0.323	0.251	0.388	.001	Accepted
H10	CON —> SAT	0.541	0.435	0.632	.002	Accepted
H11a	PU —> CUI	0.280	0.200	0.363	.002	Accepted
H11b	PU —> SAT	0.218	0.069	0.355	.003	Accepted
H12	SAT —> CUI	0.683	0.560	0.813	.001	Accepted

Awang [66] explains that the test for moderation is not significant when the difference in chi-square value between the constrained model and the unconstrained model is less than 3.84. Table 6 presents a summary of the results of the hypothesis testing using the moderating effect of gender. Based on the difference in the chi-square constrained model, it can be concluded that all the difference values were more than 3.84 and therefore meet the requirements for calculating the significance of the moderating effect, meaning that H5, H6, H7, and H8 were all accepted.

Table 6. Summary of moderating variable hypothesis testing

Variable	**Gender**			
Path	SM-PU	SS-PU	PR-PU	EI-PU
Chi-square constrained model	1,318.671	1,627.823	1,395.076	1,796.875
Chi-square unconstrained model	1,043.151			
Difference	275.520	584.672	351.925	753.724
Result	H5 accepted	H6 accepted	H7 accepted	H8 accepted

Discussion

This research shows that the incentives conveyed in fitness applications in the form of self-monitoring (SM) (e.g., kilometers, number of calories traveled, time, heart rate, etc.) influence users' motivation to undertake physical activity. The acceptance of Hypothesis 1 is thus in accordance with the findings of Yin et al. [24] and Stragier et al. [67]. Yin et al. [24] state that the user's level of physical activity correlates positively with the amount of self-monitoring they do. The majority of interviewees felt that the SM feature provided encouragement for their physical activity (*“So I feel happy because I have exercised, more enthusiasm"* – Interviewee 6). In addition, the interviewees believed that fitness applications documented or tracked their progress in physical activity, which helped them to maintain or even improve their exercise consistency (*"So that I can compare with previous progress and so that in the future I can look back at my history. Like pace, I also remember what date I did sport.”* – Interviewee 9). An example of a feature that can be implemented is one that displays a summary of the user's performance while exercising, together with visualizations in the form of trends and graphs. Some applications also display comments that describe the user's sports performance, based on their activity level. Users can take advantage of these insights to increase their physical activity levels in their next sporting activity.

However, H2 was rejected in this study. H2's rejection aligns with the findings of Sun and Jiang [68] and Kim et al. [69]. Kim et al. [69] explain that social comparison and the user's level of physical activity are not directly connected. Social comparison here is defined as the relationship between the level of physical activity in relation to the variable self-efficacy, or a person's belief in their own capabilities [69]. The rejection of H2 indicates that the community

or social ecosystem around MFA users does not have a significant impact on motivating the users to exercise. Based on the interviews, the social support feature in the application does not have an important effect on physical activity levels because users do not feel compelled to exercise when using the social feature (*"There is no motivation from the engagement side, more from tracking my own progress."* – Interviewee 9). In addition, as many as 30% of the interviewees admitted that they used social features only to document sports that had already been completed.

H3 was accepted in this study. Acceptance of H3 aligns with Bojd et al. [38], Payne et al. [39], Plangger et al. [13], Goes et al. [70], and Hamari and Koivisto [71]. Bojd et al. [38] found that the gamification element in MFA can provide two types of information: (1) the progress of the user's physical activity (PA) and (2) a comparison of the PA with other users. Furthermore, when MFA users can observe their progress, they feel more satisfied and recognize their own PA competency, which will drive higher user competency satisfaction and behavioral motivation [13,39]. Goes et al. [70] and Hamari and Koivisto [71] also explain that the gamification element in MFA shows the user's effort, progress, and achievement of personal goals. This is because the public nature of user-acquired gamification elements, such as levels, badges, or leaderboards, can generate users' social status on the MFA platform, which encourages social comparison and competitive motivation among users [70]. Based on the interviews, MFA users want to take part in challenges (an example of implementing gamification) on the application because they want to get limited edition rewards and measure their own capabilities in sports (*"Gamification keeps me motivated and helps me see my activities historically during physical activity based on the badge I have earned"* – Interviewee 21). Furthermore, the interviewees acknowledged that the rewards they obtain can be used as a benchmark of their capacity in the sport against which to build new achievements (*"I feel happy when I get an achievement because it shows an improvement in my sport. Even though I don't I have specifically targeted certain achievements, but if I can surpass the previous achievements, it means that my sport has improved. The goals that I have set are higher than before."* – Interviewee 17). Therefore, it would be better if the MFA had challenges that were personalized and recommendations were based on the user's type of sport, the user's sports goals, and the user's own sports history. An example of such a feature could be that, based on the user's history, if a user has only reached three kilometers when running, in order to improve their performance, other MFA users could recommend a four kilometer challenge.

