

Optimizing User Engagement in Fitness Apps: A Comparative Analysis of Features and User Models

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Health apps are increasingly popular tools that help people monitor and improve their lifestyles. To optimize personalized health interventions, it's essential to understand what types of data these apps collect and how they can be used effectively. This research investigates the specific types of user data collected by fitness apps, identifying which ones most effectively contribute to lifestyle improvements. By comparing these findings with existing user models in the literature, this study aims to propose recommendations for enhancing personalized health interventions in fitness apps. The research will contribute to the field of user modeling by providing insights into data usage in fitness apps and suggesting ways to better leverage this data for improved user outcomes.

Additional Key Words and Phrases: Fitness Apps, User Engagement, Personalized Coaching, Gamification, Social Features, Mobile Health (mHealth), Behavioral Change, Health Technology, User Retention

1 INTRODUCTION

The landscape of digital health is changing quickly due to the growing use of technology in routine health care and the growing need for remote health solutions. This need for remote health apps is driven by several factors :

The COVID-19 pandemic showed the importance of remote health solutions, as in-person consultations were limited or unsafe [10]. Technological advancements have seen the rise of modern health apps capable of real-time data collection and analysis [8]. Remote health apps are crucial for individuals in remote or underserved areas, providing easier access to healthcare services [7]. The rise in chronic diseases like diabetes needs regular monitoring, which health apps can provide and are very helpful for reminders such as for example during Ramadan, during and between fasting periods, an sms with tips would be sent to remind people to hydrate. [3, 20].

In order to propose more efficient administration of one's own health and wellness, it is important that user engagement with health apps be optimized. However, because user interaction with health apps is broad and can range from passive data monitoring like sleep tracking or heart rate monitoring, to active participation in health-driven tasks like tracking micro-nutrients or workouts, it can be difficult to assess and enhance user engagement [14]. The challenge is in efficiently gaining and retaining this kind of interaction, especially in a market full of different apps that are all competing for users' attention by offering different levels of personalization and effectiveness [5, 6].

Health apps play a significant role in facilitating the monitoring and improvement of users' health by providing tools for tracking fitness activities, dietary habits, and overall well-being. While the

field of health apps is vast, including a wide range of applications for various aspects of health and wellness, this study specifically focuses on fitness apps.

There is little doubt about the requirement of successful user engagement in health and fitness apps, given the demonstrated correlation between frequent app use and improved health results [9]. This requires an understanding of how specific, data-driven elements of fitness impact user behavior and adherence to health regimens. Data-driven features are approaches that use collected data to inform decisions, improve functionalities, and enhance user experience. AI-enhanced health applications have demonstrated potential to increase user engagement by incorporating interactive elements and personalized features[4]. Despite their potential, these tools often face limitations, such as user data privacy concerns, underutilization of user-generated data, and the challenge of maintaining user interest over time [1, 16]. Due to these drawbacks, a more thorough evaluation of the proposed app features' utility is required to make sure they meet user expectations and encourage long-term healthier habits.

This research aims to explore how fitness apps can better use user information to boost engagement and promote lasting fitness habits by analyzing current features in use, identifying effective engagement strategies from literature, and comparing these findings to recommend improvements.

2 PROBLEM STATEMENT

Despite the broad use of fitness apps, there is still a significant challenge in using user information to have a real impact on health behaviors and maintain user engagement over time. Studies have shown that while there are a lot of fitness apps, their efficacy often diminishes due to a lack of personalization and adaptability in their features [1]. Furthermore, there is an inconsistency in how these apps manage and use user data to promote long-term health engagement [19], meaning that while some apps might use user data effectively to personalize experiences and maintain engagement, others might fail to do so, leading to a decrease in user retention and effectiveness over time. There is also a critical need to explore the relationship between the features offered by these apps and actual user retention and behavior modification, as highlighted by recent analyses which suggest that more intuitive and responsive app designs could significantly enhance user engagement [12]. Therefore, this research aims to identify and propose enhancements of specific features within fitness apps to improve their effectiveness and user adherence, addressing gaps in current app functionalities and user satisfaction.

