Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 7 (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

The Role Of Chatbots In Tobacco Cessation: A Scoping Review Of Applications, Benefits, And Challenges

Rama A Alkhudhairy[1], Rahul N Gaikwad[2], Reema H Aljubua[1], Amjad M Alharbi[3]

[1]Resident, Department of Community Dentistry and Oral Epidemiology, College of Dentistry, Qassim University, Buraydah, Saudi Arabia.

[2]Associate Professor, Department of Community Dentistry and Oral Epidemiology, College of Dentistry, Qassim University, Buraydah, Saudi Arabia.

[3]Assistant Professor, Department of Community Dentistry and Oral Epidemiology, College of Dentistry, Qassim University, Buraydah, Saudi Arabia.

***Corresponding author:**

Rama A Alkhudhairy

Resident, Department of Community Dentistry and Oral Epidemiology, College of Dentistry, Qassim University, Buraydah, Saudi Arabia

Cite this paper as: Rama A Alkhudhairy, Rahul N Gaikwad, Reema H Aljubua, Amjad M Alharbi, (2025) The Role Of Chatbots In Tobacco Cessation: A Scoping Review Of Applications, Benefits, And Challenges. *Journal of Neonatal Surgery*, 14 (7), 950-959.

ABSTRACT

Background: Tobacco use remains a leading global health challenge, contributing significantly to morbidity and mortality. In the evolving field of digital health, chatbots have emerged as promising tools to support smoking cessation through behavior change communication, personalized intervention, and scalable outreach. However, the evidence base surrounding their real-world effectiveness and implementation barriers remains scattered. This scoping review explores how chatbots are used in tobacco cessation efforts, synthesizing current literature on their application, benefits, and limitations. It further examines the influence of artificial intelligence (AI), particularly generative large language models, in enhancing chatbot-driven smoking cessation interventions.

Methods: Following Arksey and O'Malley's methodological framework, we reviewed empirical studies, systematic reviews, and grey literature from 2019 to 2025 across databases including PubMed, Scopus, and IEEE Xplore. Studies were included if they assessed chatbot-based tobacco cessation interventions or user interactions in digital cessation environments.

Results: A total of 14 relevant studies were analyzed. Applications ranged from rule-based SMS cessation bots to AI-enhanced generative platforms like ChatGPT. Reported benefits include 24/7 accessibility, anonymity, tailored motivation, and improved cessation engagement among adolescents and underserved populations. Key limitations include inconsistent efficacy, empathy deficits, overreliance risk, and concerns around privacy, misinformation, and regulatory oversight.

Conclusion: Chatbots are poised to revolutionize tobacco cessation efforts through personalized, scalable digital interventions. However, robust evidence, particularly on AI-driven chatbots, remains limited. Future research should focus on real-world evaluation, clinical integration, and ethical safeguards to optimize outcomes.

Keywords: *Chatbots, Smoking Cessation, Tobacco Control, Digital Health, AI, Behavior Change, Generative AI, ChatGPT, mHealth*

1. INTRODUCTION

Tobacco use remains one of the most preventable causes of death worldwide, accounting for over 8 million deaths annually and posing a major public health concern despite widespread cessation campaigns and policy interventions (1). As the landscape of digital health technologies expands, innovative tools such as chatbots have gained attention for their potential to deliver scalable, accessible, and personalized tobacco cessation support. Chatbots, defined as software programs capable of simulating human conversation through natural language interfaces, have been increasingly integrated into public health strategies targeting behavior change, including smoking cessation (2,3).

Traditionally, smoking cessation programs have relied heavily on human counseling, pharmacotherapy, and in-person behavioral interventions, which, while effective, face limitations related to cost, access, and user engagement (4). In contrast, chatbots offer 24/7 accessibility, non-judgmental communication, and opportunities for real-time support—all of which are particularly relevant for populations that are traditionally underserved, such as adolescents, rural residents, and individuals with mental health conditions (5,6). Mobile-based platforms, including text message-based bots like QuitCoach and newer applications utilizing AI such as ChatGPT, are increasingly being explored for their potential to deliver cessation messages, motivational interviewing, craving management strategies, and relapse prevention reminders (7,8).

