

AI-Based Craving Prediction and Behavioural Nudges to Support Smoking Cessation in Adults

Background

- Smoking plays a major role in the causes of preventable sickness and premature death in the UK, especially in adults who are exposed to stress, habitual factors, and socio-economic deprivation.
- Approximately, 11% of the UK adult population smokes tobacco (Office for National Statistics, 2024).
- Relapse is also frequent due to the sudden appearance of cravings that are supported by environmental factors (Zorjan et al., 2025).
- The conventional cessation programmes offer systematic advice but are not able to intervene at the very point of temptation.
- Digital strategies are a means of reducing this disconnect by providing individually targeted, real-time assistance (Kabisa et al., 2021).

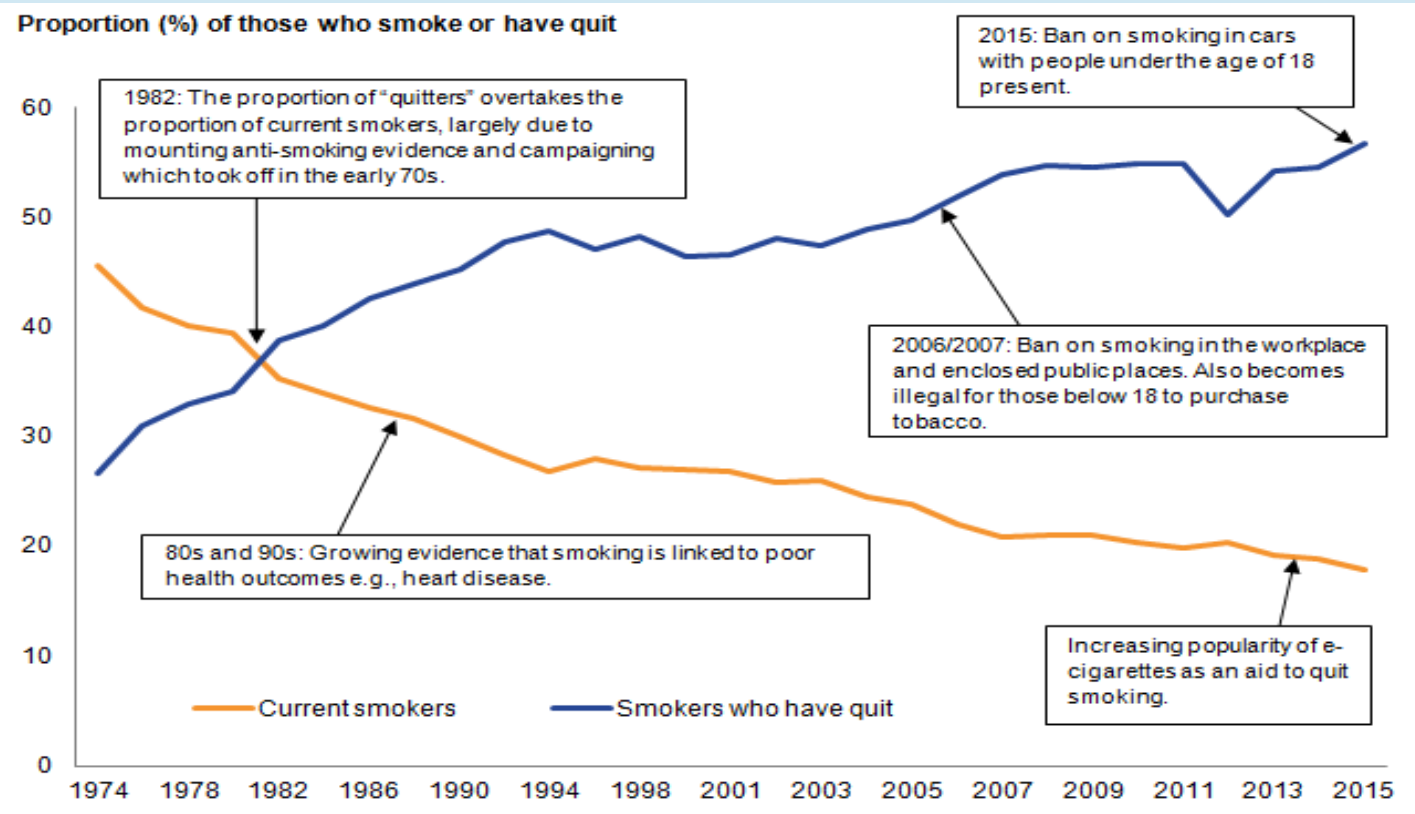


Figure 1: Smokers in the UK (Source: ONS, 2024)