2.1 Research question

The problem statement leads to the following research question :

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How can fitness apps more effectively leverage user information to enhance user engagement and promote sustained fitness behaviors through targeted features?

This can be answered with the help of the following sub-questions:

- (1) What types of features are currently implemented in fitness tracking apps ?
- (2) Which features for user engagement in fitness apps (or similar technologies) have been identified in the literature?
- (3) How do the features identified in fitness apps compare with those recommended in the literature?

3 METHODS OF RESEARCH

3.1 Methodology

- (1) **Feature Identification and Analysis:**
Select and analyze a diverse range of fitness apps based on predefined criteria stated in the next paragraph. This will involve downloading and interacting with these apps to document key features promoting user engagement
Identify and catalog the specific features currently implemented in fitness apps such as personalized feedback, goal setting, integration with other health services, social features, and motivational incentives.
- (2) **Feature Effectiveness Assessment:**
Collect qualitative data available online on forums, blogs, and articles with app users to understand their experiences and the perceived impact of these features on their health behaviors.
- (3) **Comparative Analysis of Features:**
Review academic and scientific literature to identify features recommended for enhancing user engagement and promoting healthy habits.
Check if these theoretical features are implemented in existing apps. Compare the effectiveness of the features identified in available literature with those implemented in actual apps.
- (4) **Synthesis and Recommendations:**
Summarize findings and develop actionable recommendations for app developers by analyzing the data collected to identify gaps between current app features and those proven to be effective in literature.
Propose a set of recommendations for enhancing app design to better use user information and maintain engagement.

3.2 Selection criteria

For this study, the global Apple store and global Google store were used to select popular fitness apps from the rankings. The goal was to find popular applications linked to fitness, that have diverse features categories and require some form of user engagement. The applications that appeared the most in the rankings were selected.

The main restriction was that the application needed to be free to download but exploring their paid premium features is part of the analysis. In addition to being free to download, below are the extra criteria needed to fit in the selection. The Selection is explained in more details in the appendix at the end of the paper

Inclusion criteria:

Popularity: Applications with a large user base and high number of ratings. The applications that featured the most times in the rankings of the Apple store, google store and ranking websites were selected.

Diversity of Features: Applications that offer a range of features such as activity tracking, personalized plans, social sharing, and nutritional help. The minimum required was to have at least an activity tracking feature and 2 more relevant features related to nutritional help, personalized plans and/or social sharing

Integration with Other Devices and Apps:

Applications that integrate with other health and fitness devices or apps for detailed tracking. This helps to make applications more complete by using features from other apps to make the whole fitness journey more accurate and help towards reaching objectives.

User Engagement Features: Applications that include features designed to enhance user engagement, such as personalized feedback, goal setting, gamification and social features including but not limited to sharing and posting on blogs and forums.

Exclusion criteria:

Platform Limitation:

Applications that are not available on both major mobile platforms (iOS and Android) will be excluded to ensure accessibility and user base diversity.

User Base and Popularity:

Applications with fewer than 1 million downloads will be excluded to focus on widely used and tested apps.
Applications with an average user rating below 3.5 stars on app stores will be excluded to ensure a baseline level of user satisfaction and reliability.

Cost and Availability:

Applications that require mandatory upfront payment or subscription without a free version will be excluded to ensure inclusivity and accessibility.
Applications with significant geographical restrictions, making them unavailable to a global audience, will be excluded.

Feature Set:

Applications that lack core fitness tracking functionalities such as activity monitoring (steps, distance, calories burned), heart rate monitoring, or workout logging will be excluded.

