

The Influence of Social Media on the adoption and continuous use of health fitness mobile apps during the COVID-19 pandemic

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Abstract

Background: During the COVID – 19 pandemic, health management is of utmost important in order to ensure a better quality of life for every individual. With this being said, it is imperative to explore the ways and means to enhance the immune system of individuals through the adoption and use of health fitness apps used for improving the quality of life of individuals and health fitness mobile (HFM) application developers.

Aim: This study aimed to explore the users' perception of social media influence on various factors, including the adoption and continuous use of HFM apps.

Methods: This study utilized a quantitative research design, using structured questionnaires which were distributed amongst all the health app users located in four-tier 1 cities in India namely Bengaluru, Chennai, Delhi, and Mumbai. Confirmatory factor analysis was used to analyze the measurement model. A path analysis was conducted to examine the conceptual model of the research.

Results: The results of the analysis indicated that social media has a significant influence on perceived usefulness, trust, and ease of use, and these factors also have a significant positive impact on the adoption of HFM apps. The adoption of HFM apps also has a significant positive impact on satisfaction and it also has a significant positive effect on the continuous use of HFM applications.

Conclusions: Based on the results of this research, it has been found that health app developers are expected to focus on perceived usefulness, perceived trust, and perceived ease of use during the design, and development of their fitness apps, and also during the promotion of the apps on social media networking sites. The HFM app developers should also focus on the usefulness of the apps, in accordance with the expectations of the intended users as this directly impacts the adoption of the health fitness mobile apps by the users. Similarly, the reviews/ comments/ feedback shared by the current users on social media networks has a significant impact on the perceived usefulness for potential users. Therefore, negative comments or reviews shared on social media should be immediately addressed by the HFM app developers with appropriate updates/versions/features and this should be reported on social media, in order to enhance perceived usefulness, and trust among the intended users. However, satisfied users are loyal users, hence they would be more inclined to use the HFM apps continuously. Therefore, understanding the users' requirements and making appropriate modifications promptly will enable the app developers to retain their users. [*Ethiop. J. Health Dev*: 2022:36(1): 00-00]

Keywords: Social Media, Health Fitness Mobile apps, ease of use, usefulness, Trust, adoption, satisfaction, Continue use.

Introduction

The COVID - 19 pandemic has provided a lot of new insights and perspectives in terms of health management across the globe. Individuals who are at risk for COVID – 19, seek measures to boost their immune system, thereby limiting the devastating impacts of COVID -19(1, 2). One such important measure is a regular physical workout which could significantly improve the immune system (1) and minimize the risk of infection due to COVID - 19 (2-4). People living in the technological era depend on technology-oriented solutions for all their problems. Smartphones and social media bring about a lot of changes to the way in which humans do things, especially during the COVID - 19 pandemic. The contributions of the health fitness mobile (HFM) applications in health management and fitness has proven to be beneficial in recent times, particularly during COVID - 19. Fitness apps support the monitoring of exercises at a low cost or at no cost at all. Users utilize HFM apps during their physical

workout, exercises, walking, or jogging in order to track progress and increase their sense of accomplishment (2, 4).

According to Statista (2021), the most prominent activity in the internet is the use of social media. The users of social media around the globe is expected to increase from 3.6 billion people in the year 2020 to 4.41 billion in 2025 (5). The rapid increase in social media users play a significant role in enhancing the public health of the people, by protecting them from COVID – 19 and by creating awareness about transmission, prevention, symptoms, treatment, and health-related apps. The Technology Acceptance Model (TAM) is widely used to monitor the adoption of various technology by the intended population. Perceived usefulness, perceived ease of use and perceived trust are significantly correlated with the adoption of technology. This research aimed to explore the other factors which are not included in the TAM but which also have a significant influence on the

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adoption of technology through the extension of TAM (6, 7). Therefore, the primary objective of this research was to explore the influence of social media on the adoption and continuous use of HFM applications during the COVID - 19 pandemic.

The outcome of the study would enable the developers of health apps to understand the key factors which have a substantial effect on the adoption and continuous use of HFM applications, in order to prioritize significant attributes of the health fitness applications during the various stages of development. Furthermore, the results of the study may enable the marketers of health fitness apps to understand the significance of social media influence on the adoption and continuous use of HFM applications, particularly during the COVID - 19 pandemic. This will enable the design, development, and launching of promotional campaigns or advertisements which can attract a large pool of users towards their fitness apps.

