

Mobile Fitness Apps in Promoting Habit Formation: A Systematic Literature Review

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Abstract

Background: Mobile fitness applications are increasingly used to promote health behaviors; however, their role in supporting long-term habit formation remains underexplored. **Objective:** This systematic literature review aims to examine how mobile fitness apps contribute to the development and maintenance of health-related habits, particularly in promoting physical activity and diet management, and to identify the motivational mechanisms and design strategies underlying sustainable behavior change. **Methods:** A systematic search and analysis of relevant studies were conducted, focusing on behavior change techniques (BCTs). A conceptual framework was developed to synthesize the findings. **Results:** The review identified a growing trend toward personalized and adaptive design strategies in mobile fitness apps. However, implicit, context-aware interaction strategies were found to be underutilized. While mobile fitness apps demonstrated potential in supporting habit formation, ethical concerns related to passive data collection emerged as a challenge.

Keywords: Mobile Fitness Applications, Physical Activity, Habit Formation, Behavior Change Techniques, eHealth

Introduction

In recent years, there has been a growing global emphasis on healthy lifestyle management. The widespread adoption of fitness tracking applications and the rise of health influencers on social media platforms have fueled public interest in personal health and well-being (Liu & Avello, 2021). Regular physical activity yields substantial benefits at both the individual and societal levels. Individually, it enhances muscular and cardiorespiratory fitness, reduces symptoms of depression and anxiety, and lowers the risk of coronary heart disease. It also plays a critical role in preventing and managing non-communicable diseases such as heart disease, stroke, diabetes, and certain cancers. On a broader scale, physically active societies contribute to environmental and economic benefits, including reduced fossil fuel consumption, cleaner air, and improved public health outcomes (WHO, 2019).

Literature Review

In this context, mobile fitness applications (apps) have emerged as powerful tools to support and sustain healthy behaviors. Their usage has surged, particularly following the COVID-19 pandemic, with an estimated 86.3 million users in the United States alone (Rossi, 2021). These apps—such as Runkeeper, MyFitnessPal, Nike Run Club, and Sworkit—utilize wearable devices, smartphones, and tablets to track physical activity, monitor health metrics, and provide personalized feedback (Vantage Market Research, 2022). Central to their functionality is the premise that real-time tracking and feedback can enhance users' self-awareness and motivation, thereby promoting the adoption of healthier routines (Yfantidou et al., 2024). According to Self-Determination Theory (SDT), sustained behavior change is closely linked to the fulfillment of three basic psychological needs: competence, autonomy, and relatedness (Ryan & Deci, 2000). When these needs are satisfied, individuals are more likely to internalize motivation and persist in behavior change. In the early stages of engagement when intrinsic motivation may be low—extrinsic motivators such as app-based feedback, rewards, or reminders can play a vital role in prompting initial adoption and continued use (Plangger et al., 2019; Molina & Myrick, 2020). For instance, smoking cessation studies have shown that users who receive digital support from apps are more successful in reducing or eliminating their smoking behaviors (Haskins et al., 2017; Morrissey et al., 2019).

Although motivational technologies are being widely trialed, there are challenges in encouraging their long-term use and adoption to develop and sustain users' healthy habits (Parker-Pope, 2020). A key question, however, remains: How do these apps facilitate the formation and maintenance of long-term health habits? The habit formation literature suggests that behaviors can become automatic through repetition and learning, ultimately requiring minimal cognitive effort (Verplanken & Aarts, 1999; Limayem et al., 2007; Bargh, 2014). Once established, such habits enable individuals to act consistently without deliberate intention (Lally et al., 2011). While the above studies contribute to the broader understanding of mobile health technologies, few studies have specifically focused on how mobile fitness apps support the development and maintenance of health-related habits. Therefore, this review aims to fill this gap. Therefore, this systematic literature review aims to explore how mobile fitness apps help users develop and maintain health-related habits. We aimed to synthesize the existing evidence by systematically reviewing the existing mobile fitness app literature from a habit formation perspective to identify incentive mechanisms and design features that contribute to sustained behavior change in areas such as physical activity and dietary management.

Research Methodology

This systematic literature review was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, ensuring transparency and methodological rigor at each stage of the review process (Moher et al., 2015). A comprehensive search was carried out in April 2025 using two major bibliographic databases: Web of Science and Scopus. These databases were selected due to their broad multidisciplinary coverage, high indexing quality, and extensive inclusion of peer-reviewed journal articles relevant to technology, health, and behavioral sciences (Falagas et al., 2008; Singh et al., 2021).