Health Promotion Values and Principles

The intervention is in line with the important health promotion values such as supporting the idea of empowerment, equity, and person-centred practice. Personalised information regarding the craving patterns also increases empowerment as people get to know their behaviour and control it more confidently (Kelpin et al., 2024). One way of how equity is addressed is by working on scalable digital delivery to make sure that adults who might not receive conventional cessation services receive support (Štánerová, 2025). The principles embedded in the design are:

- Evidence-based practice.
- Independence of the user and informed consent.
- Availability and accessibility.

Combined, these principles can be used to make the intervention effective in promoting behavioural change without violating personal needs and situations.

Behavioural Change Theory: Health Belief Model

- The Health Belief Model is a concept that describes the smoking cessation in terms of beliefs related to risk, benefits, barriers, and action cues (Prutzman, 2021).
- The perceived susceptibility is also improved with the help of the AI system that detects the moments when a user is at high risk and warns them when the cravings are most likely to occur (Hussain et al., 2020).
- Perceived severity is supported by the use of personalized messages that are brief and emphasise the physical and financial impact of relapse.
- Real time displays of progress, indicators of health gains and positive reinforcement after successful craving resistance enhance the perceived benefits (Nandakumar et al., 2023).
- Perceived barriers are minimized by the intervention which provides easy to implement short lived coping mechanisms, like breathing exercises or distraction cues, when one feels vulnerable.
- Self-efficacy is nurtured via sustained feedback mechanisms that confirm to the user the progress of success and affirms his/her capability of staying abstinent (Shields et al., 2023).
- Above all, the AI-generated alerts are accurate signals to act, that convert the abstract health beliefs into the immediate behavioural change (Taylor and Francis, 2022).
- Such a combination makes the intervention become a proactive relapse-prevention method in adult smokers.

Expected Outcome

- Improved sensitivity of specific triggers and cravings.
- Enhanced reaction to risk instances by responding in time (IJPMH, 2023).
- Greater self-confidence about the ability to resist cravings and abstinence.
- Greater perception of the advantages of quitting (Neliti, 2023).
- Less psychological and practical obstacles to cessation.
- Reduced levels of relapse in high-risk stages (Springer, 2024).
- Increased access to cessation support to underserved populations online (JESAT, 2024).
- Greater reinforcement of the healthy behaviours, which subsidies the long-term quitting (JMIR, 2023).

Figure 2: Smokers in the UK Divided by Gender (Source: ONS, 2024)