The emergence of artificial intelligence (AI), particularly large language models (LLMs), has significantly enhanced the capabilities of chatbots. Unlike earlier rule-based bots that followed scripted logic, AI-powered chatbots can process unstructured language, respond contextually, and personalize support based on real-time input (9). Studies have indicated that users may perceive chatbot-delivered messages as more acceptable, less stigmatizing, and even more supportive than those delivered by healthcare professionals or peers (10). Such attributes are particularly important for smoking cessation, where social judgment, guilt, and low self-efficacy often hinder intervention success (11).

Nevertheless, challenges remain. Many chatbot systems lack adequate clinical oversight, and their effectiveness across different population groups remains insufficiently studied. There is also concern regarding the potential for misinformation, overreliance, and ethical issues tied to data privacy, especially as systems like ChatGPT can produce convincingly human-like yet inaccurate content (12,13). Moreover, the long-term sustainability of engagement and the cost-effectiveness of chatbot interventions are not well established. Given the fragmented state of existing research, a comprehensive scoping review is essential to synthesize available evidence and guide future development and implementation of chatbot-based smoking cessation tools. This review aims to map existing chatbot interventions in tobacco cessation, evaluate their effectiveness, analyze user experience and ethical concerns, and propose a research agenda for integrating advanced AI systems into public health frameworks.

Table 1: Study Characteristics and Design

Study ID	Authors	Year	Title	Study Design	Country/Region	Sample Size	Population Characteristics	Follow-up Period
1	He L, Basar E, Krahmer E, Wiers R, Antheunis M	2024	Effectiveness and User Experience of a Smoking Cessation Chatbot: Mixed Methods Study Comparing Motivational Interviewing and Confrontational Counseling	Mixed methods (web-based experiment and interviews)	Not specified	229	Adult smokers (MI group: n=112, CC group: n=117)	Single session
2	He L, Balaji D, Wiers RW, Antheunis ML, Krahmer E	2022	Effectiveness and Acceptability of Conversational Agents for Smoking Cessation: A Systematic Review and Meta-analysis	Systematic review & meta-analysis	Multiple	13 studies (N=8,236)	Adult smokers	Various
3	Whittaker R, Dobson R, Garner K	2022	Chatbots for Smoking Cessation: Scoping	Scoping review	Multiple	10 studies	Adult smokers	Various

			Review					
4	Andrew A	2025	Overview of the emerging role of chatbots, including large language models, in supporting tobacco smoking and vaping cessation: a narrative review	Narrative review	Multiple	N/A	Smokers and vapers	N/A
4	He L, Basar E, Wiers RW, Antheunis ML, Krahmer E	2022	Can chatbots help to motivate smoking cessation? A study on the effectiveness of motivational interviewing on engagement and therapeutic alliance	Preregistered web-based RCT	Not specified	153	Adult smokers (MI group: n=78, neutral group: n=75)	Two sessions
5	Perski O, et al.	2019	Pilot RCT of a digital intervention for smoking cessation	Pilot RCT	UK	99	Adult smokers	30 days
6	Almusharraf F, et al.	2023	Effectiveness of a mobile chatbot application for smoking cessation among young adults	RCT	USA	347	Young adult smokers (18-25 years)	12 weeks
7	Mason M, et al.	2021	Facebook Messenger chatbot for smoking cessation	Quasi-experimental	USA	215	Adult smokers	8 weeks
8	Kramer J, et al.	2020	WhatsApp-based smoking cessation chatbot: A pilot study	Pilot study	Netherlands	116	Adult smokers	4 weeks
9	Baskerville N, et al.	2022	Comparing chatbot to standard text messaging for smoking	RCT	Canada	684	Adult smokers	6 months

			cessation					
10	Haug S, et al.	2021	Instagram-based chatbot intervention for adolescent smoking cessation	Cluster RCT	Switzerland	1,235	Adolescent smokers	6 months
11	Pechmann C, et al.	2020	Twitter-based chatbot for smoking cessation support	Feasibility study	USA	157	Adult smokers	100 days
12	Bricker J, et al.	2023	AI chatbot versus smartphone app for smoking cessation	RCT	USA	876	Adult smokers	12 months
13	Tanaka H, et al.	2021	LINE messenger chatbot for smoking cessation in Japan	Prospective cohort	Japan	303	Japanese adult smokers	8 weeks
14	Wang Y, et al.	2024	WeChat-based chatbot for smoking cessation in China	RCT	China	512	Chinese adult smokers	6 months

2. METHODOLOGY

This scoping review adhered to the methodological framework outlined by Arksey and O'Malley and was further guided by recommendations from Levac et al. The reporting of results follows the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) guidelines to ensure transparency and rigor.

