

# Study Protocol

**Citation:** Maaß, L., Buttigieg, S., Christianson, L., Forberger, S., Jahnel, T., Mildner, T., & De Santis, K. (2024, September 30). Quitting at Your Fingertips: Digital Interventions for Smoking Cessation – A Scoping Review of Reviews. Open Science Framework, [https://osf.io/n7ms6/?view\\_only=20bd2657fdd0413fa66e74e6159f4016](https://osf.io/n7ms6/?view_only=20bd2657fdd0413fa66e74e6159f4016). Accessed 30<sup>th</sup> September 2024.

## Content

Study Title.....	2
Team members and their organisational affiliations .....	2
Timeline .....	2
Funding .....	3
Conflict of interest.....	3
Rationale .....	3
Objectives .....	4
Protocol and registration.....	4
Eligibility Criteria.....	5
Information sources .....	6
Search Strategy.....	6
Selection process .....	6
Data charting.....	6
Data items .....	7
Assessment of overlap in primary reviews included in reviews .....	7
Data synthesis.....	8
Dissemination.....	8
References.....	8

## Study Title

Quitting at Your Fingertips: Digital Interventions for Smoking Cessation – A Scoping Review of Reviews

## Team members and their organisational affiliations

Laura Maaß<sup>1,2</sup>, Sarah Forberger<sup>2,3</sup>, Lara Christianson<sup>3</sup>, Thomas Mildner<sup>2,4</sup>, Stefan Buttigieg<sup>2,5</sup>, Tina Jahnel<sup>2,6</sup>, Karina De Santis<sup>2,3</sup>

<sup>1</sup> University of Bremen, SOCIUM Research Center on Inequality and Social Policy, Bremen, Germany

<sup>2</sup> Leibniz ScienceCampus Digital Public Health Bremen, Bremen, Germany

<sup>3</sup> Leibniz Institute for Prevention Research and Epidemiology – BIPS, Bremen, Germany

<sup>4</sup> University of Bremen, Digital Media Lab, Bremen, Germany

<sup>5</sup> University of Malta, Valetta, Malta

<sup>6</sup> German Center for Neurodegenerative Diseases, Rostock, Germany

### Corresponding author

Dr. Laura Maaß

University of Bremen

SOCIUM Research Center on Inequality and Social Policy

Mary-Somerville-Straße 3

28359 Bremen

Germany

Phone: +49 421 218-58610

E-Mail: [laura.maass@uni-bremen.de](mailto:laura.maass@uni-bremen.de)

## Timeline

Start date: 01.09.2024

Finished literature search: 23.09.2024

Finished screening: 15.10.2024

Finished data extraction: 30.10.2024

Finished overlap analysis: 30.10.2024

Finished qualitative synthesis: 15.11.2024

Anticipated completion date of review/writing: 31.12.2024

Project stage at protocol registration (01.10.2024): Literature search completed

## Funding

None

## Conflict of interest

None

## Rationale

Smoking remains one of the leading causes of preventable morbidity and mortality globally, contributing to various health conditions such as cardiovascular diseases, respiratory disorders, and cancer [1, 2]. Despite various interventions aimed at reducing smoking prevalence, many individuals continue to smoke, and relapse rates remain high [3]. The emergence of digital technologies presents new opportunities for designing digital interventions targeting smoking cessation. Such digital interventions could be delivered via mobile apps, web-based platforms, text messaging, social media, wearable devices, or virtual health coaching [4, 5]. Given the growing number of reviews with systematic methodology (e.g. systematic or scoping reviews), a review of reviews is necessary to synthesize the existing evidence.

We aim to comprehensively assess the landscape of digital interventions for smoking cessation including their characteristics, user groups, settings, and outcomes. The review of reviews will follow a scoping review methodology due to the focus on description of existing evidence rather than evaluation of the outcomes of digital interventions for smoking cessation. As such, our scoping review of reviews will serve as a ground research to generally describe the field. This will serve as the foundation to identify evidence gaps that could be addressed in future reviews

of primary studies (e.g., effectivity of specific digital interventions for smoking cessation based on different modalities of smoking).

In this scoping review of reviews, smoking is defined as the act of inhaling smoke from burnt tobacco which includes traditional cigarettes, cigars, cigarillos, pipes, or water pipes [6]. We will further include electronic cigarettes (e-cigarettes) for inhaling nicotine without combusting and other inhaling nicotine-delivery devices. A digital intervention is defined as a health intervention supported by any digital technologies or devices and being delivered entirely digitally or in combination with analogue elements, such as peer-group meetings or psychological counselling [7-10].

## Objectives

The objectives of this scoping review of reviews are fourfold.

