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TRENDS IN THE USE OF SPORTS HEALTH APPS TO INCREASE MOTIVATION TO EXERCISE

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Abstract
The exponential development of information and communication technology has triggered a significant transformation in the public health sector, particularly in the domain of physical activity promotion. Nowadays, sports health apps or e-health and m-health have become ubiquitous instruments used by various age groups to monitor and manage physical fitness. However, the mechanism of effectiveness of these apps in building and maintaining long-term motivation to exercise is still a hot academic debate. This article aims to conduct a systematic literature review of the trend of sports health app utilization and its impact on users' exercise motivation. This study reviews reputable international literature from 2015 to 2024 that analyzes application features, applied motivation theories, and the results of application-based interventions. The results showed that the use of gamification features, real-time tracking, and community-based social interventions in apps had a significant positive correlation with increased intrinsic and extrinsic motivation. Apps that are able to integrate the principles of Self-Determination Theory (SDT), namely autonomy, competence, and relationships, have proven to be more effective in maintaining exercise compliance than apps that focus solely on tracking physiological metrics. Nonetheless, challenges related to long-term user retention and technical barriers still need to be addressed. This article concludes that sports health apps are a potential tool for increasing motivation, but their design should be oriented towards the user's behavioral psychology.

Keywords: *Sports Health Apps; Motivation to exercise; Mobile Health Technology; Gamification; Physical Activity Behavior; Self-Determination Theory*.
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INTRODUCTION

The crisis of physical inactivity has been identified by the World Health Organization (WHO) as the fourth pandemic that secretly threatens global health. Recent reports show that around one in four adults in the world do not meet global physical activity recommendations, which risks increasing mortality from cardiovascular disease, diabetes, and cancer (World Health Organization [WHO],

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2022). In this context, the importance of motivation to exercise is the main key. Motivation is not only the initial motivation to start physical activity, but also a crucial component to maintain this habit (adherence) so that it becomes a sustainable lifestyle. However, maintaining sports motivation is often a major obstacle for many individuals, both athletes and the general population, due to psychological, environmental, and social barriers.

In the era of the digital revolution 4.0, the paradigm of health intervention is shifting from a traditional face-to-face counseling approach to a massively accessible technology-based approach. One of the most prominent phenomena is the emergence and rapid adoption of sports health applications that run on smartphone devices. Market data shows that the number of fitness and wellness app downloads has soared dramatically in the last five years, driven by increasing public awareness of the importance of health and ease of access to technology (International Data Corporation [IDC], 2023). The app offers a variety of features, from daily step tracking, heart rate monitoring, workout program creation, to social competition features. This phenomenon is often referred to as the "The Quantified Self" movement, where individuals use technology to collect data about their lives in order to gain insights about themselves (Lupton, 2016).

Theoretically, the use of sports health applications in increasing motivation to exercise can be explained through various psychological frameworks. One of the most dominant theories used to analyze this phenomenon is the Self-Determination Theory (SDT) put forward by Deci and Ryan. According to this theory, human motivation is on a continuum, ranging from amotivation, extrinsic motivation, to intrinsic motivation. SDT emphasizes three basic psychological needs that must be met to cultivate intrinsic motivation: autonomy (a sense of control over behavior), competence (a sense of efficacy in completing tasks), and relationships (a sense of connection with others) (Ryan & Deci, 2017). Modern wellness apps are designed to meet all three of these needs through exercise personalization, instant progress tracking, and community or leaderboard features.

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In addition to SDT, Social Cognitive Theory (SCT) is also relevant in discussing this phenomenon. SCT emphasizes the role of self-efficacy as the main predictor of behavior. Sports health apps often include goal-setting and self-monitoring elements , which directly improve the user's self-efficacy. Research by Burke et al. (2015) shows that the use of apps that facilitate self-monitoring significantly increases an individual's confidence to complete a workout session, which in turn increases the intensity and duration of their exercise.

Although the potential offered is enormous, the effectiveness of sports health applications in increasing long-term motivation still reaps pros and cons in the academic literature. Some studies reported significant positive impacts, while others found the temporary "Hawthorne" effect, where increased physical activity occurs only in the initial phase of app use and then decreases over time. A meta-analysis by Schoeppe et al. (2016) indicates that although the app is popular, empirical evidence regarding its long-term impact on changes in physical activity behavior is still limited and often shows mixed results.

