

Optimizing digital smoking cessation interventions

Citation for published version (APA):

Elling, J. M. (2022). *Optimizing digital smoking cessation interventions*. [Doctoral Thesis, Maastricht University]. Maastricht University. <https://doi.org/10.26481/dis.20221207je>

Document status and date:

Published: 01/01/2022

DOI:

[10.26481/dis.20221207je](https://doi.org/10.26481/dis.20221207je)

Document Version:

Publisher's PDF, also known as Version of record

Please check the document version of this publication:

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Summary

Smoking is the leading cause of preventable mortality worldwide. Smokers die on average 10 years earlier than non-smokers. Despite public health efforts to curb smoking prevalence, 20.6% of the adult Dutch population still smokes. One way to support smokers to quit is through digital smoking cessation interventions. Such interventions are the focus of this dissertation. While the effectiveness of such interventions is well established, low use by participants hinders the realization of their full potential. The studies presented in the various chapters of this dissertation aim to optimize digital interventions for smoking cessation by addressing research questions pertaining to digital interventions (e.g., user engagement) and the context of smoking cessation (e.g., use of e-cigarettes for smoking cessation).

Chapter 1 describes the background, rationale, and objectives of the studies conducted as part of this dissertation. It also describes the theoretical framework underlying most of the studies (i.e., the I-Change model, or short ICM) and explains how the various studies relate to the ICM. While the channel factor of the ICM was manipulated in the study described in Chapter 2, the message factor of the ICM was manipulated in the study described in Chapter 3 and 4. Furthermore, a key method for changing behavior, namely computer tailoring, is explained.

Chapter 2 reports the results of an experimental study that examined the impact of animated video- versus text-based delivery of a computer-tailored smoking cessation intervention on user engagement. The results showed that participants who received the animated video version evaluated the intervention more positively than participants who received the text version. These results suggest that enriching interventions with animated video increases user engagement, which may ultimately increase intervention use and effectiveness.

Chapter 3 provides the protocol for a randomized controlled trial that examined the effects of providing information about e-cigarettes in a digital smoking cessation intervention on decision-making about the use of e-cigarettes for smoking cessation and smoking behavior. Participants in the control condition received a computer-tailored smoking cessation intervention. Participants in the intervention condition received the same intervention but with additional information about e-cigarettes (e.g., the relative harmfulness of e-cigarettes and cigarettes) as part of the intervention content.

Chapter 4 describes the results of the randomized controlled trial introduced in Chapter 3. An important finding was that control participants' knowledge about e-cigarettes and the relative harmfulness compared to cigarettes was limited. Participants in the intervention condition possessed more knowledge after the intervention than participants in the control condition. No differences were found between the two conditions regarding the use of

e-cigarettes as a cessation method, nor on smoking cessation. The results suggest that such a digital intervention can improve knowledge, which can facilitate decision-making about the use of e-cigarettes for smoking cessation.

Chapter 5 describes a cross-sectional study of the influence of the COVID-19 pandemic on smoking behavior and beliefs about smoking cessation among a sample of smokers who were motivated to quit smoking within five years. This study was embedded in the trial described in Chapter 3 and 4 and was conducted during the early pre-vaccination phase of the COVID-19 pandemic in spring 2020. The results showed that motivation to quit smoking increased in one-third of smokers because of COVID-19. The study also examined which specific beliefs about COVID-19 and smoking were associated with motivation to quit.

Chapter 6 describes the results of an ecological momentary assessment study on the role of contextual factors (e.g., activities, social environment) in smoking relapse. For 14 days following the quit attempt, smokers used an application on their smartphone to indicate in the moment when they experienced temptations or lapses. Smokers also answered random assessments throughout the day. Generalized linear mixed models were used to calculate associations between contextual factors and temptations and lapses. Results indicated that various contextual factors (e.g., leisure, being social, drinking coffee, doing nothing, sexual intercourse) were associated with either increased or lower risk of temptation and lapsing. The results suggest that contextual factors are suitable intervention targets to change relapse behavior. In particular, digital just-in-time interventions have the potential to capture contextual factors and provide support (e.g., coping advice, distraction) in high-risk situations.

Chapter 7 discusses and integrates the major findings of the studies described in this dissertation, suggests directions for future research and practice, and offers methodological considerations. The results of the studies suggest that optimizing digital smoking cessation interventions can be successful by using animated video to increase user engagement, by providing information on e-cigarettes to increase knowledge and facilitate decision-making on the use of e-cigarettes for smoking cessation, and by addressing contextual factors in smoking relapse prevention interventions to help ex-smokers in risk situations. Future research is needed to better inform both practice (e.g., how can contextual factors be measured and addressed in digital relapse prevention interventions) and theory (e.g., why is animated video more engaging than text and for whom), as well as how to best foster implementation of evidence-based digital smoking cessation interventions.