App Name	Developer	Platform	Free/Premium
MyFitnessPal	MyFitnessPal, Inc.	iOS, Android	Free with Premium Option
Nike Training Club	Nike, Inc.	iOS, Android	Free
Fitbit	Fitbit, Inc.	iOS, Android	Free with Premium Option
Strava	Strava, Inc.	iOS, Android	Free with Premium Option
Google Fit	Google LLC	iOS, Android	Free
Apple Health	Apple Inc.	iOS	Free
Samsung Health	Samsung Electronics	iOS, Android	Free
MapMyRun	Under Armour, Inc.	iOS, Android	Free with Premium Option
JEFIT	JEFIT Inc.	iOS, Android	Free with Premium Option
Runtastic	Adidas Runtastic GmbH	iOS, Android	Free with Premium Option

Fig. 1. Fitness applications used in this study

Applications that do not offer personalized plans or feedback mechanisms will be excluded as they do not align with best practices identified in the literature.

Integration and Compatibility:

Applications that do not integrate with popular wearable devices (e.g., Fitbit, Apple Watch) or other health apps (e.g., Google Fit, Apple Health) will be excluded to ensure comprehensive health tracking capabilities.

Applications that do not support syncing with other fitness platforms or social features will be excluded.

Security and Privacy:

Applications that do not comply with standard data protection practices, such as GDPR, will be excluded to ensure user data privacy and security.

Applications with a history of significant data breaches or unresolved security issues will be excluded.

Updates and Support:

Applications that have not been updated in the last 12 months will be excluded to ensure ongoing support and feature relevance. Applications with poor support infrastructure, such as lack of customer support or user guidance, will be excluded.

We limited the scope of this study to 10 applications that all met the criteria for this study to avoid repetitions and due do the limited timeframe. Check Fig 1 for the full list.

4 FEATURES CURRENTLY IMPLEMENTED IN FITNESS TRACKING APPS

Fitness tracking applications have become integral tools in promoting healthier lifestyles and habits. The current landscape of these apps is characterized by a diverse array of features designed to monitor various aspects of physical health, provide personalized guidance, and enhance user engagement. The analysis of popular fitness tracking apps reveals several core features consistently implemented across the platforms:

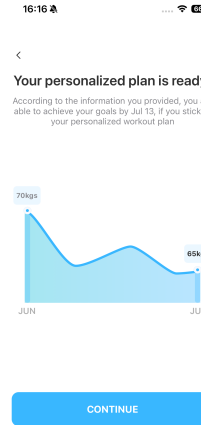


Fig. 2. Snapshot from Jefit showing user personalized plan

4.1 Personalized Coaching and Adaptability

Customized Plans: 6 apps offer personalized workout plans based on user goals and fitness levels. An example can be seen at Fig 2

Adaptive Plans: 4 apps provide adaptive plans that adjust based on user progress and feedback.

Dashboards: 5 apps allow users to customize dashboards to prioritize specific health metrics.

4.2 Goal Setting and Feedback

Goal setting and feedback are critical features in fitness apps to help users stay motivated and on track. Examples include:

Personalized Goals: 5 apps enable users to set personalized fitness and health goals. An example of how this would look like in an app can be found at Fig 3

Feedback: 7 apps provide detailed feedback on users' progress, helping them stay motivated.

4.3 User Engagement and Retention Strategies

Fitness apps use various strategies to engage users and retain them over time. All the following subsections of this section are linked to this topic but should be analyzed separately for more detailed analysis. An example of feature:

Interactive Content: 5 apps provide high-quality video demonstrations and motivational content.

4.4 Personalized Notifications and Reminders

Most fitness apps incorporate notifications and reminders to maintain user engagement. Examples include:

Standard Notifications: All apps send basic notifications but only 5 apps send regular notifications to encourage activity.

Reminders: All apps use reminders but only 5 use them automatically to help users stay on track with their fitness goals.