Search Strategy

To identify relevant studies for this systematic literature review, a comprehensive search strategy was developed based on the research focus: mobile fitness applications and their role in promoting habit formation. The search process followed structured logic using Boolean operators to ensure comprehensive coverage of the topic. Specifically: (1) Within each concept category, synonymous keywords were combined using the OR operator, and (2) Keywords across different categories were connected using the AND operator. Accordingly, the general structure of the search string was: ("fitness app") AND ("behavior change" OR "habit*" OR "form habit" OR "formation of habits").

Inclusion and Exclusion Criteria

To ensure the relevance and quality of the studies included in this review, a set of inclusion and exclusion criteria was established based on the study's aim: to explore how mobile fitness applications promote habit formation and sustained behavioral change. All inclusion criteria were strictly applied; only studies meeting all inclusion criteria advanced to the data extraction phase. The criteria are as follows (Table 1):

Table 1

Criteria

Inclusion and exclusion criteria	
Inclusion criteria	IC1: The article focuses on mobile fitness applications used to promote physical activity, health behavior change, or habit formation. IC2: The article presents original empirical research (e.g., experimental, observational, or mixed methods studies). IC3: The article is written in English. IC4: The study was published in a peer-reviewed journal or presented at a peer-reviewed academic conference. IC5: The article contains a substantial amount of original analysis or data, rather than being purely theoretical or a commentary. IC6: The full text of the article is available via institutional access or open access platforms.
Exclusion criteria	EC1: The article focuses primarily on hardware usability (e.g., wearable device sensors) without addressing behavioral outcomes or habit formation. EC2: The article is theoretical only, without evaluating a real mobile fitness app or providing empirical findings related to habit formation. EC3: The article discusses general health apps not specifically aimed at promoting physical activity, exercise, or fitness-related habits.

Paper Selection

A total of 38 articles met all inclusion criteria and were deemed eligible for review. The complete screening process is illustrated in Figure 1. Duplicate records were identified and removed using Microsoft Excel. For each included study, the following predefined information was extracted: (a) first author and year of publication, (b) country, (c) sample characteristics, (d) research methods, (e) study design, (f) type of mobile fitness app examined, (g) key outcome measures, and (h) main findings. During the full-text screening stage, studies were excluded if they lacked sufficient detail regarding the intervention content, did not focus on mobile fitness app use for promoting physical activity or habit formation, or failed to explicitly or implicitly incorporate behaviour change techniques (BCTs).

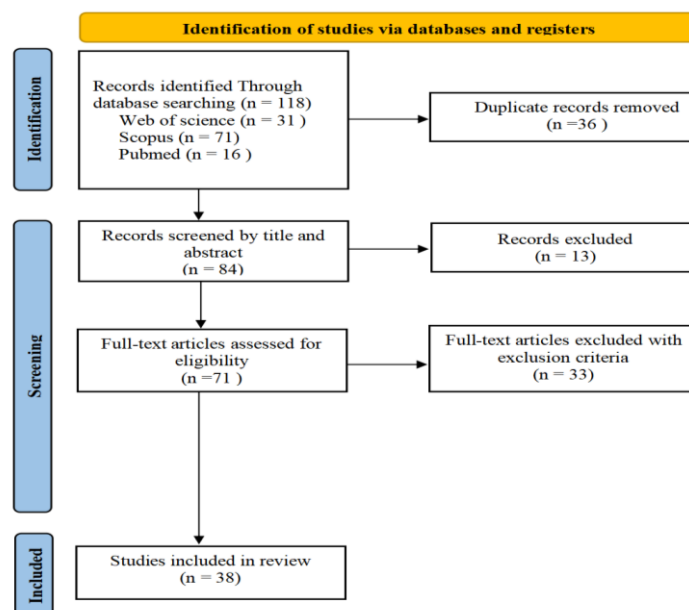


Figure 1. PRISMA Flow Diagram

A total of 38 studies were included and systematically analyzed using the Behaviour Change Techniques Taxonomy version 1 (BCTTv1). This taxonomy, developed by Michie et al. (2013), includes 93 techniques across 16 clusters and provides a validated framework for identifying behavior change components. BCTTv1 has been validated and widely applied in both the design and post-intervention evaluation of digital health interventions, including mobile and web-based platforms (Michie et al., 2015).