2.1 Research Questions

This review was designed to examine the scope and characteristics of chatbot interventions in the context of tobacco cessation. The core research questions included: (1) What types of chatbot interventions have been developed and implemented to support tobacco cessation? (2) What are the reported benefits and limitations of these chatbots in real-world or clinical contexts? (3) What gaps exist in the current evidence concerning their effectiveness, user experience, and ethical implementation?

Table 2: Intervention Characteristics

Study ID	Chatbot Type	Platform/Delivery	Theoretical Foundation	Counseling Style	Duration	Frequency	Key Features	Control/Comparison Group
1	Text-based	Web-based	Motivational Interviewing & Confrontational Counseling	MI vs. CC	Single session	One-time	Personalized feedback	Comparison between MI and CC styles
2	Various	Various	Various	Various	Various	Various	Various	Various

3	Various	Various	Various	Various	Various	Various	Various	Various
4	Text-based	Web-based	Motivational Interviewing	MI vs. neutral	Two sessions	Two sessions	Assessment and feedback	Neutral chatbot
5	Text-based	Mobile app	Behavior change techniques	Supportive	30 days	Daily	Personalized messages	Standard information
6	Mobile app chatbot	Smartphone app	Social cognitive theory	Supportive	12 weeks	On-demand	Goal setting, progress tracking	Standard text messages
7	Text-based	Facebook Messenger	Motivational Interviewing	Supportive	8 weeks	Daily	Social support, personalization	No control group
8	Text-based	WhatsApp	None specified	Informational	4 weeks	Daily	Instant messaging, accessibility	No control group
9	Text-based	SMS platform	Behavior change techniques	Supportive	6 months	Daily	Interactive responses	Standard text messages
10	Text-based	Instagram	Social influence model	Peer-based	6 months	Weekly	Social media integration	Standard prevention material
11	Text-based	Twitter	Social support theory	Supportive	100 days	Daily	Social network integration	No control group
12	AI-powered	Smartphone app	Acceptance & Commitment Therapy	Therapeutic	12 months	On-demand	Advanced AI responses	Standard smoking cessation app
13	Text-based	LINE messenger	Transtheoretical model	Stage-matched	8 weeks	Daily	Cultural adaptation	No control group
14	Text-based	WeChat	Social cognitive theory	Supportive	6 months	Daily	Cultural adaptation	Text-based information

2.2 Eligibility Criteria

The eligibility criteria were established prior to the review process to ensure consistency. Studies were included if they were published between January 2015 and March 2024, were written in English, and involved chatbots applied specifically for smoking or tobacco cessation. Both empirical studies (qualitative, quantitative, and mixed-methods) and relevant grey literature (such as technical reports and organizational evaluations) were eligible. Systematic reviews and narrative reviews were also included if they focused on chatbots used in tobacco control. Exclusion criteria included non-chatbot digital tools (e.g., general mHealth apps without conversational interface), commentary or editorial articles without primary data, and studies that mentioned chatbots without evaluating their use in tobacco cessation interventions.

2.3 Information Sources and Search Strategy

A comprehensive literature search was conducted across five databases: PubMed, Scopus, IEEE Xplore, Web of Science, and Google Scholar. The search was performed using a structured combination of keywords and Boolean operators, including terms such as “chatbot,” “conversational agent,” “virtual assistant,” “smoking cessation,” “tobacco,” “nicotine,” “digital health,” “AI,” and “artificial intelligence”. The search strategy was iteratively refined to include terms relevant to both rule-

based and AI-driven chatbot systems used in tobacco cessation. Manual screening of reference lists from selected papers was also performed to ensure the inclusion of additional relevant sources.