Hypotheses Development

Social-Media (SM), Perceived usefulness (PU), Perceived ease of use (PEU), and Perceived Trust (PT) on towards adoption (AD) of health-fitness mobile (HFM) apps

Social Media (SM) and Perceived usefulness (PU): In the digital era, the SM platform enables the exchange of information in various forms such as text, image, audio, video, etc. Individuals share their opinion, reviews and comments about various products and services. The lockdown announced by the various countries due to the COVID – 19 pandemic, increased the usage of SM networks considerably. While compared to the usage of SM in July 2019, there was a rise of 10.5% in SM usage, in July 2020 (5, 8). SM has a critical role in opinion-making. SM acts as a platform to communicate the availability of health fitness apps, their features, including the reviews of users which could impact the PU of health fitness applications. The PU of a system can increase the individual performance of an app (6,9-13).

Social-Media (SM) and perceived ease of use (PEU): The comments or reviews shared by the existing users based on their HFM app usage or experience include comments such as “easy to learn,” “user-friendliness”, and comments which were in favour of the apps compatibility with various electronic gadgets, and performance, all of which could improve the potential users ‘PEU’ towards the HFM apps. The degree to which an individual considers using a specific system with less knowledge, skill, and effort is termed PEU. It contains an individual’s calculation of the effort convoluted in using a specific system (6). Both PU and PEU impact the adoption of technology. Various studies are in agreement with this finding (6-7, 9-11, 12-14). Furthermore, with regards to the fitness app AD and CU research context, understanding the relationship between the two constructs is important for the developers of the app because apps need to be userfriendly and the users perception of the apps usefulness is essential.

Social-Media (SM) and Perceived Trust (PT): PT is the perceived credibility and benevolence in relation to trust (16). PT indicates companies ability in keeping up with its promises (17), therefore, users’ PT towards the app or the company developing the app is crucial in the adoption of the fitness apps, in order to gain the desired benefits. PT is a widely considered concept in technology adoption studies. (18-19). In the case of the technology adoption scenario, the customers’ PT towards the technology provider or the company developing the app, decides its AD rather than PT towards the technology or the specific health fitness app (19-22). Furthermore, PT targets the app designer and not the application, in terms of the extent to which they can provide PT in privacy, security, and information quality.

Based on the above discussions, the following three hypotheses were formed:

- H1: *SM has significant positive influences on the PU of HFM apps.*
- H2: *SM has significant positive influences on the PEU towards HFM apps*
- H3: *SM has significant positive influences on the PT of HFM apps.*

Factors affecting the Adoption (AD) of Health fitness mobile (HFM) applications

The Impact of Perceived Usefulness (PU) on the Adoption (AD) of HFM applications: The degree to which users' describe their perceptions concerning the HFM apps that offered health-related services to them are termed as PU (9-10, 12). Meanwhile, PU is commonly evaluated through the use of four elements such as performance, productivity, effectiveness, and the overall usefulness of HFM applications (13). Therefore, the end-users will benefit from using HFM during pandemics which include hard lockdowns, just like with COVID - 19 when people were unable to access gymnasiums for their physical workouts (22-24). In short, individuals who are health-conscious will have more chances of AD of the HFM apps during COVID – 19, in order to utilize its benefits during the lockdown situation (25-26).

Adoption (AD) of HFM applications and Perceived Ease of Use (PEU): The suitability and usability of HFM apps has been found to be relevant to a wide variety of targeted communities (15). TAM has been widely used in research studies where technology acceptance predicts the users' intention to use an HFM app (10, 13-15). One study proposed a model which combines TAM theory with other models that explain users' acceptance of health technology (7, 14). The chances of adopting the technology increase for the end-users when they believe that a specific HFM app is easy to use and enables them to achieve effective health management.

