Reducing Type 2 Diabetes Risk among Adults Using AI-Based Digital Health Promotion

1. Background

T2DM is an increasingly significant public health issue due to its high prevalence, modifiable risk factors and potential for long-term complications.

According to the World Health Organization, in 1990, there were 200 million people with diabetes globally and that number has reached eight times that in 2022 (Zhou et al., 2024). Cardiovascular disease, kidney failure, blindness, stroke and loss of a lower limb are all potential complications of diabetes (Antar et al., 2023).

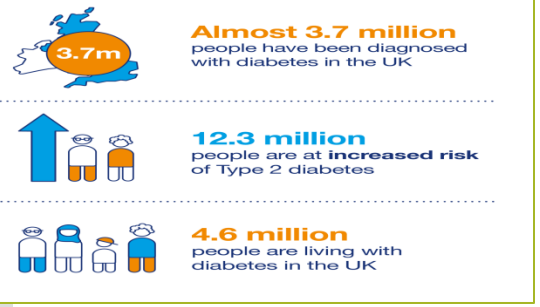
In 2021 the diabetes complications of diabetes and chronic kidney disease accounted for over 2 million deaths worldwide (World Health Organization, 2024).Body weight and blood sugar levels are important factors for the problem since when people are over-weight and have elevated blood sugar, it greatly increases the likelihood of getting T2DM, especially in adults.

Type 2 Diabetes has been estimated to affect 4.6 million people in the UK, 6.3 million people are thought to be living with pre-diabetes, and 1.3 million people are living undiagnosed with type 2 Diabetes in the UK in 2025 (Diabetes UK, 2023). In total, there are estimated to be over 12 million UK adults (roughly 1 in 5) with diabetes or pre-diabetes (Office for national statistics, 2024). These numbers show the importance of focussing on adults before an onset of metabolic risk becomes a clinically diagnosed T2DM.

Previously, the Public Health interventions have been both, non-digital and digital. Traditional strategies used involve in-person lifestyle education, weight-management programs, dietary counseling, exercise prescriptions, and community screenings and primary-care referral. Intensive evidence-based lifestyle-change programmes are recommended by NICE for adults who are identified as being at high risk. These include modifications to factors like physical inactivity, dietary habits and excess weight, the latter of which can be modified.

These have been complemented by increasingly digital interventions. The NHS Diabetes Prevention Programme digital stream delivers Apps, online health coaching, e-goal setting, peer support and activity monitoring. NHS England says there is over a third reduction in the risk of acquiring T2DM as a result of people who have completed its prevention programme (NHS England, 2016).

The campaign being proposed is taking the same approach but now using an AI-powered mobile application, syncing with a smart watch. The AI system could identify prolonged inactivity and send a personalised prompt such as: "***You have been inactive for 90 minutes. A 10-minute walk will help you move towards today's activity goal***.





3. Behavioural change theory

The ***Health belief Model (HBM)*** is found to be an appropriate one for the intervention as prevention of a T2DM depends on individuals' detection of future health threats and their perception of the value of seeking preventive care (Shabibi et al., 2017). Described in the paper are six constructs in the HBM: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy.

Figure 5: Health belief Model (HBM)
(Source: Shabibi et al., 2017)

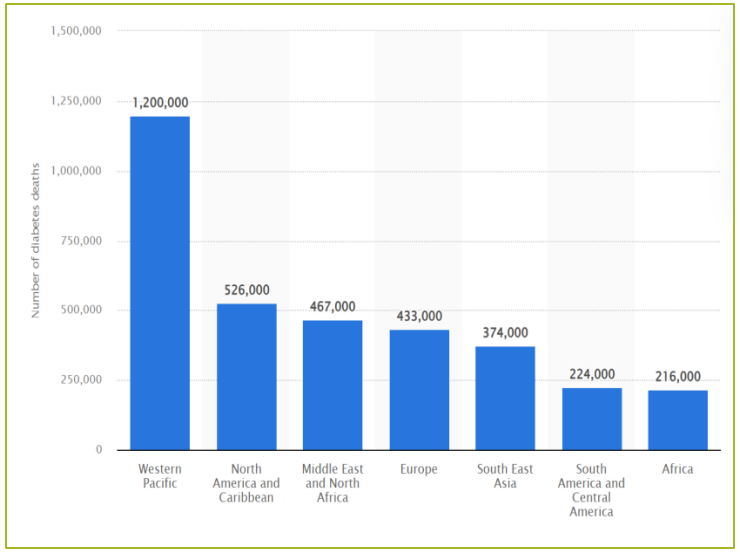
Needs for perceived susceptibility would be tackled by providing feedback on the likelihood of risk using AI personalisation techniques. Obesity or pre-diabetes adults might not realize they are at risk for getting diabetes because they are healthy now. The app might utilize factors like activity level, age, glucose status, BMI and family history to provide personalized risk level data and talk (Merwass et al., 2024).But too much fear is not a good idea in risk communication as it may lead to anxiety or disinterest of the users towards the risk without giving solutions to the problem.It would be beneficial to include the demonstration of the opportunity to lay the foundation for behavior to improve health to support the perceived benefits (Matthews et al., 2024). Eating a healthy diet and exercising regularly are two key actions to help prevent or delay the onset of T2DM, according to WHO. The app might show graphics of activity, weight and risk improvements (Amerkamp et al., 2024).

