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Role of Artificial Intelligence in Tobacco Control: A Scoping Review

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Scoping Review on Role ...



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We use this protocol and it's working

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Keywords: tobacco research, complex issues in tobacco research, supporting tobacco cessation, ai interventions in relation, tobacco control, ai intervention, tobacco cessation, limitation of ai intervention, tobacco use, predicting smoking status, high prevalence of tobacco use, smoking status, role of artificial intelligence, use of ai technique, using ai tool, ai, model of ai, ai tool, artificial intelligence, employing advanced ai, using vaping, ai technique, motivation, hybrid ai model, platform of ai, abstinence, advanced ai, ai on smallsample, researcher, public health, cochrane review, promoting factor

Abstract

Background- In the recent years, artificial intelligence (AI) is marking significant impact in fields such as psychology,

medicine, public health, etc. and researchers are using AI tools to tackle complex issues in tobacco research. In this scoping review, we aimed to summarise the published evidences on role of AI interventions in relation to tobacco cessation, motivation, relapse, cravings and identification of promoting factors.

METHOD- We aimed to summarise the published evidences on role of AI interventions in relation to tobacco cessation, motivation, relapse, cravings and identification of promoting factors. For this scoping review, we employed the PCC (Population, Concept & Context) framework as per the PRISMA-ScR guidelines. We explored literature using the following four databases- PubMed, Google Scholar, The Cochrane Review & DOAJ. Articles were included if they were peer-reviewed, published in English between 2019 & 2024 and reported the use of AI techniques like conversational agents (CA), machine learning (ML), natural language processing (NLP) etc. in tobacco use. We excluded studies done on individuals using vaping or e-cigarettes. The extracted data included title, author, year of publication, type of study, sample size, socio-demographic characteristics, study strategy, type, name, frequency & limitation of AI intervention and outcome of study.

Results- The initial search yielded 1790 articles which were uploaded to Rayyan. After removing duplicates (n=83), the remaining articles were screened and the relevant 42 articles were finalized among which 1 was narrative review and 4 were systematic review and meta-analyses. The studies were diverse in design, strategy, type and platform of AI used. Chatbots (rule based and embodied) and ML were used in some studies to promote abstinence and increase motivation. Some used hybrid AI model for predicting smoking status, lapse risk and treatment outcome while others were iterative developmental study in which they developed algorithm or model of AI and then tested it.

Conclusion- While AI hold considerable potential for supporting tobacco cessation, most existing applications relied on rule-based design that provide limited adaptability and resemble standard text-messaging programs. Some studies implemented AI on small sample which limits their generalizability while in some studies loss to follow up was high. Given the high prevalence of tobacco use in adolescents, we found only 2 such studies. This gap highlights the necessity for further well designed studies employing advanced AI driven models.

Guidelines

Search terms- 'Artificial Intelligence' OR 'Machine Learning' OR 'Natural Language processing' OR 'Conversational Agents', AND 'Tobacco Use'. Studies were identified from database searches & citation tracking and were imported to Rayyan. After removing duplicates, studies were screened based on title and abstract.

Data Extraction: The extracted data included title, author, year of publication, type of study, sample size, socio-demographic characteristics, study strategy, type, name, frequency & limitation of AI intervention and outcome of study.

Data Synthesis/ Analysis Plan: A descriptive synthesis will be conducted, presenting findings in tables and narrative form to identify gaps and themes.

Study Selection process: Studies were identified from database searches & citation tracking and were imported to Rayyan. After removing duplicates, studies were screened based on title and abstract.

Materials

Databases- PubMed, Google Scholar, The Cochrane Review & DOAJ.

Before start

Eligibility Criteria (Inclusion/ Exclusion): Articles were included in this scoping review if they were published in English between 2019 & 2024 and if they:

- Addressed individuals who use tobacco products or encountered tobacco related content (e.g. human texts, blogs, images, videos, marketing schemes, and social media content) or environments.
- Reported the use of AI techniques like CA, ML, NLP, etc.
- Conducted in any setting like clinical, community-based, online/ digital, public health records or research.
- Were peer-reviewed.
- Had any type of study designs like RCTs, developmental studies, observational studies, etc.