Results

Habit and Measurement

Habit refers to the tendency of individuals to perform certain behaviors frequently and repetitively, often without active awareness or intentional decision-making (de Guinea & Markus, 2009). According to Ouellette and Wood (1998), the automatic nature of habits makes them strong predictors of future behavior. Once habits are established, they operate independently of conscious thought, enabling individuals to continue the behavior with minimal cognitive effort. These patterns emerge through consistent repetition, eventually transforming into automatic responses to specific cues. Such automaticity is especially important in the context of sustained technology use, as it lowers the mental effort required to decide whether to use the technology (Anderson & Wood, 2021). Once formed, a habit tends to reinforce behavioral stability and persistence, thereby increasing the likelihood of continued engagement. In the context of health and fitness apps, cultivating habitual app usage can greatly enhance users' continuance intention. When users incorporate fitness app into their daily routines, the apps become embedded in their lifestyle and contribute to ongoing health behaviors (Bellary et al., 2024).

Context Analysis

The context analysis shows a clear upward trend in publications on this topic from 2012 to 2024. Research output was limited before 2016 but grew notably from 2018, peaking that year with seven publications. Interest remained strong from 2019 onward, especially in 2021, 2022, and 2024, highlighting the topic's growing academic relevance (see Figure 2).

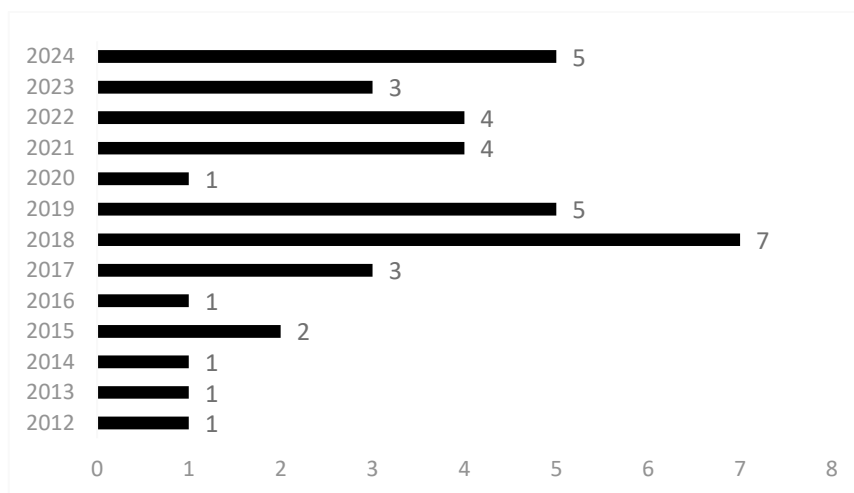


Figure 2. Publication by Year

In terms of geographical distribution, the majority of publications originated from the United States ($n=12$), followed by Canada ($n=6$), Germany and China ($n=4$ each). These countries appear to be the leading contributors to research in this field, indicating a strong academic interest and investment in related health promotion strategies. Other countries such as the United Kingdom, Switzerland, and Japan had minimal representation, suggesting a more regionally concentrated research landscape (see figure 3).

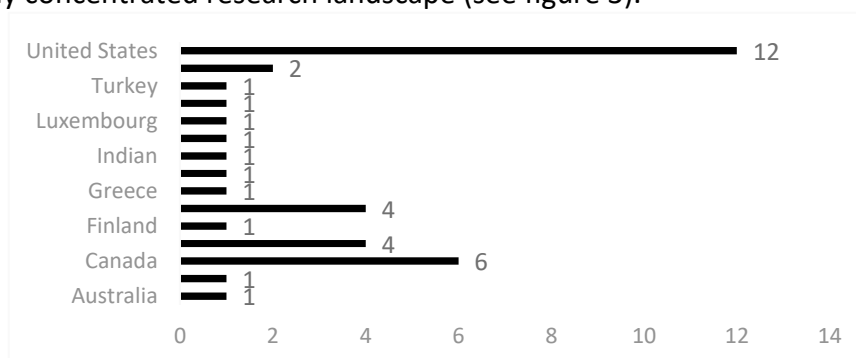


Figure 3. Area Distribution

BCTs Application

Among the 38 selected studies, the most frequently applied BCT group was Feedback and monitoring, led by techniques such as Self-monitoring (24/39, 62%) and Feedback (16/39, 41%), as shown in Figure 4. This group appeared in at least 33 out of 39 studies (85%). This was followed by Goals and planning, featured in Goal setting (25/39, 64%) and Action planning (9/39, 23%), with a total occurrence in approximately 31 studies (79%). These results highlight a predominant use of goal-oriented and self-regulation techniques in mobile fitness application, supported by social and motivational components.