AD of health – fitness mobile applications and Perceived Trust (PT): It is a state of mind where the users gain confidence and guarantees over the data

which is delivered by the system, this is known as PT, therefore, the end-users expectations with regards to technology generate trust in its use (9, 10, 15). In general, PT in the adoption and use of technology alleviates or eliminates the insecurity from the mind of the individuals who have no or adequate knowledge and experience in terms new technology/ information systems/ HFM apps (12, 15, 16-20). Studies conducted earlier established the significance of PT in the success or failure of adoption of information systems, E-payments, online purchases, internet banking, HFM apps, etc (27-30). Earlier research has indicated that PT in app developers plays a crucial role in the AD of HFM applications (8-9, 21-23, 27-32).

Based on the above discussions, the below-mentioned hypotheses were formulated:

H4: PU has significant positive influences on the AD of HFM apps.

H5: PEU has significant positive influences on the AD of HFM apps.

H6: PT has significant positive influences on the AD of HFM apps.

The relationship between the Adoption (AD) of health – fitness mobile (HFM) applications and Satisfaction (SA): The users evaluated the appropriateness and use of various features after the AD of the HFM applications. If those features were in accordance with the expectations of the users then they would be satisfied and willing to adopt the continuous use (CU) of the fitness app even after the COVID - 19 lockdown had passed, in order to manage their health for various

other chronic and communicable diseases (32-33). The users who were satisfied with the app, shared positive reviews for the fitness app with their friends, relatives, and they also shared their positive reviews in SM which may have contributed to the PU, PEU, PT, and AD of other potential users (34-35). The results of earlier studies indicated that the AD of HFM apps results in SA. (32, 35-36). The following hypothesis is proposed based on the findings above:

H7: AD of HFM apps positively influences SA towards the HFM apps.

The relationship between Satisfaction (SA) and Continuous Use (CU) of the App: SA is the expected positive response due to the AD of the HFM app (37-38). It is the pleasure or happiness the user perceives during their usage of the HFM app and stimulates them to continue to use the app in the future. SA results in loyalty and the CU of the app in a regular manner (38-39). The health benefits derived out of the use of HFM apps motivate the users for the AD of HFM apps even after the COVID - 19 pandemic (38-39).

H8: Satisfaction has significant positive influences on CU of HFM apps

The conceptual model shown in figure 1 portrays the hypothetical relationships derived from the existing literature quoted above.

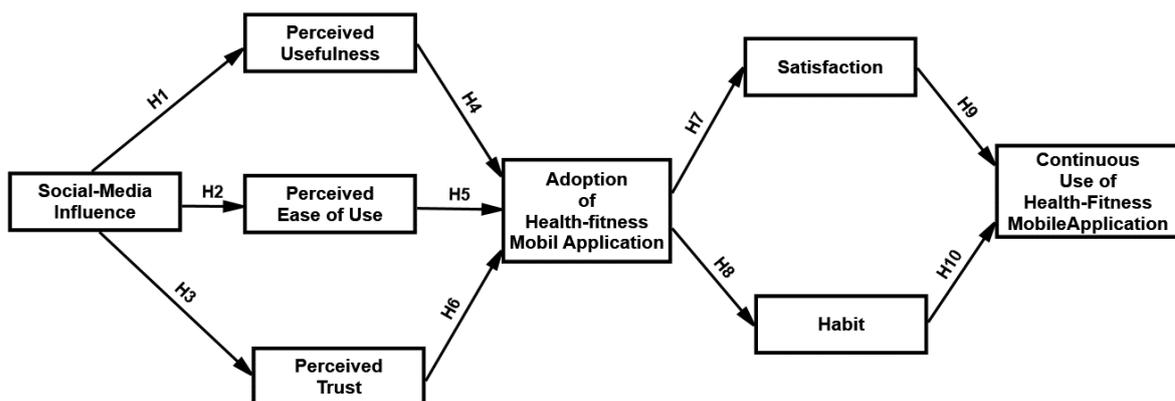


Figure 1: Conceptual Model

Methods

Youth living abroad are frequent users of HFM apps for their daily fitness needs. Previous research has indicated that the average time of SM usage by the Indian nationals prior to lockdown was 3.13 hours and minutes (January – February 2020), with a sudden increase of 4.39 hours and minutes during lockdown for the period of March – April 2020 (40-42). The participants for this study, included all users of the health fitness app, regardless of the age or gender. Data was collected through the use of email and personal methods from May 2020 to August 2020. A structured questionnaire was used, which contained a total of 25 items including all the factors recognized as essential from previous research (6, 9-13, 15-16, 26-29,31-32,