Huang [25] found that sponsor characteristics play an important role in triggering user behavior. In this study, sponsorship referred to circumstances where the use of a sponsor's product occurred naturally as part of a sponsored event [72]. For example, with a fitness app whose function is to promote physical activity, sponsorship of athletic apparel would be perceived as highly congruent, whereas sponsorship of a cold remedy would reflect low congruence. The H4 finding is in line with Yang et al. [73], who stated that the level of involvement of a brand produces a positive association with the brand and strengthens the positive effect of an evaluation impacting one's behavioral intention toward an application. From the interviews, it was found that interviewees were encouraged to take part in a

challenge or activity if the activity was associated with the party (public figure, company, etc.) that organized it (*"For a club other than Strava, I think it's cool if you participate, for example, it's like unique. There's definitely a challenge made by Strava every month, so it's not as special as other clubs. The limited edition is more about Heart Month, New Year, and others. I want to take part because it would be a shame if I didn't follow."* – Interviewee 9). We found that not many interviewees took advantage of EI incentives, but those who did participate did not pay attention to the organizers or to the external community, but rather to the challenges being held. If a user felt capable of doing a challenge, they would try to participate (*"Actually, I see from the challenge, if I feel capable, then I want to join"* – Interviewee 7). Thus, we argue that it would be better if developers, or MFA providers, developed challenges for their applications that are created by communities, organizations, and figures with high functional congruence.

Then, the results for H5 to H8 show that in every case gender has a moderating effect on the relationship between the variables investigated. This study showed that gender influences the relationship between self-monitoring and perceived usefulness (H5). These results are supported by Gardner and Gabriel [43] and Sun et al. [44], who found that men tend to make decisions based on rationality, while women tend to be more perceptual. Gardner and Gabriel [43] and Sun et al. [44] explain that men are generally more focused on personal goals that demonstrate their individual performance and abilities, while women are usually less conscious of their own goals and performance. This finding is supported by Elburg et al. [74], who states that men focus more on practical goals and achieving goals when using the mHealth application. We found that our female interviewees usually used the metrics in MFA for tracking their physical activity only as consumption information (*"I only look at the pulse."* – Interviewee 1), while the men usually used these metrics as targets for self-development (*"To find out whether in sports we have reached the desired target or not. On the other hand, if our sports performance is good, this can also be seen through the information displayed on Apple Watch. Thus, the Apple Watch can be a helpful tool in determining whether our performance has reached the expected level or not."* – Interviewee 12).

Moreover, this study found that gender influenced the extent to which social support incentives affected users' perceived usefulness (H6). The results of the interviews showed that most female respondents felt more motivated by their social community or by the social media features provided in the MFA they used. In contrast, the male users used the social support features, such as sharing their sports progress, for personal documentation purposes (*"Just so you know. Only for review, not to share with other friends."* – Interviewee 28), or simply because the system application did so automatically (*"Because it has to be posted on the Strava application."* – Interviewee 8). Many male respondents had never used this feature, indicating their lack of interest in the social support features (*"I have never tried it."* – Interviewee 18). However, the female respondents all expressed interest in the social support features available in MFA and felt more motivated to exercise due to these features (*"I also become motivated to exercise when I see my friends after posting their sports results."* – Interviewee 11). Some of the female respondents commented that the social support feature of MFA motivated them to exercise by creating a sense of competition (*"If I just wake up in the morning and get a*

notification that my friend has finished exercising, I feel left behind because I just woke up but he has finished exercising. Section it motivates, really." – Interviewee 9). Similarly, Liu et al. [30] found that women pay greater attention to social relations and are more willing to accept support from those around them. In contrast, Lin et al. [53] found that men usually ignore external advice or support due to their sense of independence. These findings are supported by Yin et al. [24], who found that social support had a more positive effect on physical activity in women than in men.