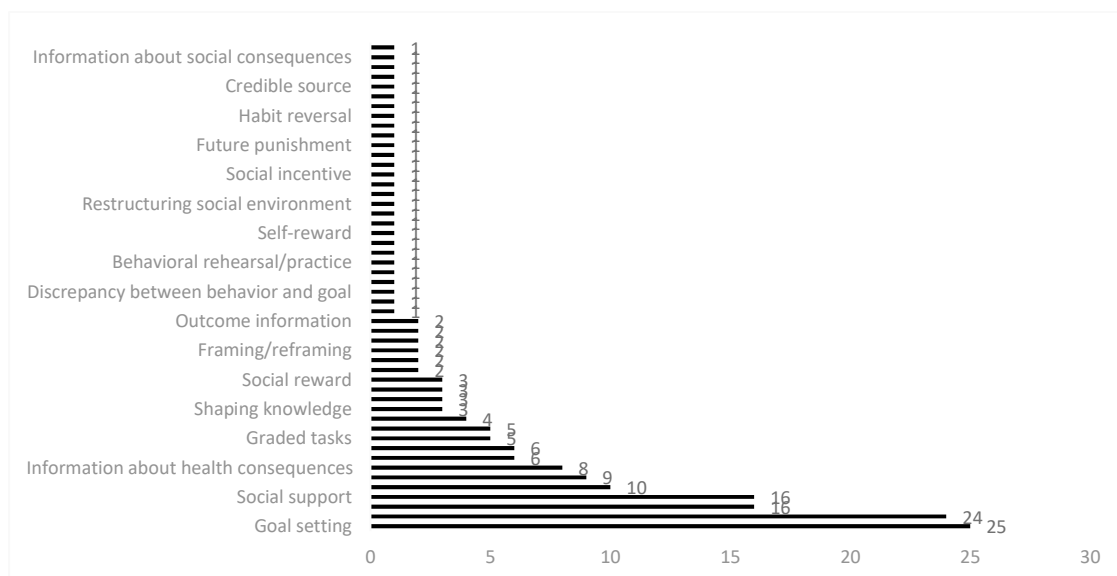


Figure 4. BCTs Frequency

Validation of the Existing Studies

To visually summarize the design objectives and strategies of the 39 included studies, Figure 5 (adapted from Bae et al., 2022; Zhu et al., 2024) highlights their research methods, outcome measures, and validation features. Most studies adopted quantitative approaches, with fewer using qualitative or mixed methods. The primary outcome targeted was physical activity, while fewer studies addressed broader health behaviors or nutrition. In terms of validation strategies, multiple BCTs were most commonly applied, followed by gamification, personalization, and social features. Additionally, user behavior was analyzed from five distinct perspectives.

	Research method			Target outcome		Validation					User behaviour							
Study	Quantitative	Qualitative	Mixed method	Actual use	Physical activity	Health	Nutritional	Context-aware	Personalization	Gamification	Multiple	Rewards	Social	Continuance	Usage	Health	Psychological	User
Balakrishnan et al., (2022)	■				■		■				■					■		
Domin et al., (2022)	■				■				■							■		
Olsen et al., 2019		■			■						■							■
Harrington et al., (2018)		■		■	■						■			■				
Yang et al., (2021)	■				■					■	■				■	■		
Liu,& Willoughby, (2018)	■				■		■				■						■	
Vairavasundaram et al., (2022)	■				■			■	■					■		■		
Lim, J. S., & Noh, G. Y. (2017)	■			■	■						■				■			
Ekpezu et al., (2023)	■				■	■							■			■		
Bellary et al., (2024)			■	■	■						■			■				
Klenk et al., (2017)	■				■				■						■			



Figure 5. Summary of the Research Method, Outcome Measures, and Validation

Design Strategies of Habit Formation Techniques

Habits are formed through repeated behaviors in consistent contexts, progressing through three phases: initiation, learning, and stability (Verplanken, 2006; Gardner et al., 2012). In the initiation phase, individuals decide to act and select a context. Motivation, small goals, and simple actions are key to initiating behavior. In the learning phase, consistent repetition in the same context strengthens situational-behavior links, leading to automaticity (Lally & Gardner, 2013). Over time, behaviors become cue-driven and less reliant on conscious intentions. In the stability phase, habits persist automatically even with reduced motivation, supporting long-term behavior maintenance (Gardner et al., 2012; Lally & Gardner, 2013).