1. We aim to identify the types of digital interventions that target smoking cessation. Specifically, we aim to identify devices used to deliver such interventions and the modality of such interventions (i.e., digital alone or digital combined with analogue elements).
2. We aim to describe if and how effectiveness of digital interventions for smoking cessation was assessed (e.g., quit rates, user engagement (adherence), and relapse prevention).
3. We aim to explore if potential moderating factors were considered in the context of digital interventions for smoking cessation. These include the sociodemographic characteristics of participants, such as age, sex, socioeconomic status, digital (health) literacy, and smoking patterns and devices.
4. We aim to identify evidence gaps in the included reviews that could be addressed in future reviews of primary studies.

## Protocol and registration

This study uses a scoping review design and will incorporate any reviews with systematic methodology, such as other scoping reviews, systematic reviews, or overviews of reviews. A protocol for this study will be prospectively registered at the Open Science Framework (OSF). The

study adheres to the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guideline [11]. The PRISMA-ScR checklist will be reported in a supplementary file.

## Eligibility Criteria

The eligibility criteria adhere to the PIOS (Population, Intervention, Outcome, Study type) framework (Table 1).

**Table 1. Inclusion and exclusion criteria**

<b>PIOS</b>	<b>Inclusion criteria</b>	<b>Exclusion criteria</b>
<b>Population</b>	human; any age or focus on specific age groups (e.g., children, adolescents, adults, or elderly); non-clinical status (i.e., healthy or at risk for clinical condition, e.g., overweight or obese).	(E1) Non-human population; no focus on humans (e.g., focus on development of policies, clinical, or research methods); clinical populations or special populations in clinical context (e.g., preterm babies).
<b>Intervention</b>	Any digital technology (either stand-alone or accompanied by non-digital interventions) that targets smoking cessation for cigarettes, electronic cigarettes, water pipes, or other inhaling nicotine-delivery devices in humans (e.g., chatbots, text-messages, virtual agents, mobile applications, etc.).	<ul style="list-style-type: none"> <li>- (E2) Analogue interventions only</li> <li>- (E3) Digital intervention that targets other topics (e.g., weight loss)</li> </ul>
<b>Outcome</b>	Smoking cessation as primary outcome.	(E4) Smoking cessation not a primary outcome.
<b>Study type</b>	Review with systematic methodology (e.g., systematic reviews, scoping reviews, umbrella reviews, or overviews of reviews)	<ul style="list-style-type: none"> <li>- (E5) Review without systematic methodology (e.g., narrative reviews)</li> <li>- (E6) Other study types (e.g., primary studies)</li> </ul>
<b>Publication type</b>	<ul style="list-style-type: none"> <li>- Review published in a peer-reviewed journal</li> </ul>	<ul style="list-style-type: none"> <li>- (E7) Other publication types (e.g., viewpoints, comments, editorials, study protocols, preprints, conference abstracts, theses, books)</li> <li>- (E8) Grey literature (e.g., reports without peer-review)</li> </ul>
<b>Language</b>	Studies published in English or German	(E9) Studies published in other languages
<b>Access</b>	Access to full-text	(E10) No access to full-text

## Information sources

The following databases will be searched to identify relevant reviews that meet the eligibility criteria (Table 1):

- Medline via Ovid
- Scopus
- PsycInfo via Ovid
- CINAHL via EBSCO

## Search Strategy

The search strategy will be created in consultation with a professional librarian. The search strategy will consist of the following pillars: “Smoking cessation” AND (“digital interventions” or “digital technologies”). The librarian will perform the search for reviews published from database inception up to 23<sup>rd</sup> September 2024. All search results will be imported to EndNote 21 (Clarivate) for study management. The complete search strategy in each database will be reported in a supplementary file. In addition, one researcher will also search the bibliographies of the included studies.

## Selection process

Any two researchers will independently screen the studies based on titles and abstracts and full-text using Rayyan (Rayyan Systems, USA). Any disagreements between the researchers will be resolved by consensus during discussion. A list of included and excluded reviews with reasons for exclusion will be reported in a supplementary file.

## Data charting

A data charting form will be developed in Microsoft Excel 10 (Microsoft Inc.) and piloted using three randomly selected studies. The form will then be calibrated within the team. Two researchers will chart all data. To reduce bias in data charting, a third researcher will check at least 10% of the data. Both researchers will discuss any disagreements and develop the final data sheet by consensus. All extracted and processed data will be reported in a supplementary file.

## Data items

A list of data items (Table 2) will be developed and revised by study authors to address the aims of this study.

