Understanding continued fitness app utilization: An extended expectation- confirmation model framework and the role of gratifications

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Abstract

As users increasingly demand to take charge of their health, digital tools such as fitness apps are being used in unprecedented ways. The COVID-19 pandemic has heightened the importance of health promotion and fundamentally changed how consumers use and access fitness apps. Despite the exponential rate at which fitness apps are introduced to the market, most users cease using them soon after their initial trial. This study evaluates the antecedents to confirmation and satisfaction and their mediating roles by considering psychological and motivational aspects in determining users' fitness app continuance intentions. It draws from three well-established theoretical models: the expectation confirmation model, flow theory, and uses and gratifications theory. Based on structural equation modeling, empirical data from 403 German fitness app users verified the proposed research model. Perceived usefulness and flow experience positively and significantly affect satisfaction. Perceived ease of use, perceived enjoyment, and social influence are essential to confirmation, reinforcing continued fitness app utilization. Our findings help developers align app design with user needs, fostering higher satisfaction and retention. Intuitive and personalized functions and gamification drive users' continued use and present essential building blocks for digitalized healthcare prevention in the future. Against their irrefutable importance, the influence of user-related psychological and motivational aspects on the post-adoption patterns of fitness apps has not been analyzed in depth in the literature, especially not after COVID-19, which has led to significant changes in consumers' usage behaviors of apps. This study bridges the gap in the literature. Understanding fitness apps' continued use is essential to address changing user needs and expectations and ensure that the apps meet user demands and remain relevant to pave the way for digitized prevention measures.

Key Words: *Expectation-confirmation model*, *fitness app users, post-adoption use behavior*.

Track Chair: *Innovation Management & New Product Development*

1. Introduction

Disruptive digital solutions such as fitness apps provide grounds for viable and purposeful healthcare. Fitness apps are third-party software programs that use data collected from a smartphone's built-in functions to measure fitness and health parameters (Higgins, 2016). Most fitness apps resort to behavioral change techniques, including exercise instruction, self-monitoring, social support, and contingent rewards. In the wake of COVID-19, fitness apps contributed momentum to provide digitally assisted health prevention and open avenues for cost-effective means to promote physical activity since patients prioritize their well-being more than before the COVID-19 health crisis (Stoumpos et al., 2023). Fitness apps still offer tremendous potential for improving health outcomes. With the increasing variety of apps and functions (e.g., nutrition, meditation, sleep) available, they will become ever more central to users' fitness and health regimens. However, the pandemic has fundamentally changed how consumers use fitness apps and access health technology (Stoumpos et al., 2023). Fitness apps in our study refer to apps that provide training units and workouts in an interactive format, track recorded training performance and its subsequent evaluation, set performance targets and progress, provide reminder functions for regular training, meditation exercises, and optionally additional offers such as food recipes, mindfulness exercises or learning videos.

The growing popularity of fitness apps attracted researchers' attention. Yet findings from studies pre-pandemic are becoming potentially obsolete due to the shift toward the increasing importance of preventive measures and longevity. Although the existing literature has advanced the understanding of specific aspects of user adoption and continued use behaviors of fitness apps pre-COVID-19 or during COVID-19 in several contexts, research still lacks a detailed picture concerning continued use behaviors. Hence, empirical evidence on how to reinforce continued use after the pandemic and ensure loyalty is still limited. Understanding the reasons for users' continuance in using technology is critical for designing strategies for continuously attracting user retention (Nabavi et al., 2016). In this regard, it is problematic that many healthcare technologies (e.g., wearable devices, health apps, or telemedicine) show high numbers of initial users (purchase, download, installation, initial use) but low retention rates (e.g., Bao & Lee, 2023). Still, for healthcare technologies like fitness apps, retaining high numbers of users is usually more meaningful than the number of first-time users (Cho, 2016), as the benefits of service providers, developers, and users depend on this use continuation due to network effects or demand-side economies of scale (Bhattacherjee, 2001). Therefore, and considering fitness apps' economic relevance and potential to create positive societal and

behavioral changes, we investigate why users continue to use fitness apps by scrutinizing users' functional, hedonic, and social experiences and psychological factors.

Consequently, to explain fitness app continuance, we expand the expectation confirmation model (ECM) (Bhattacherjee, 2001) by integrating psychological (i.e., flow experience) and motivational (i.e., gratifications obtained through app use) factors. The ECM is based on the expectation-confirmation theory (ECT) (Oliver, 1980), often used in marketing to explain how consumer satisfaction leads to repurchase intentions. It relies on the premise that confirmation of prior expectations, expectations of benefits, and emotional responses determine users' decisions to continue using an IS. Thereby, confirmation of prior expectations is a core factor uniquely distinguishing the ECM from other models to explain IS use behaviors (Thong et al., 2006). In the original model, two factors determine users' continuance intention: their assessment of previous technology usage experiences and their anticipation of future benefits obtained from continued technology usage (Bhattacherjee & Barfar, 2011).