Excluded studies done on individuals using vaping or e-cigarettes.



Title of the Review

- 1 Role of Artificial Intelligence in Tobacco Control: A Scoping Review - record the title of the review.

Authors and affiliations

- 2 List authors and affiliations: Dr. Kritika Sisodia (Assistant Professor, Psychiatry Department, Government Medical College, Bundi); Dr. Shreya Gupta (Senior Resident, Psychiatry Department, Government Medical College, Kota).

Corresponding Author details

- 3 Record corresponding author contact details for both authors: Name, Email and Contact number for Dr. Kritika Sisodia (kritikasisodia25011994@gmail.com; 7742055475) and Dr. Shreya Gupta (shriyagupta169@gmail.com; 9413476623).

Abstract

- 4 Summarise the review objective: aim to summarise published evidence on AI interventions related to tobacco cessation, motivation, relapse, cravings and identification of promoting factors using the PCC (Population, Concept & Context) framework as per PRISMA-ScR guidelines.

Background and Rationale

- 5 Note background: AI is increasingly used in fields relevant to tobacco research (psychology, medicine, public health) and there is a need for well-designed studies employing advanced AI models.

Objectives/ Research Questions

- 6 Document primary research questions: 1) What are the published evidences of the role of AI interventions in relation to tobacco cessation, motivation, relapse, cravings and identification of promotion & environments? 2) What are the benefits & shortcomings of AI technologies used in the above context?

Eligibility Criteria (Inclusion/ Exclusion)

- 7 Include articles published in English between 2019 & 2024 that: addressed individuals exposed to tobacco-related content or environments; reported use of AI techniques (CA,



ML, NLP, etc.); were conducted in any setting (clinical, community-based, online/digital, public health records, research); were peer-reviewed; and had any study design (RCTs, developmental, observational, etc.).

Exclude studies on individuals using vaping or e-cigarettes.

- 7.1 When screening, ensure included studies meet all above criteria before proceeding to data extraction.

Information Sources and Search Strategy

- 8 Search databases: PubMed, Google Scholar, The Cochrane Review & DOAJ.
Use search terms: 'Artificial Intelligence' OR 'Machine Learning' OR 'Natural Language processing' OR 'Conversational Agents', AND 'Tobacco Use'.

Study Selection process

- 9 Identify studies from database searches and citation tracking and import results into Rayyan.
Remove duplicates.
Screen studies based on title and abstract.

Data Extraction

- 10 Extract the following data from each included study: title, author, year of publication, type of study, sample size, socio-demographic characteristics, study strategy, type/name/frequency & limitation of AI intervention, and outcome of study.

Data Synthesis/ Analysis Plan

- 11 Conduct a descriptive synthesis presenting findings in tables and narrative form to identify gaps and themes.

Timeline

- 12 Record expected completion timeline: 8 months (April 2025 - November 2025).

Roles & contributions of Authors

- 13 Document roles: Dr. Kritika Sisodia and Dr. Shreya Gupta together did conceptualization, data extraction, analysis and synthesis of final conclusion.



Conflicts of Interest

- 14 Declare conflicts of interest: The authors declare no conflicts of interest.

References

- 15 Include cited references: Whittaker R, Dobson R, Garner K. Chatbots for Smoking Cessation: Scoping Review. J Med Internet Res. 2022 Sep 26;24(9):e35556. doi: 10.2196/35556. PMID: 36095295; PMCID: PMC9514452.
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Bendotti H, Lawler S, Chan GCK, Gartner C, Ireland D, Marshall HM. Conversational artificial intelligence interventions to support smoking cessation: A systematic review and meta-analysis. Digit Health. 2023 Nov 3;9:20552076231211634. doi: 10.1177/20552076231211634. PMID: 37928336; PMCID: PMC10623979.

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