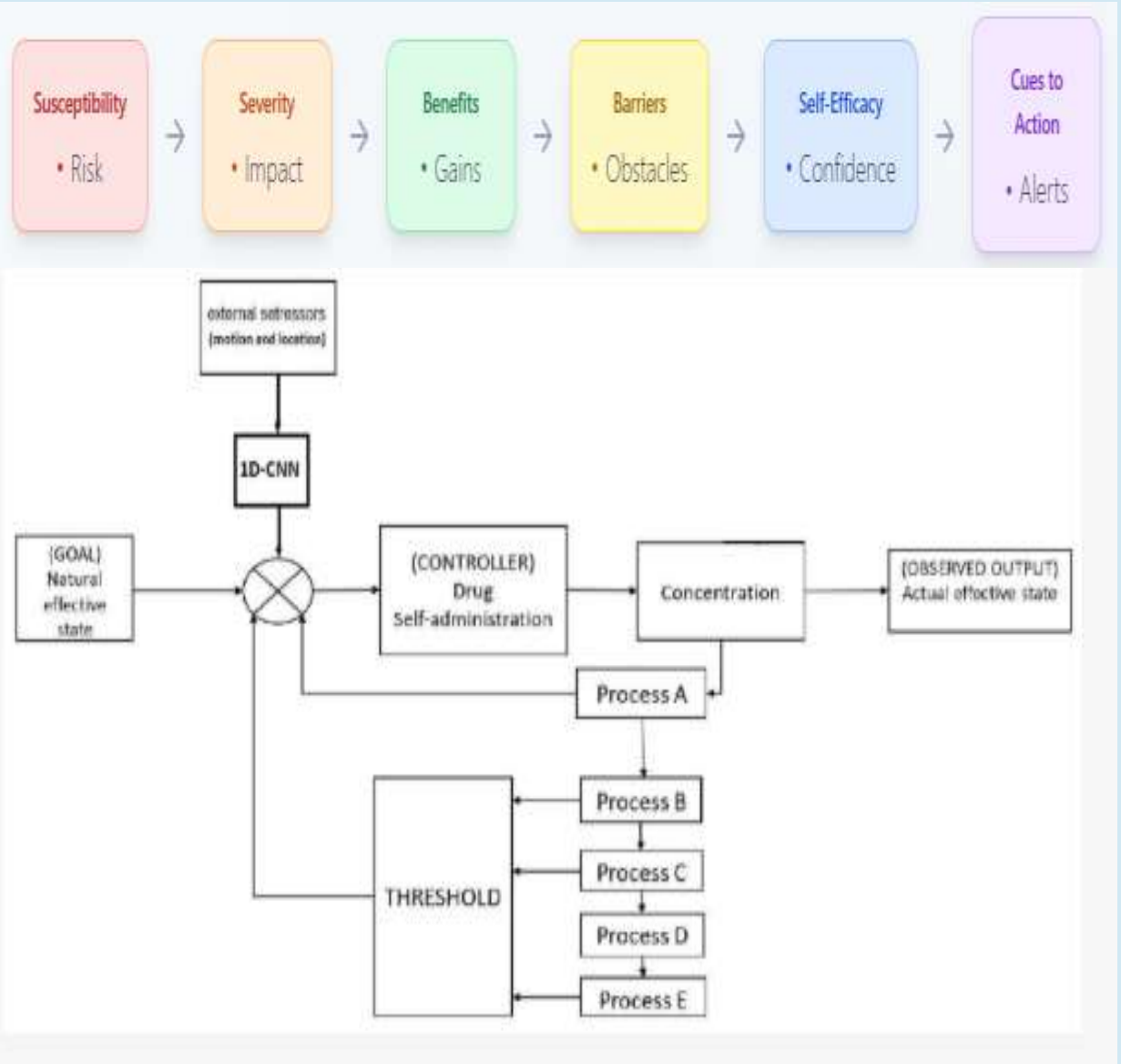
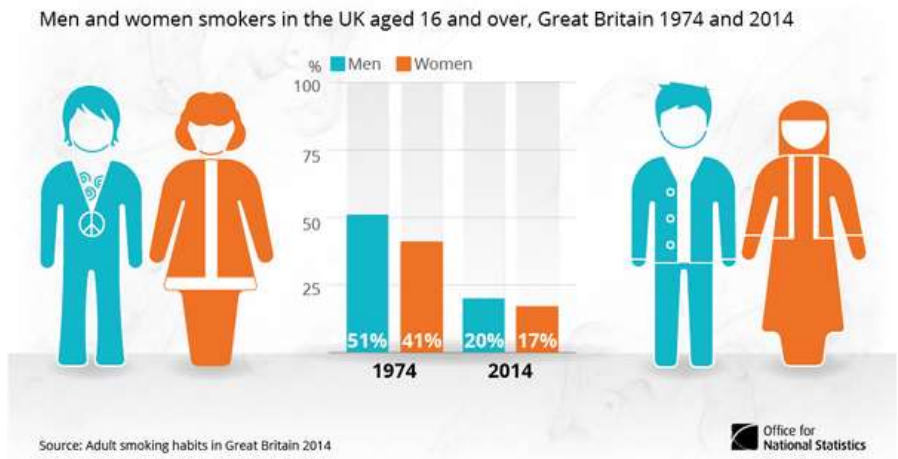


Figure 3: Smoking Cessation Model (Source: ONS, 2024)

Conclusion

- In conclusion, the prediction of craving intervention based on AI presents a valuable contribution to the digital smoking cessation by working in real-time to operationalise Health Belief Model.
- It enhances behavioural change by intensifying the risk perception, emphasizing the benefits, minimizing the barriers, and providing the accurate cues to take, at the time when users require them the most.
- This is a special strategy that could go a long way in preventing relapse and promoting permanent abstinence.
- In addition to personal benefits, the intervention has the implication of the impact on the health policy of the population, digital health education, and preventive research.

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