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Editorial

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A mobile health application that supports a patient centered approach to cardiovascular risk management

Digital health tools have the potential to support patients in managing their chronic diseases. Recently, Ullrich and colleagues (2025) introduced *PreventiPlaque*, a mobile health application that provides patients with up-to-date ultrasound images of their carotid plaques and tracks their lifestyle habits. Through a randomized controlled trial, the authors provide evidence of PreventiPlaque's efficacy in improving patients' cardiovascular risk profiles. This study highlights the potential for digital health interventions to provide personalized health information to patients and empower them to take actionable steps to improve their cardiovascular health.

Cardiovascular disease remains the leading cause of mortality worldwide[1]. Cardiovascular risk factor management, including the treatment of hypertension, dyslipidemia, and diabetes, along with lifestyle modifications such as eating a healthy diet, regular physical activity, and smoking cessation, are critical to preventing adverse cardiovascular events[2]. However, long-term adherence to optimal lifestyle and medical management of cardiovascular risk factors can be challenging for patients due to inadequate health education, insufficient motivation, and/or financial challenges, among other factors[3].

Digital health interventions may help patients overcome those barriers via self-empowerment, allowing patients to take a more active role in managing their chronic conditions[4]. Recently, Ullrich and colleagues conducted a clinical trial to evaluate the *PreventiPlaque* mobile health application, designed to support the patient-centred management of cardiovascular risk factors[5]. In this article, we highlight key findings from Ullrich et al.'s study and discuss the potential for digital health interventions to empower patients in managing their chronic diseases.

The *PreventiPlaque* mobile health application

As described by Ullrich and colleagues, *PreventiPlaque* is an application that patients can use on their own smartphones[5]. It compiles up-to-date ultrasound images of patients' carotid plaques captured during routine clinical follow-up visits. Carotid plaque burden is highlighted on the images, allowing patients to monitor the progression of their atherosclerotic disease[5]. Carotid plaques were likely chosen as the focal point because they generally provide a good representation of a patient's overall atherosclerotic burden and are relatively easy to capture longitudinally and non-invasively through ultrasound[6]. Additionally, *PreventiPlaque* enables patients to track their physical activity, diet, medication adherence, and smoking habits[5]. Patients, generally in consultation with their clinicians, set daily goals for each category and once all the tasks are completed, there is a colour change from red to green, which incentivizes them to reach their goals in an interactive, game-like format[5]. This may motivate patients to take a more active approach in optimizing their lifestyle habits to reduce their atherosclerotic burden, thereby improving their cardiovascular health[5].

Key findings from the *PreventiPlaque* clinical trial

Ullrich and colleagues performed a single-centre randomized controlled trial in Germany to evaluate the impact of *PreventiPlaque* usage on cardiovascular risk profiles[5]. The authors recruited 240 patients with atherosclerotic cardiovascular disease, including coronary, peripheral, and cerebrovascular disease[5]. Ultrasound evidence of carotid atherosclerotic plaque was required for study inclusion[5]. The authors randomly allocated 121 patients to the intervention group and 119 patients to the control group[5]. The intervention group was given access to *PreventiPlaque* and received instructions on using the application, while the control group did not have access to *PreventiPlaque*[5]. Both groups received optimal guideline-directed medical treatment and underwent carotid ultrasound examinations at their 3-, 6-, 9-, and 12 month follow-up visits, a routine practice at the study centre[5]. The primary outcome was the change in patients' cardiovascular risk profiles over a 12-month period, as measured by Systematic Coronary Risk Evaluation 2 (SCORE2)[7]. SCORE2 estimates the 10-year risk of cardiovascular disease by considering multiple factors, including the patient's age, sex, smoking habits, cholesterol levels, and systolic blood pressure[7]. The authors found that SCORE2 risk decreased significantly over the study period in the intervention group but not the control group[5]. In the intervention group, the authors also found a significant decrease in low-density lipoprotein cholesterol and systolic blood pressure and an increase in medication adherence and quality of life[5].