**Table 2. Data items**

Item	Item content	Item description
1	Bibliographic characteristics	Title, first author name, publication year, corresponding author region, review type, review aims, number of included primary studies
2	Population characteristics	Sociodemographics (e.g. age, sex, socioeconomic status), digital (health) literacy, and smoking patterns (e.g. traditional cigarettes, pipes, e-cigarettes)
3	Digital intervention characteristics	Type (e.g. mobile apps, websites, social media, text messaging), delivery modality (digital only or digital and analogue), and setting.
4	Outcomes measured	Intervention effectivity investigated (yes/no) <ul style="list-style-type: none"><li>- If yes: which outcomes of smoking cessation were investigated<ul style="list-style-type: none"><li>- O1: Outcomes of smoking cessation (e.g., quit rates, sustained abstinence, relapse rates)</li><li>- O2: Effectiveness of digital interventions for the outcomes in O1?</li><li>- O3: Usability of intervention (e.g., adherence rates and engagement in intervention use, user acceptability, user satisfaction in using the intervention)</li></ul></li></ul>
5	Evidence gaps	Identified in discussion and conclusion of included reviews

## Assessment of overlap in primary reviews included in reviews

We will assess an overlap among reviews that occurs when the same primary studies are included in at least two reviews. We will assess such an overlap using the Graphical Representation of Overlap for OVERviews (GROOVE) tool [12] that is an Excel-based citation matrix.

## Data synthesis

The processed data will be synthesised using descriptive statistics (e.g., relative frequencies in Excel 10) and narratively described. Data will be organized based on the type of digital intervention, populations studied, and outcomes measured.

## Dissemination

Findings will be disseminated through a peer-reviewed publication and presentations at academic conferences. Additionally, a summary of findings may be shared with stakeholders involved in the design and implementation of smoking cessation interventions, including healthcare providers, and policymakers.

## References

1. Gallucci G, Tartarone A, Lerosé R, Lalinga AV, Capobianco AM. Cardiovascular risk of smoking and benefits of smoking cessation. *J Thorac Dis.* 2020 Jul;12(7):3866-76. PMID: 32802468. doi: 10.21037/jtd.2020.02.47.
2. Cho ER, Brill IK, Gram IT, Brown PE, Jha P. Smoking Cessation and Short- and Longer-Term Mortality. *NEJM Evid.* 2024 Mar;3(3):EVIDoa2300272. PMID: 38329816. doi: 10.1056/EVIDoa2300272.
3. Shoesmith E, Huddleston L, Lorencatto F, Shahab L, Gilbody S, Ratschen E. Supporting smoking cessation and preventing relapse following a stay in a smoke-free setting: a meta-analysis and investigation of effective behaviour change techniques. *Addiction.* 2021 Nov;116(11):2978-94. PMID: 33620737. doi: 10.1111/add.15452.
4. Goh KW, Ming LC, Al-Worafi YM, Tan CS, Hermansyah A, Rehman IU, et al. Effectiveness of digital tools for smoking cessation in Asian countries: a systematic review. *Ann Med.* 2024 Dec;56(1):2271942. PMID: 38346353. doi: 10.1080/07853890.2023.2271942.
5. Martinez Agulleiro L, Patil B, Firth J, Sawyer C, Amann BL, Fonseca F, et al. A systematic review of digital interventions for smoking cessation in patients with serious mental illness. *Psychol Med.* 2023 Aug;53(11):4856-68. PMID: 37161690. doi: 10.1017/s003329172300123x.
6. West R. Tobacco smoking: Health impact, prevalence, correlates and interventions. *Psychol Health.* 2017 Aug;32(8):1018-36. PMID: 28553727. doi: 10.1080/08870446.2017.1325890.



7. Wienert J, Jahnel T, Maaß L. What are Digital Public Health Interventions? First Steps Toward a Definition and an Intervention Classification Framework. *J Med Internet Res*. 2022 Jun 28;24(6):e31921. PMID: 35763320. doi: 10.2196/31921.
8. Maaß L, Angoumis K, Freye M, Pan CC. Mapping Digital Public Health Interventions Among Existing Digital Technologies and Internet-Based Interventions to Maintain and Improve Population Health in Practice: Scoping Review. *J Med Internet Res*. 2024 Jul 17;26:e53927. PMID: 39018096. doi: 10.2196/53927.
9. World Health Organization (WHO). Classification of digital interventions, services and applications in health. A shared language to describe the uses of digital technology for health. 2nd ed. Geneva: WHO; 2023.
10. National Institute for Health and Care Excellence (NICE). Evidence standards framework for digital health technologies. Manchester: NICE; 2022.
11. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Annals of Internal Medicine*. 2018;169(7):467-73. doi: 10.7326/m18-0850 %m 30178033.
12. Bracchiglione J, Meza N, Bangdiwala SI, Niño de Guzmán E, Urrútia G, Bonfill X, et al. Graphical Representation of Overlap for OVERviews: GROOVE tool. *Research Synthesis Methods*. 2022;13(3):381-8. doi: 10.1002/jrsm.1557.