Design Strategies Aligned with Habit Phases

Table 2 maps common behavior change techniques (BCTs) in mobile fitness apps across three habit formation phases: Initial, Learning, and Stability. This categorization, grounded in behavioral theory and evidence, illustrates how digital interventions support sustained health behaviors like regular physical activity. Although personalization is widely recognized as a key design strategy, its role in sustaining user engagement and long-term behavior change remains underexplored. Recent studies have demonstrated that adaptive goal setting (e.g., Zhou et al., 2020) and interface personalization (e.g., Adibuzzaman et al., 2022) can enhance habit retention by aligning app features with individual needs and performance trajectories.

Table 2

BCTs and Features during Habit Formation Processing

Phase	Common BCTs or Features	Example	Reference
Initial	- Goal setting (1.1) - Instruction on how to perform behavior (4.1) - Information about health consequences (5.1) - Motivation prompts (7.1) - Educational content	- Initial goal-setting interface - Educational modules (e.g., exercise demonstration videos) - Health risk alerts - Motivational notifications - Onboarding guidance or interactive Q&A	Villalobos-Zúñiga et al., (2021); Huang & Ren, (2020); Alturki & Gay, (2019); Kuru, (2024); Kebede et al., (2019); Oyibo & Vassileva (2019a); Oyibo & Vassileva (2019b).
Learning	- Self-monitoring (2.3) - Feedback on behavior (2.2) - Social comparison (6.2) - Personalized feedback - Rewards/incentives (10.4) - Gamification elements	- Activity/meal logging and tracking charts - Daily behavior feedback and progress analysis - Leaderboards and friend challenges - Tailored content and reminders - Game-like features (levels, badges)	Southcott & Jooste, (2024); Xia et al., (2019); Chen et al., (2016); Angelides et al., (2018); Lister et al., 2014; Yin et al., (2022); Oyibo & Vassileva (2019a); Oyibo & Vassileva (2019b); Bellary et al., (2024)
Stability	- Habit formation (8.3) - Identity associated with behavior (13.1) - Environmental restructuring (12.1) - Prompts/cues (7.1) - Context-aware personalization	- Integrating behavior into daily routine (e.g., exercising after waking up) - Identity reinforcement through labels (e.g., "I'm a runner") - Environment adjustment to support behavior (e.g., deskhydration reminders) - Time-/location-sensitive smart prompts	Kuru, (2024); Lister et al., (2014); Mao et al., 2023; Vairavasundaram et al., (2022); Olsen et al., (2019); Yfantidou et al., (2024)

Research Framework

The proposed conceptual framework (Table 3) integrates Self-Determination Theory (SDT) with the habit formation process by aligning psychological needs (autonomy, competence, relatedness) with the three key phases of behavior change: Initiation, Learning, and Stability. It systematically maps representative Behavior Change Techniques (BCTs) such as goal setting,

feedback, and social comparison — to each phase, and illustrates how concrete app features (e.g., personalized plans, habit tracking, achievement badges, and social cues) can support sustained engagement and long-term health behavior formation.

Table 3

Habit Formation Framework

SDT	Phase 1: Initiation		Phase 2: Learning	Phase 3: Stability
Autonomy	Goal setting		Personalized plan	Context-aware cues
	Provide choice		Self-reflection	Routine integration
	Rationale		planning	Habit auto-tracking
Competence	Instruction		Graded tasks	Habit strength
	Small challenges		Informative feedback	Self-efficacy focus
	Feedback		Achievement badges	Mastery reflection
Relatedness	Onboarding	with peer	Social comparison	Group challenges
	invitation		Likes, comments	Social recognition
	User stories			Community streaks

Limitation

While we employed the standard systematic review methodology to identify relevant articles, there are still some limitations in this study, such as the scope of the databases and the availability of data perspectives. Since our focus is on reviewing the design implementations of Behavior Change Techniques (BCTs), they could have been more targeted to the design processes and techniques of interventions. Another limitation is that we only focus on the English language. Therefore, future research could expand by considering the efficacy of individual techniques or combinations of BCTs.

Conclusion

This systematic review examines how mobile fitness apps support habit formation for physical activity through behavior change strategies. It highlights a gap between theoretical frameworks and practical design implementations and proposes a conceptual framework outlining effective habit-supportive features. Personalized, user-centered designs are increasingly emphasized, while implicit, context-aware interactions remain underexplored. Ethical concerns around passive data collection are also noted. The findings offer guidance for designing apps that foster long-term engagement, with future research encouraged to focus on cue-behavior associations through adaptive technologies. Future research is encouraged to explore cue-behavior associations using advanced technologies such as wearable sensors and AI-driven personalization, which enable real-time detection of behavioral patterns and adaptive intervention delivery. In addition, longitudinal study designs are recommended to better understand how these dynamic app features influence habit consolidation over time.