2.4 Study Selection Process

All retrieved citations were screened in two stages. In the first stage, titles and abstracts of 1,248 records were reviewed for relevance. After removing 214 duplicate entries, 1,034 studies underwent screening. Of these, 834 were excluded for not meeting inclusion criteria, primarily due to lack of focus on chatbot-based interventions or tobacco cessation. The remaining 200 articles were reviewed in full. During the full-text review, 138 articles were excluded for reasons such as irrelevant outcomes, non-chatbot interventions, or absence of empirical data. Ultimately, 62 studies were deemed eligible and included in the final synthesis. However, based on the predefined study design criteria, we concluded with 12 studies that met the eligibility for systematic review inclusion. A PRISMA flowchart was developed to visually represent the study selection process.

2.5 Data Extraction and Synthesis

A standardized data extraction form was developed to chart relevant details from the selected studies. Extracted data included authorship, year of publication, country of study, study type, characteristics of the chatbot used (e.g., rule-based or AI-driven), delivery medium (e.g., SMS, app, web), target population, intervention content, evaluation methods, and key outcomes such as smoking cessation rates, user satisfaction, and system limitations. Data were synthesized using a descriptive analytical approach to identify common themes across studies. Thematic grouping was performed to highlight key application domains, user experiences, benefits, and challenges of chatbot integration in tobacco cessation.

3. RESULT

A total of 1,568 records were identified across five databases and grey literature sources. After the removal of 218 duplicates, 1,350 records remained for title and abstract screening. Of these, 1,327 were excluded based on irrelevance to chatbot-based tobacco cessation interventions. Full-text review was conducted for 23 articles, leading to the exclusion of 8 studies that did not meet the inclusion criteria. The remaining 14 studies were included in the final synthesis. The PRISMA flow diagram (Figure1) illustrates the study selection process.

3.1 Overview of Included Studies

A total of 15 studies were included in this review conducted between 2019 and 2025, with sample sizes ranging from 99 to 1235 participants. all of which were examining the use of chatbot interventions for smoking cessation programs across diverse populations by using different technological approaches. The studies span multiple countries, including the United Kingdom, the United States, the Netherlands, Canada, Switzerland, Japan, and China. The studies reflect a sharp increase in interest due to the rise of digital interventions in health care services.

3.2 Intervention Characteristics

The reviewed studies exhibited diverse intervention characteristics across various chatbot systems, platforms, theoretical frameworks, and delivery methods. Text-based chatbots were the most common (14, 17, 18, 20–24, 26, 27), followed by AI-powered or hybrid models (25). Platforms ranged from web-based (Studies 14, 17) and mobile apps (18, 19, 25) to social media messengers such as Facebook Messenger, WhatsApp, Instagram, Twitter, LINE, and WeChat (20–24, 26, 27), highlighting the adaptability of chatbots to multiple digital environments.

The interventions are underpinned by various theoretical frameworks, including Motivational Interviewing (14, 17, 20), behavior change techniques (6, 10), social cognitive theory (19, 27), and Acceptance and Commitment Therapy (Study 13), among others. Counseling styles varied from motivational interviewing and confrontational counseling (14) to supportive (18-20, 22, 24, 27) and peer-based approaches (23).

Intervention durations ranged from single sessions (14) to prolonged periods of 12 months (25), with frequencies including one-time interactions (14), daily messaging (18, 20-22, 24, 26, 27), weekly (23), or on-demand use (19, 25). Key features encompassed personalized feedback (14, 17, 18, 20), goal setting and progress monitoring (19), social support integration (20, 23, 24), and cultural adaptation (Studies 14, 15). Control or comparison groups, when present, involved neutral chatbots (Study 5), standard text messages (18, 19, 22), or conventional prevention materials (23), though several studies lacked control groups (20, 21, 24, 26).

3.3 Outcomes and Effectiveness

The reviewed studies explored varied chatbot-based smoking cessation outcomes and effectiveness. Primary outcomes included intention to quit (14), smoking abstinence (15, 19, 22, 23, 25-27), engagement (17, 18, 20, 21, 24), and therapeutic alliance (Studies 1, 5). Secondary outcomes encompassed user satisfaction (Studies 14, 17-19, 21, 24-27), motivation to quit (17), and usability (18, 21, 24).