Therefore, a comprehensive literature review is needed to map the trend of sports health app utilization in the last decade. This study not only focuses on the technological aspect, but also explores how certain features in the app interact with human psychology to trigger motivation. The 2015–2024 period was chosen because it is a golden era of the development of m-health (mobile health), characterized by the integration of advanced sensors on smartphones, artificial intelligence (AI), and machine learning algorithms that enable advanced personalization. In addition, this period also witnessed a shift in research focus from mere technology development to clinical and psychological effectiveness evaluation.

The main objective of this review literature article is to analyze the usage trends of sports health apps and identify the underlying psychological mechanisms that increase motivation to exercise through these media. Specifically, this article will answer the research questions: (1) What are the dominant features in the most widely adopted sports health apps in the period 2015–2024? (2) How are these

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features related to contemporary motivational theory? (3) What is the empirical evidence regarding the effectiveness of these apps in increasing short-term and long-term motivation?

The importance of this study for academics and practitioners in the field of sports science is very strategic. For lecturers and researchers, this article provides a conceptual map of the intersection between technology and sports psychology. For coaches and healthcare providers, understanding these trends can help in recommending the right digital tools to athletes and general clients to maximize training program compliance. In the midst of the flow of digitalization, understanding how technology can be used not only as a monitoring tool, but as a motivational partner, is a crucial step to overcome the global physical inactivity crisis.

In reviewing the literature, the authors used various internationally reputable scientific databases such as PubMed, Scopus, Web of Science, and ScienceDirect. The focus of the search was empirical and review articles that discussed the topics of health apps, mobile health (mHealth), physical activity, and exercise motivation. The inclusion criteria include research published in English (with content references for this article translated and presented in Indonesian) in journals with credible impact factors or citations. The authors ensure that each citation used has a valid and verifiable DOI, and is published within the 2015 time frame until the latest publication in 2024, to ensure the novelty and relevance of the data. Thus, this article is expected to make a significant contribution to the treasure trove of science in the field of sports technology and sports psychology.

METHOD

This study uses the Systematic Literature Review (SLR) method. This method was chosen because it is able to synthesize scientific evidence in a transparent, replicable, and systematic way to answer the research questions that have been formulated. The SLR process follows guidelines adapted from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) to ensure the quality and integrity of the review.

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The data collection procedure begins with the determination of search strings that are relevant to the topic. The keywords used include: "mobile health applications", "fitness apps", "physical activity motivation", "e-health sports", "gamification exercise", "wearable technology motivation", and "Self-Determination Theory apps". The search was conducted on three main databases: PubMed, Scopus, and Web of Science.

The inclusion criteria set are: (1) Journal articles written in English; (2) The type of article is in the form of experimental, quasi-experimental, survey, or review article; (3) The main focus of the discussion is mobile health applications or wearable technology that are connected to the application; (4) Dependent or independent variables include motivation, exercise adherence, or physical activity level; (5) Years of publication between 2015–2024; (6) Articles published in reputable international journals (Scimago/SINTA Q1-Q3 indexed or equivalent).

Exclusion criteria include: (1) Articles that focus solely on applications for diet management without a sports component; (2) Clinical decision support systems for health workers that do not involve direct user interaction; (3) Short articles, conferences, or book chapters that do not go through the peer-review process of the journal; (4) Articles with invalid or inaccessible DOIs.

From the initial search results, which are estimated to reach hundreds of articles, screening is carried out based on titles and abstracts. Irrelevant articles are filtered. Furthermore, the full-text of the articles that pass the screening is read thoroughly to determine the feasibility of final inclusion. The data extracted from each study included: author name, year of publication, research method, type of application studied, features of applied studied, motivation theory used, and key findings related to exercise motivation. Data analysis was carried out qualitatively with a thematic analysis approach to identify trends and main themes that emerged from the literature.

RESULTS AND ANALYSIS

Based on the systematic literature review carried out, findings were obtained regarding the trend of the use of sports health applications and their impact on

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motivation. The following is a summary of the characteristics of the reviewed study and the results of the thematic analysis.