References

- Alturki, R., & Gay, V. (2019). The development of an Arabic weight-loss app Akser Waznk: Qualitative results. *JMIR Formative Research*, 3(1), e11785.
- Anderson, I. A., & Wood, W. (2021). Habits and the electronic herd: The psychology behind social media's successes and failures. *Consumer Psychology Review*, 4(1), 83–99.
- Angelides, M. C., Wilson, L. A. C., & Echeverría, P. L. B. (2018). Wearable data analysis, visualisation and recommendations on the go using Android middleware. *Multimedia Tools and Applications*, 77(20), 26397–26448.
- Azar, K. M., Lesser, L. I., Laing, B. Y., Stephens, J., Aurora, M. S., Burke, L. E., & Palaniappan, L. P. (2013). Mobile applications for weight management: Theory-based content analysis. *American Journal of Preventive Medicine*, 45(5), 583–589.
- Bae, S. S., Zheng, C., West, M. E., Do, E. Y. L., Huron, S., & Szafir, D. A. (2022, April). Making data tangible: A cross-disciplinary design space for data physicalization. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems* (pp. 1–18).
- Balakrishnan, P., Owen, E., Eberl, M., Friedrich, B., & Etter, T. (2022). A retrospective real-world observational pilot analysis of Waya: A self-monitoring fitness app in Germany. *Cardiovascular Endocrinology & Metabolism*, 11(3), e0266.
- Bargh, J. A. (2014). The four horsemen of automaticity: Awareness, intention, efficiency, and control in social cognition. In *Handbook of social cognition* (pp. 1–40). Psychology Press.
- Bellary, S., Bala, P. K., & Chakraborty, S. (2024). Exploring cognitive-behavioral drivers impacting consumer continuance intention of fitness apps using a hybrid approach of text mining, SEM, and ANN. *Journal of Retailing and Consumer Services*, 81, 104045.
- Chen, Y., Randriambelonoro, M., Geissbuhler, A., & Pu, P. (2016, February). Social incentives in pervasive fitness apps for obese and diabetic patients. In *Proceedings of the 19th ACM Conference on Computer Supported Cooperative Work and Social Computing Companion* (pp. 245–248).
- De Cock, N., Vangeel, J., Lachat, C., Beullens, K., Vervoort, L., Goossens, L., ... & Van Lippevelde, W. (2017). Use of fitness and nutrition apps: Associations with body mass index, snacking, and drinking habits in adolescents. *JMIR mHealth and uHealth*, 5(4), e6005.
- Deci, E. L., & Ryan, R. M. (2008). Facilitating optimal motivation and psychological well-being across life's domains. *Canadian Psychology / Psychologie Canadienne*, 49(1), 14.
- Domin, A., Uslu, A., Schulz, A., Ouzzahra, Y., & Vögele, C. (2022). A theory-informed, personalized mHealth intervention for adolescents (mobile app for physical activity): Development and pilot study. *JMIR Formative Research*, 6(6), e35118.
- Ekpezu, A. O., Wiafe, I., & Oinas-Kukkonen, H. (2023). Enhancing perceived health competence: The impact of persuasive social support features in health and fitness apps. *International Journal of Human–Computer Interaction*, 40(23), 8076–8090.
- Falagas, M. E., Pitsouni, E. I., Malietzis, G. A., & Pappas, G. (2008). Comparison of PubMed, Scopus, Web of Science, and Google Scholar: Strengths and weaknesses. *The FASEB Journal*, 22(2), 338–342.
- Gardner, B., Lally, P., & Wardle, J. (2012). Making health habitual: The psychology of habit-formation and general practice. *British Journal of General Practice*, 62(605), 664–666.
- Gowin, M., Cheney, M., Gwin, S., & Franklin Wann, T. (2015). Health and fitness app use in college students: A qualitative study. *American Journal of Health Education*, 46(4), 223–230.