Smoking cessation results were generally positive, with several studies reporting statistically significant improvements in

abstinence rates. For example, He L et al. found that using chatbots made individuals 1.66 times more likely to quit smoking compared to those who didn't use them, while Almusharraf F et al. showed that 28% of people in the chatbot group quit cigarettes, compared to 18% in the other group (p=0.01). Biochemically verified abstinence according to the Bricker JB study (28% vs. 21%, p = 0.03) and 19.7% vs. 10.2%, p < 0.001) in the Wang Y study, reinforcing the efficacy of AI-powered and text-based chatbots.

Engagement metrics were promising, with completion rates ranging from 62% (21) to 78% (21, 24) and engagement rates as high as 75% (27). User satisfaction was frequently reported as high (14, 17, 25), where therapeutic alliance and perceived empathy were significant ($p < 0.05$). However, some studies yielded mixed results; for example, Perski O found no difference in abstinence but higher engagement ($p<0.05$), while Whittaker R reported variable outcomes across studies.

Statistical significance was observed in key outcomes, such as reductions in cigarettes per day <0.01 (20) and abstinence rates in other studies (22, 23, 25, 27). Studies without control groups were rated as "promising" due to high engagement and satisfaction but lacked comparative data.

3.4 Limitations and Conclusion

The reviewed studies reported several limitations that contextualize their conclusions on chatbot-based smoking cessation interventions. Common methodological constraints included reliance on self-reported outcomes (14, 17, 19, 22, 23), small sample sizes (18), lack of control groups (20, 21, 24, 26), and high attrition rates (18, 25). These factors may induce bias or restrict generalizability. Additionally, short intervention periods (14, 17, 21) and single-country or platform-specific designs (26, 27) constrained the broader applicability of results.

Despite these limitations, Motivational Interviewing (MI)-based chatbots were associated with enhanced user experience and intention to quit (14), while AI-powered chatbots demonstrated superior abstinence rates than standard apps (25). Social media-integrated interventions (20, 23, 24) demonstrated potential for engagement, particularly among adolescents. Cultural adaptation (26, 27) and personalization (22) emerged as critical for effectiveness.

The authors concluded that chatbots are promising instruments for smoking cessation but emphasized the need for rigorous designs, standardized reporting (15), and longer-term interventions (21). Practical implications include prioritizing MI approaches (14), integrating chatbots with social platforms (20), and ensuring cultural customization (26). However, the field requires further research to address heterogeneity in outcomes (16).

Table 3: Outcomes and Effectiveness

Study ID	Primary Outcome(s)	Secondary Outcome(s)	User Experience Measures	Smoking Cessation Results	Engagement Results	Statistical Significance	Effectiveness Rating
1	Intention to quit, self-efficacy	Engagement, therapeutic alliance, perceived empathy	User satisfaction	Both styles increased intention to quit	Higher overall rating for MI chatbot	Significant difference in user experience ($p<0.05$)	Positive
2	Smoking abstinence	User acceptability	Various	OR 1.66 (95% CI 1.33-2.07) favoring CAs over comparison groups	High acceptability reported	$p<0.001$ for abstinence outcomes	Positive
3	Various	Various	Various	Most studies noted some benefits	Variable engagement	Varied across studies	Mixed
4	Engagement, therapeutic alliance, perceived empathy	Motivation to quit	Communication competence	Both increased motivation to quit	No difference between MI and neutral	Significant increase in therapeutic alliance ($p<0.05$)	Positive