Furthermore, in this study, we considered socio-psychological factors for various reasons. Firstly, users place varying degrees of importance on health, which may affect their decision to continue or discontinue using a fitness app. Hence, motivations vary across users, influencing whether users consider such apps useful and easy to use in the pre-adoption stage (Lee & Cho, 2017). Consequently, we propose that gratifications obtained from previous use of the apps may affect the influence of variables that enhance user satisfaction and continuance intention with fitness apps. Uses and gratification theory (UGT) (Katz et al., 1973) focuses on why and how users choose specific media outlets to gratify their psychological needs, and it originates from traditional mass communications research. With more built-in features such as planning, goal setting, self-monitoring, and receiving continuous feedback, fitness apps have become convenient, technologically based platforms resonating with different gratifications obtained through the app use.

Secondly, fitness apps differ from other digital technologies concerning their features that help users pursue long-term health goals (Yan et al., 2021). Features like interactive training formats, progress tracking, self-monitoring, and reminders inherent to most fitness apps nowadays may trigger flow experience. Flow attempts to explain cognitive states in which individuals are deeply absorbed in an activity, which means they act with total involvement (Csikszentmihalyi (1975). In a state of flow, users' attention is limited to the stimulus field, and they sense control over their behaviors, which results in pleasurable experiences that may lead to satisfaction and continuance intention. Recent research applied flow theory in health technologies continuance (Yan et al., 2021), however, it has not been used to predict

continuance intention for fitness apps. Since definite goals, immediate feedback, and a balance between users' skills and challenges can trigger flow experiences, we presume that users can enter states of flow while operating their fitness app and performing physical activities (Kim, 2022; Yan et al., 2021). Our research thus contributes to the literature by integrating hedonic, social, and psychological factors into the ECM (Bhattacherjee, 2001) to examine whether technology-related or psychological and motivational factors drive the expectation-confirmation-satisfaction paradigm. We thus aim to (1) identify the factors that explain continuance intentions for fitness apps by verifying the proposed theoretical model with empirical data from fitness app users in Germany and (2) consider the role of motivation in users' continuance intentions for fitness apps by analyzing how gratifications obtained influence user confirmation and reinforce continuance intention.

2. Conceptual framework

2.1 Expectation-confirmation-satisfaction paradigm and flow theory

Consistent with the post-adoption paradigm (Bhattacherjee, 2001), satisfaction arises if the ex-ante expectation matches the actual use experience and if the frame of reference (i.e., prior expectations) results in the perception that the technology is useful for accomplishing the given task. To better understand how confirmation affects satisfaction with the app, we investigate two competing underlying processes: First, we focus on perceived usefulness as a utilitarian process in user behavior, arguing that fitness apps are mainly used for specific purposes (e.g., tracking/ monitoring features to become fitter or lose weight) (Angosto et al., 2023). Accordingly, the perception of usefulness affects users' satisfaction and intention to continue using it (Cho, 2016). Also, recent research in other technology contexts found that satisfaction mediates the relationship between perceived usefulness and continuance intentions (Yan et al., 2021). Second, we scrutinize flow experience as a more hedonic-oriented processing variable. Hence, confirmation of initial expectations may also positively contribute to users' level of flow experience elicited by operating the app. Extant literature emphasizes a direct effect of flow experience on continuance intention in the case of various online technologies (Cheng, 2021). However, Yan et al. (2021) indicate that satisfaction mediates the relationship between flow experience and continuance intention. Therefore, we hypothesize:

H1: Confirmation has a positive effect on satisfaction.

H2: By increasing satisfaction, confirmation increases continuance intention.

H3: By increasing perceived usefulness, confirmation increases **a)** satisfaction and **b)** continuance intention. (serial mediation)

H4: By increasing flow experience, confirmation increases **a)** satisfaction and **b)** continuance intention. (serial mediation)

2.2 Gratifications obtained from fitness app use

To the best of our knowledge, no other empirical study has explored whether confirming gratifications obtained from fitness app use ultimately result in satisfaction and, in turn, continuance intention. Utilitarian gratifications refer to users' extrinsic motivations for technology use and determine the fulfillment of users' utility expectations and extrinsic motivations. Perceived ease of use promotes a positive evaluation and increases with use experience, which reduces the effort necessary to obtain skills related to the technology (Thong et al., 2006). We assume that the higher the perceived ease of use, the more users can concentrate on the task itself without being distracted by operational challenges requiring additional cognitive effort. If users can confirm that the app is easy to use, a sense of utilitarian gratification arises, ultimately leading to satisfaction and continued use. Drawing from the above, we conclude:

H5: By increasing confirmation, perceived ease of use strengthens **a)** satisfaction and **b)** continuance intention. (serial mediation)

Hedonic gratifications pertain to users' intrinsic motives for technology use. Specifically, we examine users' perceived enjoyment as one type of hedonic gratification. Perceived enjoyment refers to the extent to which users perceive utilizing the technology as pleasurable (Luo et al., 2011). So far, no comparable research exists on the influence of perceived enjoyment relating to the expectation-satisfaction-continuance paradigm of fitness app post-adoption behaviors. However, building up on UGT, we expect that if users confirm that the app turns complex or repetitive fitness tasks into enjoyable activities, satisfaction increases and, in turn, fosters continuance intention. Therefore, we hypothesize:

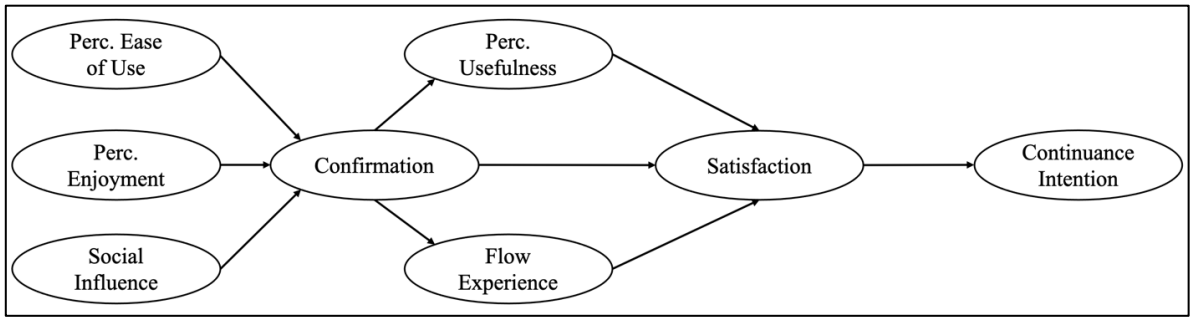
H6: By increasing confirmation, higher levels of perceived enjoyment increase **a)** satisfaction and **b)** continuance intention. (serial mediation)

Based on UGT, social gratifications are essential in fulfilling user needs, potentially determining whether they continue using or abandoning a technology (Li et al., 2022). In this study, social gratifications pertain to users' social influence, which results from features often inherent to fitness apps, like challenges or social sharing (Angosto et al., 2023). The greater the extent to which fitness app users can confirm their prior expectations, the higher their satisfaction with the app will be, ultimately leading to continued use. Hence, we propose:

H7: By increasing confirmation, higher levels of social influence positively influence **a)** satisfaction and **b)** continuance intention. (serial mediation)

To illustrate the above hypotheses, the authors developed the following framework.

Figure 1. Conceptual model of the determinants of continuance intention for fitness apps.



3. Methods

Using Lime Survey, an online questionnaire was employed to analyze the underlying constructs and their relations. Data was collected by spreading the online self-administered questionnaire across various fitness online communities and health forums to understand the German fitness landscape. A cross-sectional design was chosen. The study population constituted German fitness app users who continued using fitness apps. All constructs were measured by multiple reflective items on a five-point Likert scale (1= "strongly disagree" to 5= "strongly agree"). The underlying items were derived from validated scales from existing literature. Based on the maturity of ECM, flow theory, and UGT, the study benefits from previous empirical validations.

4. Results

We applied partial least squares structural equation modeling (PLS-SEM). Having ensured that all measures worked correctly, hypotheses were tested using a bootstrapping procedure with 10,000 subsamples. Point estimators, as well as 95% confidence intervals, were derived. Our findings regarding testing the direct hypothesis show that confirmation positively and significantly influences satisfaction at the 0.001 level (β = .283, p < .001), which supports H1. We utilized the bootstrapping method Zhao et al. (2010) recommended to test the proposed mediation effects. Table 1 summarizes the results. Hair et al. (2011) state that significant indirect effects confirm mediation. All eight indirect effects were significant in our study, with a 95% confidence interval, excluding zero. Therefore, we can deduce that satisfaction mediates the effect of confirmation on continuance intention (H2). Furthermore, perceived

usefulness and flow experience mediate the relationship between confirmation and satisfaction (H3a and H4a), while perceived usefulness, flow experience, and satisfaction mediate the effect of confirmation on continuance intention (H3b and H4b). Secondly, we can infer that the effects of perceived ease of use, perceived enjoyment, and social influence are important gratifications reinforcing the effect of confirmation on satisfaction and continuance intention (H5a,b–H7a,b).