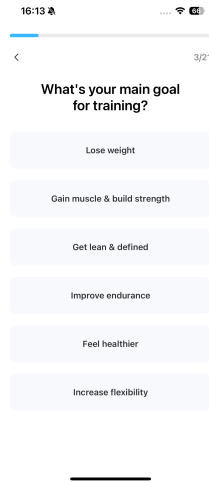


Fig. 3. Snapshot from Jefit showing user main goal

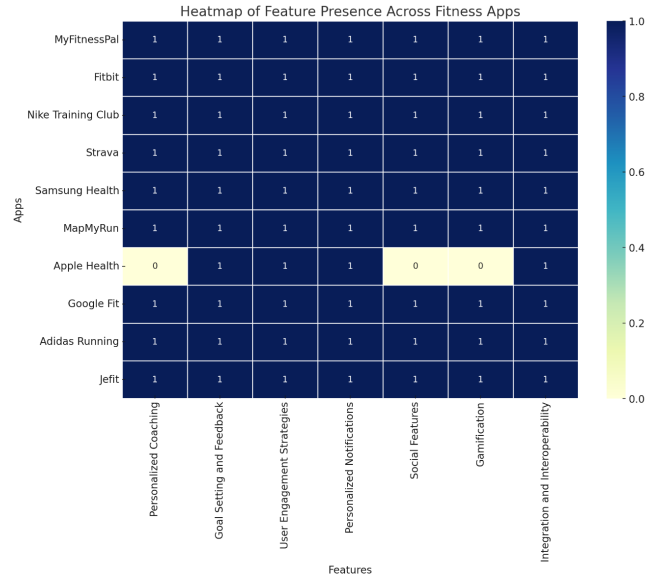


Fig. 4. Heatmap of features across the apps

4.5 Social Features and Community Support

Social features in fitness apps foster a sense of community and support among users. Examples include:

Community Interaction: 6 apps allow users to connect with friends, join clubs, and participate in community challenges.

Progress Sharing: 6 apps enable users to share workout results and achievements on social media platforms.

Support Forums: 5 apps include community forums where users can share experiences and advice.

4.6 Gamification

Gamification elements are widely used in fitness apps to maintain user interest and motivation. Examples include:

Achievements and Badges: 5 apps reward users with badges and achievements for reaching specific milestones.

Leaderboards: 4 apps feature competitive leaderboards that allow users to compare their performance with others.

Challenges: 4 apps offer daily, weekly, and monthly challenges to keep users engaged.

4.7 Integration and Interoperability

Integration with other devices and apps enhances the comprehensiveness of fitness tracking. Examples include:

Device Compatibility: 5 apps sync with various fitness devices for holistic health monitoring.

Health Services Integration: 4 apps integrate with health services and medical records, providing a comprehensive overview of the user's health.

4.8 Other information

Given the sensitive nature of health data, fitness apps prioritize security and privacy. Examples include:

Data Protection: All apps adhere to standard data protection practices and GDPR compliance to ensure user data security.

Privacy Settings: All apps allow users to control their privacy settings, managing data sharing and visibility.

Fig 4 helps to visualize the presence of features across the ten fitness apps. A 1 means that at least 1 features is present for a specific category. For example, apple health has 0 feature linked to gamification.

A figure in the appendix will summarize the relevant aspects of the app analysis at the end of this paper (Fig6).

5 FEATURES IDENTIFIED IN THE LITERATURE AND THEIR COMPARISON WITH CURRENT IMPLEMENTATIONS

This section compares the features recommended in the literature to the features identified in the analysis of current fitness apps to determine how well these apps align with best practices for user engagement and health promotion. The effectiveness of fitness tracking apps in promoting sustained user engagement and healthy behaviors has been a significant focus in recent literature. Various studies have identified key features that enhance user engagement in fitness apps and similar technologies. These features make use of behavioral science principles and technological advancements to maintain user interest and create long-term commitment to health goals.

5.1 Personalized Coaching and Adaptability

Personalized coaching and adaptable plans are essential for long-term engagement.