Implications of *PreventiPlaque*

The combination of visually-depicted personalized health information and goal-directed tracking of lifestyle habits is a unique advantage of digital health applications like *PreventiPlaque*[5]. Specifically, the image depicted is simply an ultrasound image of a patient's carotid plaque with the plaque burden highlighted; however, the consistent and real-time access to this image along with tracking of daily habits likely contributed to the high level of patient engagement and behaviour change associated with *PreventiPlaque*. In essence, *PreventiPlaque* can be described as a multimodal patient engagement application with both a visual depiction of progress and interactive tracking of daily habits. By demonstrating a significant reduction in SCORE2 risk over a 12-month period associated with the use of *PreventiPlaque*, Ullrich and colleagues highlight the important potential for this technology to empower patients to improve their cardiovascular health[5]. Notably, many papers report the development of a digital health intervention, but few rigorously evaluate their clinical impact[8]. Through a randomized controlled trial, the authors provide convincing evidence of the efficacy of a mobile health application in

improving cardiovascular risk profiles[5]. This study represents a significant advancement in digital health research.

Limitations of *PreventiPlaque*

Although *PreventiPlaque* has important potential for clinical impact, several limitations should be acknowledged[5].

1. It is unclear how *PreventiPlaque* influenced patient behaviours and improved SCORE2 risk[5]. For example, *PreventiPlaque* usage was not associated with increased self-reported physical activity levels[5]. Future qualitative studies are needed to assess patients' experiences with the technology, including how they used the application and how it influenced their behaviours. This may help identify key elements of digital health interventions that significantly impact patients' behaviours and outcomes[9].
2. A key component of *PreventiPlaque* is a visual depiction of the patient's carotid plaque burden[5]. Although carotid plaque is associated with systemic atherosclerosis, it may not be fully correlated with plaque severity in other arterial beds[10]. For example, a patient may have low carotid plaque burden, but significant coronary plaque burden, putting them at elevated risk of heart attacks[10]. *PreventiPlaque* may falsely reassure such a patient; therefore, it would be prudent for future mobile health applications of this type to capture plaque burden in multiple arterial beds[11]. Additionally, visual interpretation of the carotid plaque by the patient may be subjective. Similarly, most of the behavioural tracking, including physical activity, is self-reported, leading to another potential avenue for bias. Therefore, incorporation of more objective tracking methods, including the use of wearable technologies that can accurately track quantifiable measures such as step counts, may increase the objectivity of the tool.
3. *PreventiPlaque* is in German and requires patients to have smartphones to use it[5]. These barriers may limit accessibility, which could be addressed through translation to other languages and technological interfaces such as computers, televisions, and other devices.
4. The real-time transfer of carotid plaque images from ultrasound reports to *PreventiPlaque* likely requires integration with electronic medical records (EMR). However, there are over 50 different EMR's used in Germany and many more globally[12]. This may make the routine use of *PreventiPlaque* challenging. Digital health applications of this nature require careful consideration of EMR integration strategies to increase their potential for broad, real-world impact[13]. Specifically, these applications should be designed to function across different EMR systems[13].
5. The clinical trial demonstrated robust efficacy over a 12-month follow-up period; however, it is important to note the potential for effect decay over time with patient engagement interventions[14]. Given that the management of chronic diseases generally requires a lifelong commitment to behavioural changes, it will be important to continue studying the long-term effectiveness of *PreventiPlaque*.

Conclusions

Through a randomized controlled trial, Ullrich and colleagues provide evidence of the efficacy of *PreventiPlaque* in improving cardiovascular risk profiles[5]. This study highlights the potential for digital health applications to provide patients with personalized health information and empower them to take actionable steps to improve their cardiovascular health[5]. Although potential improvements could be made to *PreventiPlaque's* utility, accessibility, and explainability, this technology and its robust evaluation represents a significant step forward in supporting the routine use of digital health technologies to facilitate patient-centred management of their chronic diseases.

Data availability

No datasets were generated or analysed during the current study.

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Competing interests

J.C.K. is the editor-in-chief of npj Digital Medicine. All other authors declare no competing interests.