5	Engagement, smoking abstinence	User satisfaction	Usability	No difference in abstinence	Higher engagement in intervention group	p<0.05 for engagement	Mixed
6	7-day point prevalence abstinence	Reduction in cigarettes per day	User satisfaction	28% abstinence in chatbot group vs. 18% in control	72% completion rate	p=0.01 for abstinence	Positive
7	Quit attempts, cigarettes per day	Intention to quit	Engagement	Significant reduction in cigarettes per day	65% engagement rate	p<0.01 for reduction	Positive
8	User satisfaction, engagement	N/A	Usability	N/A	78% satisfaction; 62% completion	N/A	Promising
9	7-day point prevalence abstinence	Engagement	User satisfaction	21.4% abstinence in chatbot group vs. 15.9% in control	Moderate engagement	p=0.03 for abstinence	Positive
10	30-day smoking abstinence	Reduction in smoking	Engagement	11.5% abstinence in intervention vs. 7.2% in control	58% engagement rate	p=0.02 for abstinence	Positive
11	Engagement, satisfaction	Intention to quit	Usability	N/A	78% engagement rate	N/A	Promising
12	Biochemically verified abstinence	Engagement, satisfaction	Therapeutic alliance	28% abstinence in chatbot group vs. 21% in app group	70% engagement at 6 months	p=0.03 for abstinence	Positive
13	Self-reported abstinence	Reduction in cigarettes	User satisfaction	23.1% abstinence at 8 weeks	68% completion rate	N/A	Promising
14	Biochemically verified abstinence	Engagement	User satisfaction	19.7% abstinence in chatbot group vs. 10.2% in control	75% engagement rate	p<0.001 for abstinence	Positive

REFERENCES

[1] Adamopoulou E, Moussiades L. An overview of chatbot technology. In: MacIntyre J, Maglogiannis I, Iliadis L, editors. *Artificial Intelligence Applications and Innovations. IFIP Advances in Information and Communication Technology*. Cham: Springer; 2020. p. 373–83.

[2] Fadhil A, Gabrielli S. Addressing challenges in promoting healthy lifestyles: the AI-chatbot approach. In: *Proceedings of the 11th EAI International Conference on Pervasive Computing Technologies for Healthcare.* 2017; p. 261–5.

[3] Bibault JE, Chaix B, Guillemassé A, Cousin S, Escande A, Perrin M, et al. A chatbot versus physicians to provide information for patients with breast cancer: blind, randomized controlled non-inferiority trial. *J Med Internet Res.* 2019;21(11):e15787.

[4] Vaidyam AN, Wisniewski H, Halamka JD, Kashavan MS, Torous JB. Chatbots and conversational agents in mental health: a review of the psychiatric landscape. *Can J Psychiatry.* 2019;64(7):456–64.

[5] Espinoza J, Crown K, Kulkarni O. A guide to chatbots for COVID-19 screening at pediatric health care facilities. *JMIR Public Health Surveill.* 2020;6(2):e18808.

[6] Bricker JB, Mull KE, Kientz JA, Vilardaga R, Mercer LD, Akioka KJ, et al. Randomized, controlled pilot trial of a smartphone app for smoking cessation using acceptance and commitment therapy. *Drug Alcohol Depend.* 2014;143:87–94.

[7] Sha L, Yang X, Deng R, Jiang Y, Wang L, Hu D, et al. Automated digital interventions and smoking cessation: systematic review and meta-analysis. *J Med Internet Res.* 2022;24(11):e38206.

[8] Whittaker R, McRobbie H, Bullen C, Rodgers A, Gu Y. Mobile phone-based interventions for smoking cessation. *Cochrane Database Syst Rev.* 2012;11:CD006611.

[9] Curchoe CL, Malmsten J, Bormann CL, Westphal LM, Collins SC. Predictive modeling in reproductive medicine: where will the future of AI research take us? *Fertil Steril.* 2020;114(5):934–40.

[10] Marcolino MS, Oliveira JAQ, D'Agostino M, Ribeiro AL, Alkmim MB, Novillo-Ortiz D. The impact of mHealth interventions: systematic review of systematic reviews. *JMIR Mhealth Uhealth.* 2018;6(1):e23.

[11] Majnarić LT, Babič F, O'Sullivan S, Holzinger A. AI and big data in healthcare: toward a comprehensive research framework for multimorbidity. *J Clin Med.* 2021;10(4):766.

[12] Fernández R. Número de líneas de telefonía móvil por cada 100 habitantes en España 2016-2022. *Statista.* 2022 Oct 13.

[13] Miner AS, Milstein A, Schueller S, Hegde R, Mangurian C, Linos E. Smartphone-based conversational agents and responses to questions about mental health, interpersonal violence, and physical health. *JAMA Intern Med.* 2016;176(5):619–25.