34-35, 43). Specifically, This research adopted validated measures of social media influence, perceived usefulness, perceived ease of use, perceived trust, adoption of HFM, satisfaction, habit, and continuous use of HFM from Anshul (2017) and Davis et al. (1989). The measures used in the study had a total of 3-4 items (10, 43). A pilot study was conducted among sixty respondents (i.e. 15 participants from each city) and the results of the confirmatory factor analysis from the measurement model was used to verify the composite reliability, average variance extracted, and the discriminant validity. The face validity of the questionnaire was verified with the help of five users of the health fitness apps, and three academics. A total of 1200 questionnaires were circulated among the

respondents who resided at four major cities in India namely Bengaluru, Chennai, Delhi, and Mumbai. Out of the 1200 questionnaires circulated, around 521 valid responses were received with a response rate of 43.4%, after rejecting all invalid responses through data filtering and cleaning processes, the data was analysed using IBM SPSS 24.0 software.

Results and Discussion

Sample Profile: Out of the 521 valid questionnaires, 62.8% of them were male and 37.2% were female. Concerning the average age of the respondents, it was found that 43.2% of the respondents were between 25-30 years of age. With regards to education level, 62.2% of them were undergraduate and 47.0% indicated that they were using a mobile phone for more than 4 to 6

years and (32.1%) of the users indicated that they use the HFM App often. The analysis also indicated that a significant proportion (54.5%) of them spent between 31 to 60 minutes of their time on the health Fitness app and (55.3%) of the respondents indicated that they were using the health app for fitness reasons for a period of 6 months to one year.

Confirmatory Factor Analysis - Measurement Model

The first step in the SEM approach was the analysis of the measurement model which could assist in invalidating the construct validity (i.e. convergent and discriminant validity) and internal consistency (i.e. Cronbach Alpha). The AMOS 23.0 software package was used to perform the confirmatory analysis for the measurement model.

Table 1: Measurement Model Results

Construct	Item	Factor Loading	Cronbach Alpha	Composite Reliability	Average Variance Extracted (AVE)
Social Media (SM)	SM1	0.787	0.862	0.851	0.675
	SM2	0.874			
	SM3	0.801			
Perceived Usefulness (PU)	PU1	0.841	0.898	0.842	0.750
	PU2	0.903			
	PU3	0.852			
Perceived Ease of Use (PEU)	PEU1	0.822	0.896	0.898	0.688
	PEU2	0.84			
	PEU3	0.864			
	PEU4	0.79			
Perceived Trust (PT)	PT1	0.786	0.885	0.859	0.661
	PT2	0.851			
	PT3	0.844			
	PT4	0.768			
Adoption (AD)	AD1	0.852	0.895	0.843	0.681
	AD2	0.825			
	AD3	0.796			
	AD4	0.826			
Satisfaction (SA)	SA1	0.941	0.949	0.900	0.827
	SA2	0.878			
	SA3	0.895			
	SA4	0.921			
Continuous Use (CU)	CU1	0.784	0.815	0.708	0.598
	CU2	0.764			
	CU3	0.772			

Composite reliability is otherwise known as construct reliability and it is the measure of internal consistency of the scales like Cronbach's alpha. The term average variance extracted (AVE) is the statistic which computes the amount of variance between the constructs which is due to measurement error. From Table 1, it has been identified that the internal consistency (i.e. Cronbach alpha) of the constructs used in the scale is satisfactory, which range from 0.895 to 0.949 and falls within the threshold values of more than 0.7 (23). The composite reliability of the

constructs varies between 0.708 and 0.900 which is more than 0.7 (24). The convergent validity of the model is assessed based on the factor loading of the items, and AVE values of the constructs. All the items in the various constructs used in the present research demonstrated that the factor loadings were more than 0.5 (44-45) and ranged between 0.764 and 0.941. Similarly, the AVE values of the constructs were also more than 0.5 (46) and were between 0.598 and 0.827. Thus, it has been established that the convergent validity of the scale has been confirmed.