This study showed that gender influences the relationship between platform reward incentives and perceived usefulness (H7). The interviews showed that male respondents were generally more motivated by the challenges, badges, and awards features offered by their MFA (*"Makes me more enthusiastic for the next run, and I use it to keep track of whether I should improve or maintain, for example I can rank third so I feel I have to improve my performance."* – Interviewee 16). However, the female respondents usually followed or used this feature only for their own satisfaction and without specific targets or motivations (*"There is no specific goal to get rewards, but I feel happy and proud of myself if I get them."* – Interviewee 13). Yin et al. [24] also explained that, in the context of physical activity, men usually pay more attention to meeting their needs for autonomy and competence, such as badges, awards, and so on. This was also demonstrated by Vilela and Nelson [52], who said that men tend to be more aggressive, pragmatic, and self-oriented. They are therefore motivated by the need for achievement when using information system products [52]. Similar findings were identified by Forman et al. [75], who showed that the gamification element has a more positive effect on men than on women by arousing their competitive and achievement-oriented motivation. Brandts et al. [76] also support this finding and explain that task-based goal setting increases task completion and performance, but only for men.

This study also showed that gender affected the impact of external influences on the user's perceived usefulness of MFA (H8). The results of the interviews confirmed that there are two main reasons a person will participate in the physical activities supported by the MFA, namely the match between the organizer of the activity and the user and the match between the user's capabilities and the activity or challenge created. Comparing these two reasons, the authors found that the women were more likely to do something because of a match with the organizers, in contrast to the men, who usually focused more on their own ability to participate in an activity (*"If Strava doesn't have motivation, if it's a club other than in my opinion, Strava is cool if you join, it's like unique. What Strava makes is there every month, so it's not as special as other clubs to participate on Strava."* – Interviewee 29). According to Huang [25] and Yang et al. [73], the reason female users participate in activities is that they have a "special" feeling because the activities are created by a special club. Huang [25] and Yang et al. [73] explain that the sponsorship characteristics of a physical activity and high brand involvement play important roles in triggering the behavioral intention of MFA users and their behavior in general. H8 is also supported by the findings of Josefsson et al. [55], who explain that men tend to be more influenced by winning rewards than women, who tend to participate more for autonomous and social reasons.

Furthermore, H9 was confirmed in this study. The acceptance of H9 is in accordance with previous research conducted by Bhattacherjee [35], Huang et al. [15], Chiu et al. [21], Wang et al. [9], Cai et al. [77], and Wu et al. [62]. Wu et al. [62] found that perceived usefulness and user satisfaction are directly influenced by post-expectation confirmation, namely, the realization of the expected benefits on using mHealth. This result is supported by Chiu et al. [21], who said that perceived usefulness is reflected in an increase in the user's exercise ability and satisfaction expressed in the pleasure of exercising after using MFA. Thus, it is to be expected that after the initial experience, the confirmation level of the user's expectations will have a positive effect on their perceived usefulness [9,15,35,77]. One of the expectations of the informants who used MFA was that they would experience changes and improvements in their physical activity or exercise, and these expectations were indeed successfully confirmed (*"Because when I want to download Strava I want to be diligent in exercising, and it is proven that I exercise more often because I can track my sports progress"* – Interviewee 23).

H10 was also accepted by this study, and this result is in accordance with Bhattacherjee [35], Huang et al. [15], Chiu et al. [21], Wang et al. [9], Cai et al. [77], and Wu et al. [62]. Wang et al. [9] found that confirmation positively affects user satisfaction with IT products and services. The results of the interviews confirmed that interviewees felt satisfaction when using MFA (*"From a user point of view, everything has been fulfilled in my opinion. What I need so far has been achieved."* – Interviewee 24; *"In my opinion, the features are quite complete, because that's all I really need. The application also provides a reminder if you have passed one day without exercising, and automatically arranges for the workout that can be fulfilled the next day to be even tougher."* – Interviewee 10).

This study also showed that perceived usefulness influences continuance usage intention. Acceptance of H11a is in accordance with Bhattacherjee [35], Huang et al. [15], Chiu et al. [21], Huang and Ren [22], Wang et al. [9], Cai et al. [77], Wu et al. [62], and Cho et al. [20]. Cho et al. [20] reported that, in the context of MFA, perceived benefits were associated with managing health-related information. The interviews confirmed that interviewees would continue using the fitness applications if they helped them to be more active in their exercising and they could track their sports progress effectively (*"I will continue to use it, because in my opinion it is also effective and looks simple."* – Interviewee 10; *"As long as device its connected to the Apple Watch, will still use it. The ability to track different types of exercise separately is one of the advantages of the Apple Watch. This makes me still choose to use the Apple Watch in the future, as long as it lasts meet my sporting needs."* – Interviewee 12).