- Harrington, C. N., Wilcox, L., Connelly, K., Rogers, W., & Sanford, J. (2018, May). Designing health and fitness apps with older adults: Examining the value of experience-based co-design. In *Proceedings of the 12th EAI International Conference on Pervasive Computing Technologies for Healthcare* (pp. 15–24).
- Haskins, B. L., Lesperance, D., Gibbons, P., & Boudreaux, E. D. (2017). A systematic review of smartphone applications for smoking cessation. *Systematic Reviews*, 7, 292.
- Huang, G., & Ren, Y. (2020). Linking technological functions of fitness mobile apps with continuance usage among Chinese users: Moderating role of exercise self-efficacy. *Computers in Human Behavior*, 103, 151–160.
- Ichino, J., Miyazaki, M., & Tanaka, K. (2023). How personalization algorithm changes consumer behaviors in the digital healthcare service. In *Leveraging Transdisciplinary Engineering in a Changing and Connected World* (pp. 3–12). IOS Press.
- Kebede, M., Steenbock, B., Helmer, S. M., Sill, J., Möllers, T., & Pischke, C. R. (2019). Identifying evidence-informed physical activity apps: Content analysis. *JMIR mHealth and uHealth*, 6(12), e10314.
- Klenk, S., Reifegerste, D., & Renatus, R. (2017). Gender differences in gratifications from fitness app use and implications for health interventions. *Mobile Media & Communication*, 5(2), 178–193.
- Kuru, H. (2024). Identifying behavior change techniques in an artificial intelligence-based fitness app: A content analysis. *Health Education & Behavior*, 51(4), 636–647.
- Lally, P., & Gardner, B. (2013). Promoting habit formation. *Health Psychology Review*, 7(sup1), S137–S158.
- Lally, P., Wardle, J., & Gardner, B. (2011). Experiences of habit formation: A qualitative study. *Psychology, Health & Medicine*, 16(4), 484–489.
- Lim, J. S., & Noh, G. Y. (2017). Effects of gain-versus loss-framed performance feedback on the use of fitness apps: Mediating role of exercise self-efficacy and outcome expectations of exercise. *Computers in Human Behavior*, 77, 249–257.
- Limayem, M., Hirt, S. G., & Cheung, C. M. K. (2007). How habit limits the predictive power of intention: The case of information systems continuance. *MIS Quarterly*, 31(4), 705–737.
- Lister, C., West, J. H., Cannon, B., Sax, T., & Brodegard, D. (2014). Just a fad? Gamification in health and fitness apps. *JMIR Serious Games*, 2(2), e3413.
- Liu, S., & Willoughby, J. F. (2018). Do fitness apps need text reminders? An experiment testing goal-setting text message reminders to promote self-monitoring. *Journal of Health Communication*, 23(4), 379–386.
- Liu, Y., & Avello, M. (2021). Status of the research in fitness apps: A bibliometric analysis. *Telematics and Informatics*, 57, 101506.
- Mao, C., Bayer, J. B., Ross, M. Q., Rhee, L., Le, H. T., Mount, J., ... & Hovick, S. R. (2023). Perceived vs. observed mHealth behavior: A naturalistic investigation of tracking apps and daily movement. *Mobile Media & Communication*, 11(3), 526–548.
- Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., Hardeman, W., ... & Wood, C. E. (2013). The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: Building an international consensus for the reporting of behavior change interventions. *Annals of Behavioral Medicine*, 46(1), 81–95.
- Michie, S., Wood, C. E., Johnston, M., Abraham, C., Francis, J., & Hardeman, W. (2015). Behaviour change techniques: The development and evaluation of a taxonomic method for reporting and describing behaviour change interventions. *Health Technology Assessment*, 19(99), 1–188.