In terms of personalized coaching and adaptability, the literature recognizes the importance of personalized coaching to enhance

user engagement. The scoping review by Monteiro-Guerra et al [17] shows how important personalized coaching is in the context of enhancing user engagement. By analyzing 28 papers on 17 mobile applications, the review identified multiple effective personalization common strategies like feedback, goal setting, user targeting, and inter-human interaction but found that more advanced personalization strategies including self-learning, adaptability and context awareness were less frequent. These strategies ensure that the coaching experience is tailored to individual user needs and dynamically adjusts based on their performance and preferences. However, it noted a lack of advanced personalization strategies like self-learning, and real-time adaptability, which are crucial for dynamically adjusting to users' changing needs and preferences. The study emphasizes that real-time adaptability by the use of advanced technologies like machine learning can make fitness apps more relevant and effective over time.

Similarly, the study by Simoski et al. [23] explores user perceptions and acceptance of personalized coaching features within fitness apps. This was done through a large-scale survey of 1530 participants and a pilot study with a prototype app. The findings of the study indicate that users, especially younger ones and users with more experience when it comes to exercising, generally appreciate the motivation and support provided by personalized coaching, more importantly when it involves social connections and real-life interactions. The study also reveals that users are more likely to engage with apps that offer flexible, less intrusive forms of coaching that can be easily integrated into their daily routines. This highlights the importance of designing adaptable coaching features that can adjust to users' varying schedules, daily routines and preferences.

The app analysis revealed that while personalized coaching features are common, they are often basic and lack real-time adaptability. Apps like MyFitnessPal and Fitbit offer personalized feedback and customized plans, but these are generally static and do not adapt dynamically based on user performance. It is valid to say that this indicates a gap in the implementation of advanced adaptive features in current fitness apps, which are recommended in the literature for maintaining long-term user engagement.

The main difference between what the literature recommend in terms of personal coaching and adaptability is in the modernization of personalization strategies. The literature advocates for the integration of real-time adaptive features, which are currently underutilized in most fitness apps. Enhancing these apps with self-learning algorithms and context-aware personalization could significantly improve their effectiveness.

5.2 Goal Setting and Feedback

Goal setting is a critical feature that enhances user engagement by providing clear, achievable objectives:

Research by Wu et al. [26] highlights features such as goal setting, feedback, and social sharing as pivotal in increasing physical activity levels among users. The study found that users who set specific goals and received regular feedback were more likely to maintain higher levels of physical activity. Similarly, a study by Munson and Consolvo [18] demonstrated that goal-setting interventions in

fitness apps significantly increased users' exercise frequency and duration.

Additionally, Baretta et al. [2] reviewed popular physical activity apps and found that while most apps included goal specificity (95%) and timeframe (67.5%), fewer incorporated action planning (47.5%) and goal difficulty (25%). The study concluded that enhancing goal-setting strategies by including underutilized components like goal difficulty, action planning and goal re-evaluation could significantly improve the effectiveness of physical activity apps in promoting sustained physical activity. This paper's app analysis of popular fitness apps supports these findings. Apps like MyFitnessPal and Nike Training Club, offer personalized goal-setting features and provide detailed feedback on users' progress, which fit well with what the literature recommends. These apps allow users to set custom goals and track their progress, to make sure they stay motivated and engaged. However, while the literature emphasizes the inclusion of goal difficulty and re-evaluation, many current apps lack these advanced goal-setting components. They use a more standard approach of asking initially what level of exercise a user has and it gives static feedback based on the results. They do not take into account dynamic changes in goals or provide systematic re-evaluations to ensure they remain challenging but also achievable as the user's fitness improves

5.3 User Engagement and Retention Strategies

Effective user engagement and retention strategies are crucial for the long-term success of fitness apps. A review by Perski et al. [21] investigated various strategies used by health apps to enhance user engagement and retention. The study found that apps incorporating behavior change techniques, such as self-monitoring, feedback on performance, and social support, were more effective in maintaining user engagement over time. These techniques facilitate a more personalized user experience, encouraging continuous interaction with the app.