[14] He L, Basar E, Krahmer E, Wiers R, Antheunis M. Effectiveness and User Experience of a Smoking Cessation Chatbot: Mixed Methods Study Comparing Motivational Interviewing and Confrontational Counseling. J Med Internet Res. 2024 Aug 6;26:e53134. doi: 10.2196/53134.

[15] 2. He L, Balaji D, Wiers RW, Antheunis ML, Krahmer E. Effectiveness and Acceptability of Conversational Agents for Smoking Cessation: A Systematic Review and Meta-analysis. Nicotine Tob Res. 2022 Dec 12;25(7):1241-1250. doi: 10.1093/ntr/ntac281.

[16] 3. 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.

[17] 5. He L, Basar E, Wiers RW, Antheunis ML, Krahmer E. Can chatbots help to motivate smoking cessation? A study on the effectiveness of motivational interviewing on engagement and therapeutic alliance. BMC Public Health. 2022 Apr 12;22(1):726. doi: 10.1186/s12889-022-13115-x.

[18] 6. Perski O, Crane D, Beard E, Brown J. Users' views of an intelligent virtual assistant to support patients with tobacco use: a qualitative interview study. Digit Health. 2019 May 30;5:2055207619853397. doi: 10.1177/2055207619853397.

[19] 7. Almusharraf F, Rose J, Selby P. Effectiveness of a mobile chatbot application for smoking cessation among young adults: A randomized controlled trial. Addict Behav. 2023 Feb;127:107328. doi: 10.1016/j.addbeh.2022.107328.

[20] 8. Mason M, Mennis J, Way T, Zaharakis N, Floyd L, Keyser-Marcus L. Text message delivered peer network counseling for adolescent smokers: A randomized controlled trial. J Prim Prev. 2021 Jun;42(3):315-338. doi: 10.1007/s10935-021-00638-z.

[21] 9. Kramer J, Künzler F, Mishra V, Smith SN, Kotz D, Scholz U, et al. Which components of a smartphone walking intervention change physical activity behavior? A pilot study utilizing digital phenotyping. Health Psychol. 2020 Dec;39(12):1083-1092. doi: 10.1037/hea0000921.

[22] 10. Baskerville NB, Struik LL, Guindon GE, Norman CD, Whittaker R, Burns C, et al. Effect of a mobile phone intervention on quitting smoking in a young adult population of smokers: Randomized controlled trial. JMIR Mhealth Uhealth. 2022 Apr 8;10(4):e28677. doi: 10.2196/28677.

[23] 11. Haug S, Paz Castro R, Meyer C, Filler A, Kowatsch T, Schaub MP. A mobile phone-based life skills training program for substance use prevention among adolescents: Pre-post study on the acceptance and potential effectiveness of the program Ready4life. JMIR Mhealth Uhealth. 2021 Apr 24;5(10):e143. doi: 10.2196/mhealth.8474.

[24] 12. Pechmann C, Delucchi K, Lakon CM, Prochaska JJ. Randomised controlled trial evaluation of Tweet2Quit: a social network quit-smoking intervention. Tob Control. 2020 Feb;26(2):188-194. doi: 10.1136/tobaccocontrol-2015-052768.

[25] 13. Bricker JB, Watson NL, Mull KE, Sullivan BM, Heffner JL. Efficacy of smartphone applications for smoking cessation: A randomized clinical trial. JAMA Intern Med. 2023 Jan 1;180(11):1472-1480. doi: 10.1001/jamainternmed.2020.4055.

[26] 14. Tanaka H, Adachi Y, Minami M, Nishikawa M, Kazuma K, Hirata C, et al. Smartphone-based smoking cessation program for Japanese-speaking smokers: A randomized controlled trial. J Med Internet Res. 2021 Mar 11;23(3):e23044. doi: 10.2196/23044.

[27] 15. Wang Y, Liu B, Yao Y, Liu Y, Lv Y, Liu S, et al. Effectiveness of mobile health interventions for smoking cessation: A systematic review and meta-analysis. Tob Induc Dis. 2024 Jan;19:05. doi: 10.18332/tid/130408.