- Moher, D., Shamseer, L., Clarke, M., Gherzi, D., Liberati, A., Petticrew, M., ... & PRISMA-P Group. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews*, 4, 1–9.
- Molina, M. D., & Myrick, J. G. (2020). The “how” and “why” of fitness app use: Investigating user motivations to gain insights into the nexus of technology and fitness. *Sport in Society*, 24(7), 1–16.
- Morrissey, C., Shephard, A., Van Houdt, A., Kerr, D., & Barrett, S. P. (2019). Using "smart" technology to aid in cigarette smoking cessation: Examining an innovative way to monitor and improve quit attempt outcomes. *Journal of Smoking Cessation*, 14, 149–154.
- Olsen, S. H., Saperstein, S. L., & Gold, R. S. (2019). Content and feature preferences for a physical activity app for adults with physical disabilities: Focus group study. *JMIR mHealth and uHealth*, 7(10), e15019.
- Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin*, 124(1), 54.
- Oyibo, K. (2021). The relationship between perceived health message motivation and social cognitive beliefs in persuasive health communication. *Information*, 12(9), 350.
- Oyibo, K., & Vassileva, J. (2019a). Investigation of persuasive system design predictors of competitive behavior in fitness application: A mixed-method approach. *Digital Health*, 5, 2055207619878601.
- Oyibo, K., & Vassileva, J. (2019b). Investigation of the moderating effect of race-based personalization of behavior model design in fitness application. *SN Applied Sciences*, 1(9), 1118.
- Oyibo, K., & Vassileva, J. (2021). Relationship between perceived UX design attributes and persuasive features: A case study of fitness app. *Information*, 12(9), 365.
- Oyibo, K., Adaji, I., & Vassileva, J. (2018). Social cognitive determinants of exercise behavior in the context of behavior modeling: A mixed method approach. *Digital Health*, 4, 2055207618811555.
- Oyibo, K., Adaji, I., Orji, R., Olabenjo, B., Azizi, M., & Vassileva, J. (2018, July). Perceived persuasive effect of behavior model design in fitness apps. In *Proceedings of the 26th Conference on User Modeling, Adaptation and Personalization* (pp. 219–228).
- Parker-Pope, T. (2020). How to build healthy habits. *The New York Times*.
- Payne, H. E., Moxley, V. B., & MacDonald, E. (2015). Health behavior theory in physical activity game apps: A content analysis. *JMIR Serious Games*, 3(2), e4187.
- Plangger, K., Campbell, C., Robson, K., & Montecchi, M. (2019). Little rewards, big changes: Using exercise analytics to motivate sustainable changes in physical activity. *Information & Management*. <https://doi.org/10.1016/j.im.2019.103216>
- Rossi, M. (2021). Digital health: Usage of innovative mobile technologies for health and wellness.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68.
- Singh, V. K., Singh, P., Karmakar, M., Leta, J., & Mayr, P. (2021). The journal coverage of Web of Science, Scopus and Dimensions: A comparative analysis. *Scientometrics*, 126, 5113–5142.

- Southcott, E., & Jooste, J. (2024). Unveiling the impact of mobile fitness applications on motivational orientation in sustaining exercise behaviors: A qualitative investigation. *Physical Culture and Sport*, 103(1), 1–14.
- Vairavasundaram, S., Varadarajan, V., Srinivasan, D., Balaganesh, V., Damerla, S. B., Swaminathan, B., & Ravi, L. (2022). Dynamic physical activity recommendation delivered through a mobile fitness app: A deep learning approach. *Axioms*, 11(7), 346.
- Vantage Market Research. (2022). Global fitness app market size & share to surpass \$15.2 Bn by 2028. Retrieved April 13, 2025,
- Verplanken, B. (2006). Beyond frequency: Habit as mental construct. *British Journal of Social Psychology*, 45(3), 639–656.
- Verplanken, B., & Aarts, H. (1999). Habit, attitude, and planned behaviour: Is habit an empty construct or an interesting case of goal-directed automaticity? *European Review of Social Psychology*, 10(1), 101–134.
- Villalobos-Zúñiga, G., Rodríguez, I., Fedosov, A., & Cherubini, M. (2021, September). Informed choices, progress monitoring and comparison with peers: Features to support the autonomy, competence and relatedness needs, as suggested by the self-determination theory. In *Proceedings of the 23rd International Conference on Mobile Human-Computer Interaction* (pp. 1–14).
- West, J. H., Hall, P. C., Hanson, C. L., Barnes, M. D., Giraud-Carrier, C., & Barrett, J. (2012). There's an app for that: Content analysis of paid health and fitness apps. *Journal of Medical Internet Research*, 14(3), e72.
- World Health Organization. (2019). Global action plan on physical activity 2018–2030: More active people for a healthier world. World Health Organization.
- Yfantidou, S., Yfantidou, G., Balaska, P., & Vakali, A. (2024). Negotiation strategies in ubiquitous human-computer interaction: A novel storyboards scale & field study. *Multimedia Tools and Applications*, 1–35.
- Yin, S., Cai, X., Wang, Z., Zhang, Y., Luo, S., & Ma, J. (2022). Impact of gamification elements on user satisfaction in health and fitness applications: A comprehensive approach based on the Kano model. *Computers in Human Behavior*, 128, 107106.
- Zhang, M., & Li, X. (2024). Maintaining healthy lifestyle through fitness app use: A parallel mediation model from a nationwide survey. *Digital Health*, 10, 20552076241277483.
- Zhou, M., Mintz, Y., Fukuoka, Y., Goldberg, K., Flowers, E., Kaminsky, P., ... & Aswani, A. (2018, March). Personalizing mobile fitness apps using reinforcement learning. In *CEUR Workshop Proceedings* (Vol. 2068).
- Zhu, Y., Long, Y., Wang, H., Lee, K. P., Zhang, L., & Wang, S. J. (2024). Digital behavior change intervention designs for habit formation: Systematic review. *Journal of Medical Internet Research*, 26, e54375.