The study's acceptance of H11b is in accordance with Bhattacherjee [35], Huang et al. [15], Chiu et al. [21], Wang et al. [9], Cai et al. [77], and Wu et al. [62]. Cai et al. [77] explain that perceived usefulness is reflected in user satisfaction when exercising with MFA. The more benefits users get from MFA, the greater their satisfaction [21]. Wang et al. [9] also found that satisfaction was a partial mediator between continuance usage intention and perceived usefulness. We found that the level of user satisfaction with MFA was not only based on its meeting users' sports expectations but also on the convenience and effectiveness of the

features, the user interface, and the user experience that supported the user's sports activities (*"I will continue to use Strava, because I am comfortable with Strava. "* – Interviewee 14; *"I will continue to use it, because in my opinion it is also effective and the appearance is not a hassle."* – Interviewee 10; *"What makes me satisfied is the user interface, which is easy to use, and the user experience is simple."* – Interviewee 19).

Finally, the effect of satisfaction on continuance usage intention was confirmed in this study. Acceptance of H12 is in accordance with Bhattacherjee [35], Huang et al. [15], Chiu et al. [21], Wang et al. [9], Cai et al. [77], and Wu et al. [62]. Wu et al. [62] found that satisfied users are more likely to continue using an app because dissatisfied users can easily switch to other mHealth technologies. User satisfaction is an important determinant of the post-adoption behavior of IT products and services [35]. This is supported by Chiu et al. [21], who stated that user satisfaction with the use of IT products or services is very important for building long-term use of IT. The main reason for user satisfaction with MFA is that the features are complete and meet user needs, with the result that they come to depend on MFA for their exercise (*"Because I really like it and I have become very dependent on this application for sports. I don't want to exercise if there is no access to this application."* – Interviewee 9; *"This application has fulfilled my daily needs."* – Interviewee 15).

Implications

The findings from this study provide an extension to previous research by examining the incentive system in MFA [22,24] and the use of ECT in the context of mHealth [21,30,35,61,62]. It also provides an expansion of the moderating effect of gender on incentive-based systems [79]. We found that MFA and the related incentives have a strong influence on users' sports behaviors and on their intention to continue using the app. The results of this study indicate that the most influential feature of MFA is the self-monitoring incentive feature. MFA users often don't feel like exercising or engaging in physical activity if that activity isn't being tracked by their app. The self-monitoring feature was also found to have a greater impact on male users than on female users. This finding about gender differs from the results of a study by Yin et al. [24], who wrote that no gender trend was evident in the effectiveness of the self-monitoring feature. Furthermore, in contrast to Yin et al. [24], we found that social support had little effect on the physical activity of MFA users. The results of the qualitative research indicate that this is because the social circle of Indonesian MFA users is relatively small, and this small social circle affects the effectiveness of the social support feature.

MFA service providers should consider and review which of the features provided in their applications are affected by gender, so that users can be motivated to continue to use their application for a long time. In addition, users feel more satisfied when their expectations regarding the use of an application are met. Application developers can increase the perceived usefulness of MFA by utilizing the users' social communities, for example, by creating social profile features, group exercises, sporting events organized by recognized organizations or communities, and personalized challenges or awards based on the user's sports history. Application developers can improve the accuracy of the tracking feature, whether through a smartphone or smartwatch, with the goal of providing users with more in-depth statistics and data. For user convenience, application providers should also develop tracking features that can be started automatically.

Limitations

The respondents to both the quantitative and qualitative studies were predominantly aged 17–25 years and were female; thus, other moderating variables could be considered in a future study. The weak effect sizes in Table 4 indicate that the difference or relationship between some variables was not significant. This suggests that there are other variables that might influence PU, which were not used in this study. In future research, another variable that could be considered is physical activity. This could serve as a measure showing whether using MFA with particular incentives increases users' physical activity [24].

