

Evaluating Perfect Fit: A virtual coach-based mHealth intervention for smoking cessation and physical activity

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Publication date

2025

Document Version

Final published version

Citation (APA)

van Vliet, M., Versluis, A., Chavannes, N. H., Scheltinga, B., Albers, N., Penfornis, K. M., Baccinelli, W., & Meijer, E. (2025). *Evaluating Perfect Fit: A virtual coach-based mHealth intervention for smoking cessation and physical activity*. 44-45. Abstract from Supporting Health by Technology Conference. <https://www.healthbytech.com/abstract-book-2025-final.pdf>

Important note

To cite this publication, please use the final published version (if applicable). Please check the document version above.

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Background: The World Health Organization identifies low medication adherence as a significant factor contributing to elevated morbidity and mortality rates among hypertensive patients. Smart Virtual Assistants (SVA) devices are becoming more common in households, presenting opportunities to implement voice-activated interventions designed to mitigate behavioral patterns associated with medication non-adherence. Thus, the aim of this study was to develop and evaluate the usability of the most commercially available SVA device, as part of the InTakeCare platform, to monitor medication adherence in chronic patients.

Methods: The InTakeCare platform is a modular and scalable platform composed by a cloud database, an online server and a series of modules for user interaction. A skill was developed for the intended device, along with a connected web dashboard that enabled physicians' access and management of the therapies of their patients. Participants were asked to complete a survey capturing their sociodemographic details and the eHealth Literacy Scale (IT-eHEALS) questionnaire. Subsequently, physicians inserted prescribed medications, dosages, and scheduled intake times into the web dashboard. Information was synchronized with the participants' SVA device, setting reminders at the defined time and 55 minutes later. Patients were required to vocally confirm their medication intake within a 120-minute window around the scheduled time. After seven days, participants underwent a semi-structured interview, including the System Usability Scale (SUS) questionnaire.

Findings: The study included fifteen subjects (11M; 4F), with median (25th; 75th) age 67 (57; 67) years old. IT-eHEALS scores reported a median value of 27 (21; 31.5). Post-experiment SUS questionnaire yielded a median score of 72.5 (55; 85), above the literature threshold of 68. The semi-structured interview reported high interest and perceived innovation, together with lack of trust towards the company producing the SVA device and presence of difficulties in the communication with the devices.

Discussion: Participants were satisfied with the usability of the skill, viewed as engaging and interactive, with strong interest in vocal interaction. However, difficulties were reported in correctly interfacing with the SVA device vocal system, and the skill was not identified as easy to use. Further research is needed to better understand and address these issues, with the goal of enhancing vocal interaction and evaluating its effectiveness in monitoring medication adherence among hypertensive patients.

Evaluating Perfect Fit: A virtual coach-based mHealth intervention for smoking cessation and physical activity.

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Background: Mobile health (mHealth) interventions with virtual coaches (i.e. AI conversational agents) offer scalable, cost-effective solutions for promoting health behavior change. However, these interventions often present challenges such as insufficient personalization and lack of evidence-based approaches. Perfect Fit (PF), a personalized mHealth intervention with a text-based virtual coach, supports adults in simultaneously quitting smoking and increasing physical activity. Through innovative techniques (e.g. sensor technology), iterative development involving end-users, and integrating evidence-based techniques,

PF aimed to overcome common challenges faced by mHealth interventions with virtual coaches. The study examined the feasibility, acceptability, and preliminary effectiveness of PF.

Methods: A single-arm, mixed-method, real-world evaluation study was conducted in the Netherlands with 100 adults who smoke. The intervention duration was personalized, averaging approximately 16 weeks. Data were collected at baseline, post-intervention, and two-month follow-up. Quantitative data included usage data and self-report questionnaires on feasibility, acceptability, preliminary effectiveness, and participant characteristics (e.g. socioeconomic position, eHealth literacy). Qualitative data consisted of post-intervention semi-structured interviews with a subsample. Descriptive analyses, generalized linear mixed models (for the quantitative data), and the Framework Approach (for the qualitative data) were used for data analysis. Quantitative and qualitative data were integrated during interpretation.

Findings: Thirty-eight percent of participants had either no or low PF usage, 34% had moderate usage, and 28% had high usage. PF was rated as moderately feasible and acceptable at post-intervention ($n=77$). At the two-month follow-up, 35% ($n=35$) of participants self-reported smoking abstinence. High-usage participants had the highest likelihood of smoking abstinence (61.5%), followed by moderate-usage participants (46.7%), and low-usage participants (22.7%; $p<.05$). Participants also reported a significant increase in physical activity between baseline and two-month follow-up ($p<.001$; *Cohen's d*=.458), with no significant differences between usage groups. Qualitative analysis of the semi-structured interviews ($n=12$) revealed that most participants tailored PF use to their preferences and appreciated the combined focus on smoking cessation and physical activity. The virtual coach offered anonymity, which was positively experienced by some (e.g. non-judgmental) but negatively by others (e.g. reduced accountability). Suggested improvements included a more human-like coach (e.g., less repetitive and more in-depth responses and reflections) and fewer technical issues to enhance usage and effectiveness.

Discussion: The findings demonstrate the potential of interventions like PF as strategies for multiple health behavior change, contributing to chronic disease prevention and public health promotion. Identified areas for improvement in PF provide valuable insights for the future development of mHealth interventions.

Reporting, representation and subgroup analysis in studies assessing consumer wearable validity: a scoping review

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Background: Consumer wearables provide promising opportunities for early detection and prevention of disease through continuous remote monitoring of vital signs. In many cases, however, the validity of the measurements from these devices is unknown and thus has to be assessed. User characteristics like sex, age, BMI and skin tone could influence the validity of wearable sensors. Therefore, it is important that studies assessing this validity: 1) report the distribution of these characteristics in their study population; 2) ensure representation of different categories of these characteristics within the study and across studies; 3) perform appropriate subgroup analysis to investigate differences in validity outcomes between categories. It is currently unclear to what extent these user characteristics are reported and represented in consumer wearable validation studies and which analysis methods are used to investigate the influence of these characteristics. This scoping review aims to map the current reporting, representation, subgroup