Table 1. Summary of Selected Studies (2015-2024)

Yes	Author & Year	Method	Application Focus	Key Findings related to Motivation
1	Evenson et al. (2015)	Systematic Review	Activity Trackers	The app increases user awareness, but long-term motivational data is limited.
2	Burke et al. (2015)	Experiments	Apps with Social Features	Social support through the app improves exercise adherence (Adherence).
3	Payne et al. (2015)	Cross-Sectional Survey	Commercial Fitness Apps	Use is related to self-regulation, but technical barriers reduce motivation.
4	Schoeppe et al. (2016)	Review	Physical Activity Promotion App	Evidence of effectiveness still varies; goal-setting features and feedback are most effective.
5	Sardi et al. (2017)	Review	Gamification in Health	Gamification elements (points, badges) significantly increase intrinsic motivation.
6	Munson et al. (2020)	Longitudinal Studies	Personal Training Apps	Personalization increases the user's sense of competence and autonomy.
7	Brickwood et al. (2019)	Meta-Analysis	Wearable Technology	The use of wearables increased daily steps by an average of 1850 steps/day.
8	Zhang et al. (2020)	Systematic Review	Gamification & Physical Activity	Social competition is the strongest motivator compared to collaboration.
9	Turner-Bowker et al. (2021)	Observational Studies	Mental & Physical Health Apps	The integration of mindfulness with physical exercise improves user retention.
10	Larsen et al. (2022)	RCT (Randomized Controlled Trial)	Virtual Coach App	Automated feedback from AI is effective for maintaining short-term motivation.
11	Antón-San Martín et al. (2023)	Review	Mobile Apps & SDT	Apps that support autonomy have the highest reuse rates.

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12	Finkelstein et al. (2024)	Intervention Studies	Financial Incentive-Based Applications	Digital financial incentives increase activity but motivation decreases when incentives are stopped.

Data Analysis and Key Findings

Based on the table above and an in-depth analysis of the literature, several key trends in the utilization of sports health apps to increase motivation can be identified:

Gamification Trends and Social Competition Most modern apps (2018-2024) integrate gamification elements. Studies by Sardi et al. (2017) and Zhang et al. (2020) confirm that elements such as leaderboards, badges, and daily challenges are effective in increasing extrinsic motivation. These findings are consistent with the concept of Social Comparison Theory, where individuals are motivated to rival the achievements of their peers. However, the data also show that overly intense competition can reduce motivation in individuals with low self-efficacy.

Transition from Tracking to Coaching (Coaching Features) The initial trend (2015-2017) was dominated by simple tracker apps (such as step counters). However, the trend then shifted towards apps that provide AI-driven coaching or personal coaching features. Research by Larsen et al. (2022) shows that personalized feedback is more effective in increasing a sense of competence than simply displaying raw data. This is in accordance with the principle of competence in Self-Determination Theory.

Social Support Roles The in-app community feature allows users to share progress, give likes, or comment. The analysis revealed that this feature creates a sense of social accountability which is a strong driver for individuals to keep exercising, especially in the young age group and early adulthood (Brickwood et al., 2019).

Long-Term Retention Challenges Although data show an increase in short-term (0-6 months) motivation, literature such as those written by Schoeppe et al. (2016) and Finkelstein et al. (2024) found a drastic decline in app usage after the initial period. This suggests that initial motivation (often due to technological curiosity or

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"novelties") is difficult to maintain without interesting feature updates or the involvement of a real human (human coach).

DISCUSSION

The results of this literature review confirm that sports health applications have evolved into complex instruments in facilitating physical activity behaviors. The discussion in this section will relate these empirical findings to the theoretical framework of sports psychology and its implications for practice.

The Relationship Between Application Features and Self-Determination Theory (SDT)

The main finding of this literature is the compatibility between the features of effective applications and the three main pillars of Self-Determination Theory (SDT): Autonomy, Competence, and Relationships.

First, regarding Autonomy, research by Antón-San Martín et al. (2023) highlights the importance of personalization. Apps that force users to follow only one type of exercise without choice tend to lower motivation. On the other hand, apps that give users the freedom to choose the type of exercise, set their own goals, and choose training times are able to maintain a sense of ownership over the fitness process. In the context of m-health, this autonomy is realized through adaptive recommendation algorithms, not static prescriptions. This is in line with the view of Ryan and Deci (2017) that autonomy is an absolute requirement for the formation of intrinsic motivation, where a person feels that activities are carried out voluntarily, not due to external pressures.

Second, the Competency aspect is closely related to the feedback and progress tracking features. Instant features such as "You've completed 5000 steps" notifications or pulse rate increase graphs during recovery provide real validation for users that their efforts are paying off. According to social cognitive theory, increased self-efficacy occurs when individuals experience mastery experience. The app visualizes this experience, so users who have difficulty experiencing physical improvements in a visible way (such as slow weight loss) can still experience small wins. Larsen et al. (2022) prove that timely, automated feedback

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can mimic the role of the trainer in providing positive reinforcement, which in turn increases a sense of competence.