Additionally, the study by Amagai et al. [1] complements this by identifying key factors that influence user engagement and retention in mobile health apps. The research revealed that features such as in-app support from peers or coaches, appropriate reminders, and feedback are crucial for keeping users engaged.

In the app analysis, it was determined that fitness apps include basic engagement features such as notifications and reminders, social sharing, and community challenges. However, these features are often lacking the depth and flexibility recommended in the literature. For example, while apps like Nike Training Club and Strava provide social features and motivational content, they do not always offer personalized or adaptable engagement strategies that are tailored to individual user needs. There is a notable difference in the depth of engagement strategies. The literature emphasizes the importance of personalized, flexible engagement techniques and robust social support mechanisms, which are not fully implemented in many current fitness apps. Implementing more nuanced and adaptive engagement strategies could enhance user retention.

5.4 Personalized Notifications and Reminders

Personalized notifications and reminders are effective in maintaining user engagement by providing timely messages to perform health-related activities:

A study by Efendi et al. [24] focuses on the use of personalized notifications and reminders, demonstrating that these features significantly enhance adherence to given exercise routines by maintaining user interest and commitment over longer periods. Another research by McKay et al. [15] supports this by showing that timely and customized reminders can effectively make users engage in health-promoting activities

In practice, it was highlighted in the app analysis that fitness apps offer standard reminders and notifications. For instance, Nike Training Club and Samsung Health send regular notifications to encourage activity. However, these notifications are often not personalized or adapted based on individual user behavior and preferences, reducing their potential effectiveness. The key difference is in the personalization and adaptability of notifications. The literature recommends personalized and context-aware reminders, while current apps tend to use generic notifications. Enhancing these reminders with personalized content could improve user adherence and engagement.

5.5 Social Features and Community Support

Social features significantly contribute to user engagement by bringing a sense of community and support:

Social features and community support are essential for keeping users engaged and committed to use fitness apps. According to a study by Whelan et al. [25], features like community support, social sharing, and interactive elements are important in enhancing user motivation and retention. By building a sense of community, fitness apps can create a supportive environment that helps users stick to their fitness routines. Similarly, a research by Li et al. [13] highlights how social factors, such as peer pressure and social identity can play a key role in keeping users engaged. These studies highlight the need to include strong social features in fitness apps to promote community support and improving user outcomes.

The app analysis revealed that fitness apps include social features such as sharing workout results, participating in challenges, and connecting with friends. Apps like Strava and Nike Training Club are very popular in creating a community atmosphere. However, these features are not always used to their full potential to provide personalized social support and interactions. The difference lies in the depth and personalization of social features. The literature suggests a more integrated approach to social support, tailored to individual user preferences and behaviors, which is often missing in current fitness apps. Strengthening these social connections could lead to better user engagement and retention. The social features present in fitness apps are highly linked to the topic of gamification that we will discuss in the next point.

5.6 Gamification

Gamification is a powerful tool for maintaining user interest and motivation. Gamification elements are effective by making the health journey enjoyable and rewarding:

A study by Wu et al. [27] found that leaderboards can influence how users feel about physical activity and how much they actually exercise by encouraging social comparison. The study suggests that users who perceive their environment as more competitive are more likely to be motivated by leaderboards. However, users with higher self-confidence in their ability to exercise are less influenced by these leaderboards. Additionally, having supportive social networks and easy access to exercise facilities can also positively influence how much users exercise. These insights imply that while leaderboards can be a powerful motivational tool, their effectiveness largely depends on the user's surroundings and personal traits.

Additionally, a study by Koivisto and Hamari [11] reported that gamification features in health apps increased user engagement and prolonged app usage leading to a positive change in behaviour.