Table 2: Discriminant Validity

	SM	PEU	PU	PT	AD	SA	CU
SM	0.822						
PEU	0.220	0.829					
PU	0.565	0.131	0.866				
PT	0.275	0.145	0.150	0.813			
AD	0.261	0.305	0.294	0.358	0.825		
SA	0.170	0.190	0.097	0.196	0.417	0.909	
CU	0.188	0.138	0.13	0.171	0.226	0.653	0.773

Note: The Bold-faced values represent the Square-root of AVE scores, and the values mentioned in non-diagonal positions are correlation coefficients between the constructs.

Discriminant validity denotes that the constructs are not theoretically connected with each other. The discriminant validity of the measurement model was computed using the inter-correlation matrix of the constructs based on the results of the measurement model. The discriminant validity results are indicated in Table 2. From the above table, it is very clear that all the correlation coefficient values were less than their

corresponding Square-root of AVE values and the discriminant validity of the scale used in this research.

Path Analysis

The second step in the SEM approach was the verification of the path analysis which was analyzed through the use of the bootstrap resampling technique with 5000 iterations to verify the stability of the data. The hypothetical relationships mentioned in the conceptual model were verified through the use of path analysis. The results of the hypothesis testing are included in table 3, and the path analysis of the present research is displayed in figure 2.

Table 3: Hypothesis Testing - Results

Hypothesis	Relationship	β	S.E.	t value	P	Decision
H1	SM → PU	0.457	0.036	12.733	<0.001**	Supported
H2	SM → PEU	0.300	0.066	4.567	<0.001**	Supported
H3	SM → PT	0.341	0.060	5.705	<0.001**	Supported
H4	PU → AD	0.341	0.067	5.052	<0.001**	Supported
H5	PEU → AD	0.225	0.041	5.456	<0.001**	Supported
H6	PT → AD	0.303	0.045	6.577	<0.001**	Supported
H7	AD → SA	0.438	0.047	9.370	<0.001**	Supported
H8	SA → CU	0.430	0.025	12.984	<0.001**	Supported

