Mapping the landscape of digital health tool measures for monitoring and managing modifiable lifestyle behaviors to promote metabolic health: A scoping review

Victoria Brügger [1], Tobias Kowatsch[1, 2, 3], Mia Jovanova[1]

Institutions

[1] School of Medicine, University of St. Gallen, St. Gallen, Switzerland

[2] Centre for Digital Health Interventions, Department of Management, Technology and Economics, ETH Zürich, Zurich, Switzerland

[3] Institute for Implementation Science in Health Care, University of Zurich, Zurich, Switzerland

Abstract

Context | Metabolic health presents a complex, multifactorial system that is influenced by various factors, including nutrition, physical activity, sleep, and stress [1,2]. As metabolic health issues and its comorbidities rises drastically, there is a pressing need to explore innovative solutions to monitor modifiable risk factors (i.e. blood glucose and lifestyle factors) in real time[3,4,5] and to deploy effective interventions to modify these factors [6]. Promising interventions increasingly employ digital health tools (i.e., wearables and mobile applications) in individuals' day-to-day lives [7]. However, the degree to which digital health tools are used to target modifiable risk factors, and what measures they employ to track these factors remains unclear [1,8]. Assessing the degree to which studies target single (vs. multi-component) factor(s) is key considering recent evidence that supports the effectiveness of multi-factorial, lifestyle interventions for metabolic health [9]. Further, looking at the variability in measures is critical to allow for the comparability of different studies, and their potential effect sizes[10]. To address these gaps, we examine the following questions: (1) what modifiable risk factors and combinations, are most prevalent in empirical studies using digital health tools? (2) what measures are currently used for monitoring lifestyle factors (3) to what degree are operationalizations of these measures standardized vs. heterogeneous?

Methods | We are conducting a scoping review using the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) checklist and follow the scoping review framework [11]. Databases such as Scopus, Web of Science, ScienceDirect, PubMed, ACM Digital Library, and IEEE Xplore are utilized to search for relevant studies. These searches are based on predefined eligibility criteria, limited to peer-reviewed studies published in English from January 1, 2018, to December 31, 2023. The search strategy is based on digital health tools and metabolic risk factors adapted from prior work [3].

Expected results | This scoping review, to the best of our knowledge, is among the first to comprehensively summarize the landscape of how digital health tools capture lifestyle factors related to metabolic health, and the extent to which measures are standardized across studies. We look forward to presenting our results in poster format at ISRII.

Conclusion & Implications | This research contributes to the body of knowledge in digital health interventions in metabolic health by quantifying the variability in methods for obtaining risk factors and metrics from digital health tools. Consolidating the existing literature will help identify potential gaps in language among researchers and new opportunities for measurement standards to enhance the replicability and the generalizability of interventions.

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