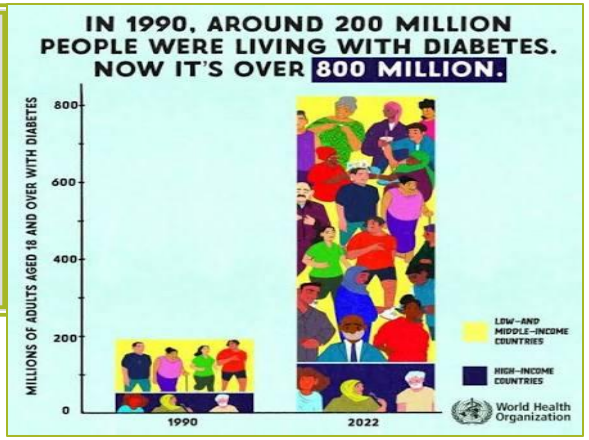
Riders may feel the barriers are time, cost, not motivated, physical difficulties and low motivation to get healthy food. AI could counter with suggestions of some brief in-home activities, relatively cheaper food options and realistic daily goals, instead of unrealistic lifestyle changes (Fell, 2026).Smartwatch notifications, customized reminders, weekly progress reports and prompts after a set period of time would be used to get them to act (Lyu, Li and Li, 2024). Such capabilities can help transform the HBM into an interactive program, rather than a one-shot educational event.

4. Expected outcome

The primary long-term anticipated results are participants' physical activity changes, sedentary behaviour decreases, dietary changes to reduce the modifiable risk of T2DM, and a lifelong decrease or stable maintenance of weight (Dehdari et al., 2025). Secondary outcomes may include increased diabetes knowledge, increased self-efficacy, heightened risk awareness and increased participation in preventive health services.A systematic review of digital health interventions conducted in the year 2024 for the prevention of Type 2 diabetes (T2DM) identified over 50% of the included studies which showed positive outcomes in body weight, blood glucose levels, and/or incidence of T2DM (Thanthrige and Wickramasinghe, 2025) . Especially promising were interventions delivered via mobile, such as apps and telehealth strategies. But there exists the need for further studies and long-term research with a diverse population.

However, it is important to note that being highly engaged in the app does not necessarily mean health promotion is a success. Openers may open an application on a frequent basis without meeting clinically significant behaviour change (Cole et al., 2023). Therefore, assessments should now focus on whether engagement leads to maintenance over the long term (6 to 12 months) and a decreased rate of progression from pre-diabetes to T2DM.





5. Conclusion

The potential of AI mobile apps to complement smartwatches in T2DM prevention is tremendous in terms of ongoing behavioural monitoring and tailored health promotion. The intervention has the potential to impact policy in the form of advocating for more implementation of evidence-based digital prevention programs in primary care and public health. Development of a policy should also define standards for privacy, algorithm transparency, clinical safety and digital inclusion.

In health education, AI can provide customised feedback alongside for adults, to help learn more about the impact of routine activities on their diabetes risk. Digital-health training also may be important for healthcare professionals to be able to interpret the information provided and offer specialized support when needed.Longer-term studies should be conducted to evaluate whether interventions with AI would lead to lasting decreases in HbA1c, obesity and progression to T2DM in different socioeconomic and ethnic groups for research purposes. While current evidence shows that digital technologies can play a role in diabetes prevention, further research is needed to determine their longer term effectiveness in a clinical setting. All in all, the future of using AI personalisation, chronicled by a smartwatch and coupled with the Health Belief Model is a promising approach to prevention as long as the technology is used to strengthen, not supplant, sound, fair and evidenced-based public health practice.

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2. Health promotion values and principles

Health promotion aims to enable individuals and communities to increase control over the determinants of their health (WHO, 2023). These are key values that hold great importance: empowerment, participation, equity, accessibility, autonomy, informed decision-making, prevention and person-centred practice. Therefore "health promotion" must go beyond giving information (Norfjord, Asp and Charlotta Åkerlind, 2025). It should provide opportunities and a safe environment, enabling people to make sustainable health choices.

Empowerment and participation are key considerations of the proposed intervention. The app does not put adults in the role of taking in medical advice, but enables them to set goals, track their behavior, and document progress (Nguyen, Rivera and Gualtieri, 2023). However, end-users would have the option to set targets such as walking for the week, weight loss or diet adjustment. The smartwatch collects data to give an objective response, and the AI translates that data into actionable recommendations (Chew, Ang and Lau, 2021) . This will facilitate self-management and a feeling of control over preventive health behaviour.

Personalisation is also promoted as part of the intervention. The 30- to 60-year-old age group is far from being a uniform population of adults. Their working schedules, ethnocultural factors, fitness, income, literacy with digital devices and responsibilities as a parent can all affect their behavior change. AI can use what it knows about each consumer to make personalized suggestions instead of making the same ones to all consumers.

But, connection to health promotion values is not conferred automatically. People unable to afford a smartphone compatible with their smartwatch, limited access to the internet, disability that impacts the use of technology and low technological literacy may be faced with an unfair disadvantage due to digital inequality. NICE believes that socioeconomic factors, disability, ethnicity, and local social and cultural factors need to be taken into consideration in diabetes prevention programmes (Been et al., 2024). Thus, there is a need to ensure devices can be loaned to disadvantaged users, and that alternative, non-digital support is available.