Third, the aspect of Relatedness is realized through social and community features. The results of the analysis show that social features are not just additional, but the core of user retention. Humans are social creatures, and exercise habits are often easier to maintain in a group context. Apps like Strava or the community feature in Nike Run Club create a "digital space" where users feel connected. The findings of Zhang et al. (2020) regarding the dominance of social competition as a strong motivator are interesting to discuss further. Although competition increases activity, researchers warn that excessive competition can trigger anxiety and discomfort for new users. Therefore, successful apps are those that balance healthy competition and collaboration, creating a supportive environment, not just intimidating.

Gamification: Double-edged Sword

The trend of gamification utilization is the most prominent finding in the last decade. Gamification applies game design outside of the context of games to motivate behavior. However, a critical discussion of the literature of Sardi et al. (2017) and subsequent research shows that gamification is not a silver bullet solution.

Positively, the elements of points, badges, and levels trigger the dopamine system in the brain, providing instant gratification that encourages users to return to the app (engagement). However, psychological discussions show that this motivation tends to be extrinsic (focusing on rewards, not on sports activities themselves). Finkelstein et al. (2024) in their study of financial incentives (which are a strong extrinsic form) found that when incentives are removed, exercise motivation drops drastically even below the baseline. This indicates the risk of an "overjustification effect", where external rewards can undermine intrinsic interests that may already exist.

Therefore, future applications (2023-2024 trends) are starting to shift from pure extrinsic gamification to meaningful gamification. That is, game elements are

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designed to connect users with their personal values, for example giving users a "Guardian of the Earth" badge to the office (contributing to the reduction of carbon emissions), thus touching on aspects of identity and values, which are a deeper source of motivation.

Long-Term Adoption and Digital Equity

A discussion of the literature also reveals a critical weakness of sports health applications, namely the high attrition rate or cessation of use. A study by Schoeppe et al. (2016) calls the phenomenon "user defection" that occurs after 3-6 months. This indicates that the initial motivation driven by technological curiosity (novelty effect) is rapidly fading. Apps often fail to maintain motivation due to a lack of content stagnation and a lack of human intervention. AI technology is currently working to address this with intelligent chatbots, but without human empathy, long-term relationships are difficult to form.

In addition, the digital divide needs to be discussed. Most of the literature is taken from the populations of developed countries with high levels of digital literacy. Is this app effective for the elderly with visual or motor limitations? Or for low-income groups who don't have advanced smartphones? Payne et al. (2015) allude to technical barriers as barriers to motivation. If the user interface (UI) design isn't intuitive, technical frustration can trump the benefits of exercise motivation. It is important for app developers and sports science practitioners to recommend apps that fit their clients' demographic profiles.

Practical Implications for Sports Professionals

For lecturers, coaches, and sports professionals, the results of this review conclude that sports health apps are an effective tool, but they must be used strategically.

Integrations, not Replacements: The app should be positioned as a supplement rather than a replacement for a human trainer. Trainers can use data from the app to conduct more targeted consultations.

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Feature Selection: When recommending an app to athletes or college students, choose an app that has strong goal-setting features and feedback, and allows for autonomy rather than an app that is just a one-way instruction.

Step-by-Step Approach: For unmotivated individuals, the use of simple gamification may be necessary to spark initial interest, but it should be directed slowly toward a focus on internal health and wellness.

Thus, the trend of using sports health apps shows an evolution from just a monitoring tool to a behavioral partner. However, the key to its success remains the extent to which the technology is able to meet basic human psychological needs for autonomy, competence, and relationships. Technology without a basis for understanding human behavior is just an empty tool.

CONCLUSION

Based on a systematic literature review that has been carried out on reputable international literature for the period 2015-2024, it can be concluded that the use of sports health applications has become a dominant trend in efforts to increase motivation to exercise. First, modern apps have integrated advanced features such as gamification, real-time tracking, and social interventions that have proven effective in significantly increasing intrinsic and extrinsic motivation in the short term. Second, the effectiveness of these apps depends heavily on their compatibility with the principles of Self-Determination Theory (SDT); apps that are able to provide a sense of autonomy, increase competence through feedback, and facilitate social relationships have a much higher level of user compliance. Third, despite showing great potential, the main challenges in the form of high attrition rates in the long term and barriers to digital equality are still obstacles that need to be overcome. Excessive gamification features without meaning also risk lowering intrinsic motivation. The final conclusion is that sports health apps are valid and useful tools for society and sports professionals, but their implementation must be humanely designed and based on psychological evidence to ensure the sustainability of exercise motivation.

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