Conclusions

The results of the study show that self-monitoring, platform rewards, and external influence can all have an influence on the perceived usefulness of MFA. However, no effect was found between social support and the perceived usefulness of MFA. The Indonesian people generally consider MFA to be useful, as it allows them to track their sports progress and provides awards. The fulfillment of a user's initial expectations and the confirmation of usefulness also affect their perceptions of the usefulness of MFA. Perceived usefulness and confirmation of usefulness also affect user satisfaction with MFA, which in turn influences the user's desire to continue using MFA. In addition, gender was shown to influence user behavior when using MFA. In future research, the scope of external influence incentives could be expanded by considering financial reasons for exercising, other people's recommendations, and job demands, among other factors. We suggest considering tangible benefits as additional incentives to find out whether quantifiable benefits, such as assets or money, can increase a person's motivation to exercise.

Conflicts of Interest

None declared.

Abbreviations

MFA – mobile fitness applications
WHO – World Health Organization
SDT – self-determination theory
ECT - expectation confirmation theory
mHealth – mobile health
PA – physical activity

Data Availability

The datasets generated and analyzed during this study are not publicly available due to a lack of authorization to share these data.

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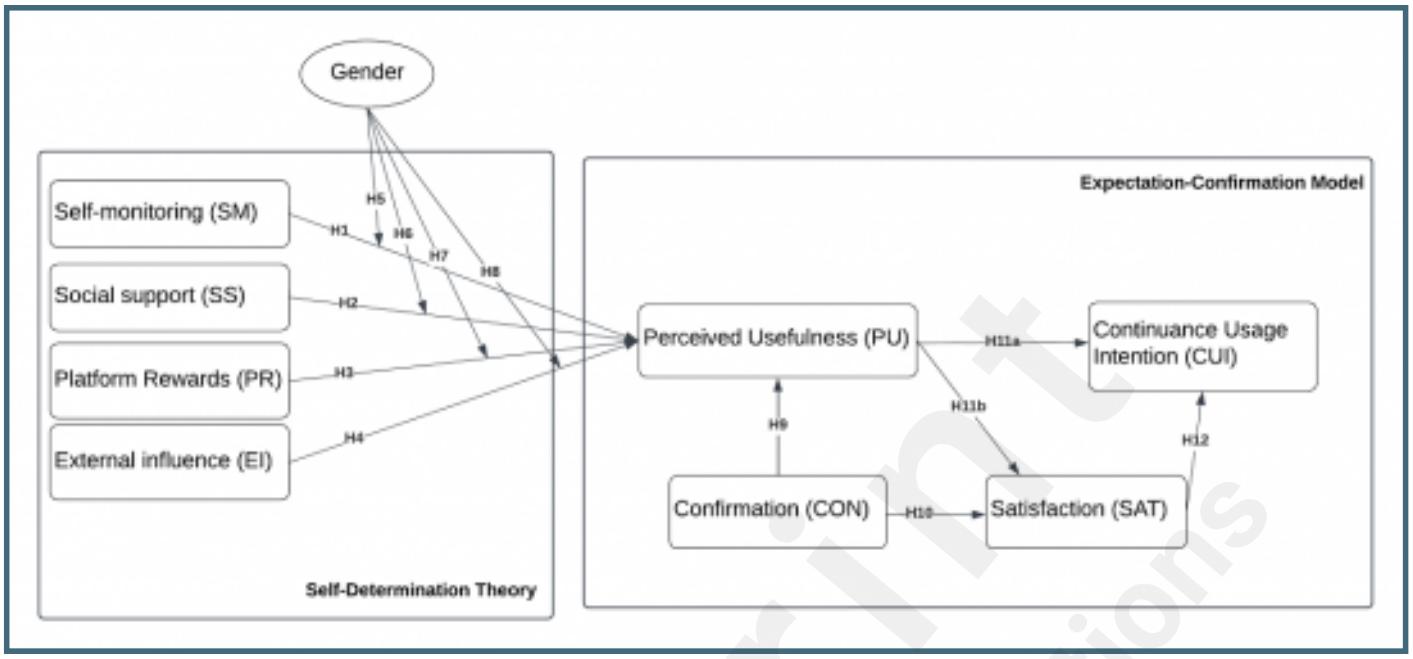
Supplementary Files

Figures

Conceptual Model.



Multimedia Appendixes

Research Instruments.
URL: http://asset.jmir.pub/assets/edb565d8fb744e11e4f77ddde23be04e.docx