Table 1. Mediation assessment.

Hypothesis	*Relationship*	*Supported*	*Path coefficient*	*Standard Deviation*	*t-statistic*	*Confidence interval (95%)*
H2	EC → SAT → CI	Yes	.303	.033	9.178***	[.238, .368]
H3a	EC → PU → SAT	Yes	.176	.030	5.921***	[.120, .237]
H3b	EC → PU → SAT→ CI	Yes	.125	.023	5.461***	[.083, .173]
H4a	EC→ FE → SAT	Yes	.068	.019	3.505***	[.034, .109]
H4b	EC → FE → SAT → CI	Yes	.048	.014	3.463***	[.024, .078]
H5a	PEOU → EC → SAT	Yes	.099	.023	4.252***	[.056, .147]
H5b	PEOU → EC → SAT→ CI	Yes	.070	.017	4.040***	[.039, .107]
H6a	PE → EC → SAT	Yes	.152	.026	5.755***	[.102, .205]
H6b	PE → EC → SAT → CI	Yes	.108	.020	5.469***	[.071, .148]
H7a	SI → EC → SAT	Yes	.070	.019	3.708***	[.035, .110]
H7b	SI → EC → SAT→ CI	Yes	.050	.014	3.544***	[.024, .080]

Notes: ***: significant at the .001 level, **: at the .01 level, *: at the .05 level, n.s.: not significant. EC = Expectation Confirmation, SAT = Satisfaction, CI = Continuance Intention, PU = Perceived Usefulness, FE = Flow Experience, PEOU = Perceived Ease of Use, PE = Perceived Enjoyment, SI = Social Influence

5. Discussion

Despite the exponential rate at which fitness apps are still introduced to the market, most users cease using them soon after their initial trial; this gap between acceptance and discontinuance will likely not result in the much-needed digitization of preventive health measures. The lack of research in this regard is troubling because it limits our understanding of long-term continued use and the effectiveness of fitness apps. While initial adoption indicates how many people are willing to try tools like fitness apps, the analysis of post-adoption behaviors reveals how users actually interact with them over time. Whether they find sustained value, face barriers, or eventually abandon them, considering the evolving user needs and expectations is especially relevant in the post-pandemic context.

Our findings support the role of flow experience on satisfaction towards fitness apps, affecting continuance intention. Users in states of flow feel a sense of accomplishment and enjoyment, leading to a more satisfying interaction with the app and strengthening users' intention to continue using it. However, perceived usefulness as a utilitarian factor in user behavior seems to be the more pivotal predictor than the hedonic-oriented processing variable of flow experience. This may be because perceived usefulness aligns with users' primary

objective: to achieve fitness results. While states of flow (i.e., the immersive, enjoyable experience during use) can enhance engagement and motivation, perceived usefulness assures users that the app is genuinely helping them progress toward their goals, reinforcing satisfaction through tangible results rather than just the experience.

Overall, examining antecedents of confirmation has proven vital in identifying specific reasons for using fitness apps other than technological factors. It enlarges the understanding of how these gratifications precede and influence confirmation and, thus, users' satisfaction and willingness to continue using them. This broadens the knowledge of fitness app users' specific needs and expectations and how these can be met. Especially perceived enjoyment is critical concerning the extent to which users feel satisfied with the fitness app, depending on whether they can confirm their expectations. It seems to enhance the app's intrinsic appeal. Our findings thus imply that users who confirm experiencing enjoyment alongside usefulness are likelier to perceive satisfaction or, in other words, perceive the app as a comprehensive solution that meets both practical and emotional needs.

In terms of practice, simple functions designed to undertake specific health and fitness-related tasks as effortlessly and quickly as possible are crucial to user satisfaction and when forming new, healthy habits. Supporting users with easy-to-use, intuitive functions and effective communication measures is thus an essential complementary investment for both the pre-acceptance and the subsequent usage phase. Practitioners need a clear understanding of user needs and expectations, which underlines the importance of market research in developing strategies to retain users. Findings also indicate that participants value the utility of fitness apps. Perceived usefulness was the most crucial determinant for promoting users' satisfaction and, in turn, continuance intention to use fitness apps. Users typically use fitness apps for specific purposes and expect the platforms' functions to guide them to achieve their health goals, i.e., lose weight. Concerning the balance between workout challenges and users' skills, user retention increases if developers ensure that challengeable but achievable tasks can be set and functions such as intermediate goals or nutritional control are provided. Next to providing utilitarian value to users, apps should also create pleasurable experiences to ensure user retention. This may be achieved through personalized messages encouraging users and celebrating their successes. Apps could also provide motivational content that helps users achieve their personal health goals (e.g., through tailored nutrition plans).

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