In the app analysis, it was seen that apps like MyFitnessPal, Strava and MapMyRun utilize these elements to motivate users. However, the integration of these features often lacks a deeper personalization and adaptability that could enhance their effectiveness. While gamification is prevalent, its potential is not fully exploited in many apps. While literature suggests incorporating varying levels of challenges, more personalized and adaptive gamification strategies that cater to individual user motivations could further enhance engagement and user satisfaction.

5.7 Integration and Interoperability

Integration with other devices and platforms is crucial for providing a comprehensive health-tracking experience since it enhances the functionality and user experience of fitness apps:

A study by Reda et al. [22] analyzed how the integration with other devices and platforms is essential for fitness apps because it significantly boosts their effectiveness and user satisfaction. The combination of data from various sources like wearable devices and health apps can allow users to get a bigger and more complete picture of their health and fitness activities. This integration leads to more accurate and reliable health metrics, which enhances the user experience by making it easier to track all their fitness information in one place. Additionally, integrated data allows for more advanced analytics, providing personalized health and fitness recommendations that can keep users motivated and engaged. This comprehensive data approach also aids in better clinical decision-making and improves interoperability among different health systems, making fitness apps more versatile and valuable. As highlighted by Reda et al., using linked open data approaches addresses the challenge of data fragmentation, ensuring a seamless and efficient user experience.

In the analysis of current fitness apps, it was seen that all fitness apps do integrate with popular wearable devices and other health platforms. For instance, Fitbit and Apple Health provide extensive integration capabilities. However, the level of integration varies, and not all apps offer flawless interoperability with other health systems. The main difference is in the extent and quality of integration. The literature recommends for more comprehensive and seamless integration to provide a global health tracking experience, which is not always achieved by current fitness apps, mainly due to compatibility issues. Thus, enhancing interoperability could improve user

Feature	Recommended in Literature	Currently Implemented in Apps	Similarities	Differences
Personalized Coaching	Real-time adaptability, context-aware personalization	Basic personalization, static feedback	Both offer personalized feedback and plans	Apps lack real-time adaptability and context-aware features
Goal Setting and Feedback	Specific goals, feedback, goal difficulty, re-evaluation	Basic goal setting, regular feedback	Both include goal setting and feedback	Apps often lack goal difficulty and systematic re-evaluation
User Engagement Strategies	Social interactions, real-life coaching, flexible methods	Notifications, social sharing, community challenges	Both include social features and notifications	Apps lack depth and flexibility in engagement strategies
Personalized Notifications	Context-aware, personalized reminders	Standard reminders and notifications	Both provide reminders and notifications	Apps use generic notifications instead of personalized ones
Social Features	Strong community support, personalized interactions	Social sharing, community challenges	Both promote social engagement	Apps often miss personalized social support
Gamification	Personalized, adaptive gamification strategies	Achievements, badges, leaderboards	Both use gamification elements	Apps often lack deeper personalization in gamification
Integration and Interoperability	Comprehensive, seamless integration with other health systems	Integration with popular wearables and health apps	Both offer integration with health devices and apps	Level of integration varies, not always seamless

Fig. 5. Similarities and differences between literature recommendations and current implementations

engagement and satisfaction.

An overview of this section can be found at Fig 5

6 LIMITATIONS

There are several constraints to this study that restrict the wide-reaching aspects of its discoveries. Firstly, the diversity and variety of user data collection systems in different fitness apps will limit the comprehensiveness of the analysis. Each app may use unique methods to gather, store, and utilize user data, making it challenging to create a standardized framework for a thorough analysis. Secondly, reliance on public sources for the app analysis and user reports may introduce bias or result in missing data about the application’s performance and user experience. Public sources might not provide a complete picture of how the apps perform, and user reports can be subjective and inconsistent, leading to potential gaps or inaccuracies in the study. Additionally, the rapid evolution of technology and the fitness app market may lead to some findings becoming less relevant over time. Also, the study focuses solely on fitness apps, excluding other categories such as psychological health, dietary, and chronic condition management apps. Furthermore, privacy concerns and varying national regulations regarding data protection might limit access to user data, reducing the depth and accuracy of the analysis. Lastly, the selection criteria used to identify fitness apps for this study, such as popularity and high user ratings, may introduce a selection bias. The applications that are less popular or new but have potentially innovative and effective features may have been

excluded from the analysis, limiting the scope of the findings to more established popular apps.