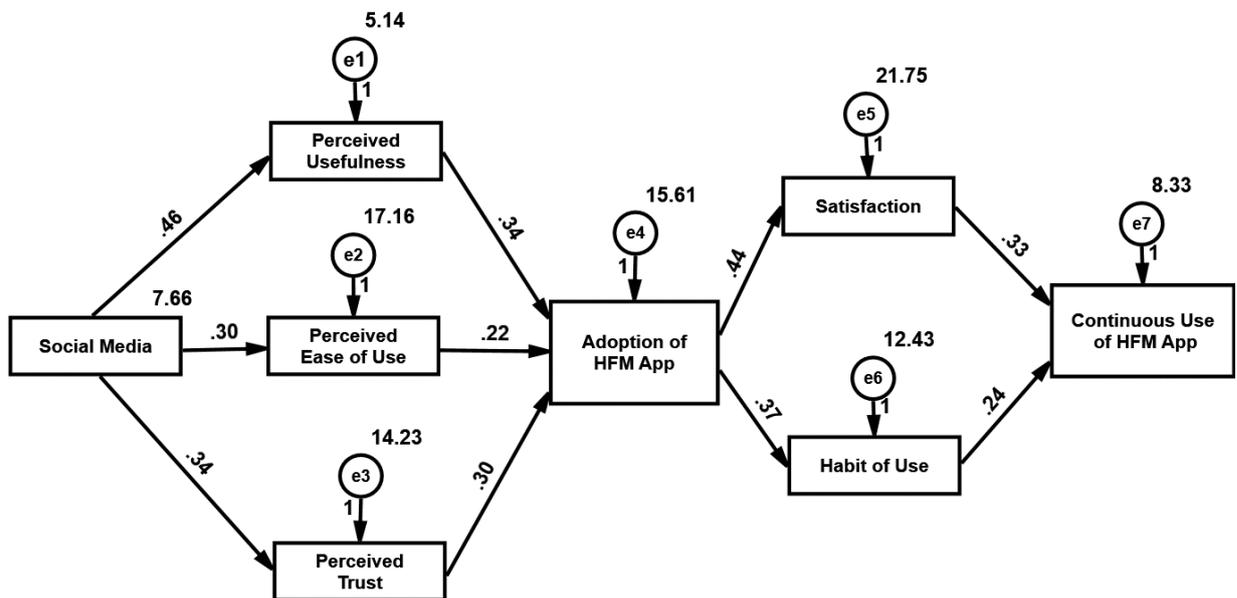


Figure 2. Path Analysis

The results of the path analysis indicate that all the hypothetical relationships (i.e. hypotheses) are supported with t-values ranging from 4.567 to 12.984. SM influence was significant in explaining all three constructs namely PU ($\beta = 0.457$; $p < 0.001$), PEU ($\beta = 0.300$; $p < 0.001$), and PT ($\beta = 0.341$; $p < 0.001$). Similarly, PU ($\beta = 0.331$; $p < 0.001$), PEU ($\beta = 0.225$; $p < 0.001$), and PT ($\beta = 0.263$; $p < 0.001$) significantly influence the AD of HFM apps. The hypothesis results further indicated that the AD of HFM applications were significant in explaining SA ($\beta = 0.438$; $p < 0.001$). Likewise, SA ($\beta = 0.430$; $p < 0.001$) with the HFM apps has a significant effect on its CU. The model fitness indices falls within the recommended range ($\chi^2 = 31.256$, $\chi^2/df = 1.736$, GFI = 0.943, AGFI = 0.932, CFI = 0.914, NFI = 0.904, and RMR = 0.023) therefore, it has been established that model is fit with the data.

The results of this research indicate that social media has a significant influence on all three variables namely PU, PEU, and PT with a regression coefficient of more than 0.30. However, social media has the greatest influence on PU, with a regression coefficient of 0.46, as compared to PEU and PT. The reviews /comments/ feedback shared on social media has a significant influence on PU of the HFM by the users. PU of the users has the highest level of influence on adoption of the HFM app, with a regression coefficient of 0.34, which is followed by PT (0.30), and PEU (0.22). The results of this research also indicate that the adoption of the HFM apps has a significant influence on the users' satisfaction, with a regression coefficient of 0.44, which is followed by habit of use (0.37). It has also been found that satisfaction (0.33), and habit of use (0.24) have a significant effect on the continuous use of HFM apps by the users.

Conclusions

The results of this research indicate that SM has a key role in building the PU, PEU, and PT in the minds of users regarding the HFM apps. Hence, creating awareness about the HFM apps in SM is inevitable in the digital era. The HFM app developers and marketing companies need to develop their brand with the brand name, features, privacy of users, security features available, memory usage, compatibility, technical expertise or user guide required to use the app, user-friendliness, and potential benefits through SM applications like Facebook, Twitter, YouTube, etc.

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SM is an essential factor in convincing users to download the app, and this is further enhanced through the reviews, comments, and ratings in the blogs or SM of the existing users of the app. Therefore, it is essential to address negative comments at the earliest, by providing an update or additional features to meet the expectations of the users, which could result in the SA of the users, which in turn leads to the CU of health apps. The present COVID - 19 pandemic requires everyone to boost their immunity through the use of yoga/physical activities, healthy lifestyles, healthy eating habits, supplementary food products, herbal medicines, etc., in order to improve their resistance against COVID - 19 (47). Currently, social media and HFM apps provide a platform to promote public health. HFM app providers should analyze their user behavior and preferences through the use of big data technology (19-20, 48). Therefore, it can be concluded that HFM app developers are encouraged to focus on PU, PT, and PEU during the design, development, and promotion of the HFM apps in SM networking sites.

Limitations and Future Recommendations

This research has certain limitations. This research included respondents of all ages and both gender from four major cities in India, however, may not have explored the factors related to age and gender to its fullest capacity, as this was not the focus of the research. Furthermore, a replication of this study with control variables such as gender, and age category could be proved to be beneficial. This study was focused only on tier 1 cities in India, therefore replicating the study in tier 2, and tier 3 cities may assist the research community, and HFM app developers in understanding the significant difference between the users, in terms of the factors influencing the AD of HFM apps based on the city they reside in.

Ethics approval and consent to participate

The Doctoral research committee of Anna University accepted the research proposal. Prior to data collection, written consent was obtained from each respondent. Personal details of the respondents were not disclosed in order to ensure confidentiality.

Competing interests

The authors affirm that they have no competing interests.

2020 <https://doi.org/10.1007/s10238-020-00650-3>

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