7 CONCLUSION

In this study, we investigated the features and user engagement strategies employed by fitness apps and compared them with best practices identified in the literature. The goal was to understand how fitness apps can better utilize user information to enhance engagement and promote sustained fitness behaviors. The analysis revealed several key insights and areas for improvement. The findings indicate that while many fitness apps incorporate basic personalized coaching, goal setting, notifications, social features, and gamification elements, there is a notable gap in the implementation of advanced adaptive features and personalized engagement strategies. The literature strongly encourages real-time adaptability, context-aware personalization, and comprehensive integration with other health systems, which are often underutilized in current fitness apps. Effective user engagement strategies identified in the literature include the use of flexible and less intrusive coaching methods, personalized and context-aware notifications, and robust social support mechanisms. These strategies are crucial for maintaining long-term user engagement and promoting sustained fitness behaviors. Nevertheless, the analysis shows that many fitness apps fall short of these recommendations, often offering static and generic features that do not fully meet the needs and preferences of users.

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APPENDIX

A APP ANALYSIS AND GENERAL INFORMATION

A.1 AI use in this paper

During the preparation of this work the author used ChatGPT in order to :

1. Generate visuals. All the visuals have been created using ChatGPT by providing all the information needed and by specifically asking what to generate.
2. Making the language used in this paper more academic. This has been done by inputting parts of the text and asking the AI to make it more academic in order to enhance the overall quality and language of the entire paper.

After using this tool/service, the author reviewed and edited the content as needed and take(s) full responsibility for the content of the work

A.2 App analysis

The analysis was conducted by visiting the global stores for Apple and Android and reviewing popular free fitness apps. After compiling a list of applications, selection criteria were applied to narrow down the list until 10 apps remained. The relevant findings used in this paper are summarized in the following figure.

App	Key Features
MyFitnessPal	Activity Monitoring, Health Metrics, Nutritional Tracking, Community Interaction, Achievements and Badges, Device Compatibility, Educational Content, Regular Updates
Nike Training Club	Activity Monitoring, Customized Plans, Community Interaction, Progress Sharing, Achievements and Badges, Notifications and Reminders, Interactive Content, Regular Updates
Fitbit	Activity Monitoring, Health Metrics, Adaptive Plans, Dashboards, Achievements and Badges, Challenges, Device Compatibility, Data Protection, Privacy Settings, Success Stories, Regular Updates
Strava	Activity Monitoring, Community Interaction, Achievements and Badges, Leaderboards, Challenges, Device Compatibility, Regular Updates
Google Fit	Activity Monitoring, Health Metrics, Customized Plans, Challenges, Device Compatibility, Notifications and Reminders, Regular Updates
Apple Health	Activity Monitoring, Health Metrics, Dashboards, Device Compatibility, Health Services Integration, Data Protection, Regular Updates
Samsung Health	Activity Monitoring, Health Metrics, Community Interaction, Achievements and Badges, Challenges, Device Compatibility, Notifications and Reminders, Data Protection, Privacy Settings, Regular Updates
MapMyRun	Activity Monitoring, Community Interaction, Achievements and Badges, Challenges, Device Compatibility, Regular Updates
JEFIT	Activity Monitoring, Exercise Logging, Customized Plans, Community Interaction, Support Forums, Achievements and Badges, Device Compatibility, Interactive Content, Regular Updates
Runtastic	Activity Monitoring, Customized Plans, Community Interaction, Achievements and Badges, Device Compatibility, Regular Updates

Fig. 6. Summary Features of each App