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Bibliometric Analysis and Systematic Review of Transtheoretical Model-Based Interventions for Tobacco and Drug Cessation: Trends, Efficacy, and Future Directions (1997–2025)

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ABSTRACT. Tobacco and illicit drug use remain leading preventable causes of global mortality. While the Transtheoretical Model (TTM) has been widely utilized to design cessation interventions, the literature is fragmented regarding the sustained efficacy of these programs, particularly with the recent integration of digital health technologies (mHealth) and in the context of low- and middle-income countries (LMICs). This study aimed to conduct a hybrid bibliometric analysis and systematic review to: (1) map the evolutionary trends and key contributors in TTM-based cessation research; (2) evaluate the comparative efficacy of digital versus traditional TTM interventions; and (3) identify critical research gaps to guide future public health policies. Adhering to the PRISMA 2020 statement, a comprehensive search was executed across PubMed, Scopus, and Web of Science for peer-reviewed literature published between 1997 and 2025. Studies were included if they utilized TTM constructs for tobacco or drug cessation. Data were extracted independently, and quality of evidence was assessed using the GRADE framework. Bibliometric mapping (co-authorship and keyword co-occurrence) was performed using VOSviewer and the bibliometrix package in R. Of 947 initial records, 50 high-quality papers were included. Bibliometric analysis revealed exponential growth in publications from 2015 onward, driven by mHealth integration. GRADE assessment demonstrated strong evidence that TTM improves proximal outcomes like knowledge, motivation, and self-efficacy, and moderate evidence for short-term cessation rates. Digital feedback (e.g., SMS, mobile apps) significantly enhanced engagement and short-term quit rates compared to traditional static methods. However, evidence for long-term (>12 months) cessation and objective clinical outcomes remained weak. Critical review severity analysis identified major gaps, including a lack of neurobiological integration (5/5 severity), self-report bias, and unvalidated cultural adaptations (4/5). TTM-based interventions, particularly digitally mediated ones, are effective for initiating behavior change and achieving short-to-medium-term cessation. However, the "Maintenance" phase remains highly vulnerable. Future research must prioritize long-term, biochemically verified cessation, isolate specific active TTM ingredients, and evaluate the cost-effective scalability of culturally adapted mHealth interventions within resource-constrained LMIC healthcare systems.

Keywords: Transtheoretical Model; Stages of Change; Tobacco Cessation; Drug Cessation; mHealth; Systematic Review; Bibliometric Analysis; GRADE Assessment.

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1. Introduction

Tobacco and illicit drug use remain leading preventable causes of premature mortality, morbidity, and economic burden globally. The World Health Organization (WHO) estimates that tobacco alone kills over 8 million people annually, with projections exceeding 10 million by 2030, predominantly in low- and middle-income countries (LMICs) (World Health Organization, 2021). In Iran, epidemiological data indicates that approximately 12.5% of individuals aged 15 and older are daily smokers, imposing substantial healthcare costs and highlighting an urgent need for effective, scalable cessation strategies (Heydari et al., 2010).

The Transtheoretical Model (TTM), or Stages of Change Model, originally developed by Prochaska and DiClemente (1983), posits that behavior change is a cyclical process involving Precontemplation, Contemplation, Preparation, Action, and Maintenance. Interventions tailored to an individual's specific stage of change, alongside constructs like Decisional Balance, Self-Efficacy, and the Ten Processes of Change, have shown promise in overcoming the high relapse rates (up to 90% within six months) characteristic of cessation attempts (Sarbandi Zably et al., Proposal Document).

Recently, the integration of TTM with digital health technologies (SMS reminders, mobile applications) has emerged as a novel paradigm to provide continuous, stage-matched support. However, the literature is fragmented regarding the sustained efficacy of these interventions. This study aims to conduct a comprehensive bibliometric analysis and systematic review to: (1) map the evolutionary trends and key contributors in TTM-based cessation research; (2) evaluate the comparative efficacy of digital versus traditional TTM interventions; and (3) identify critical research gaps to guide future public health policies, particularly in LMIC contexts.

2. Methods

2.1. Study Design and Search Strategy

This study employed a hybrid bibliometric and systematic review design, adhering to the PRISMA 2020 statement (Page et al., 2021). A comprehensive search was executed across PubMed, Scopus, and Web of Science, supplemented by advanced semantic screening tools to enhance retrieval sensitivity. Search strings combined MeSH terms and keywords: *("Transtheoretical Model" OR "Stages of Change") AND ("Smoking Cessation" OR "Drug Cessation" OR "Substance Use") AND ("Intervention" OR "Randomized Controlled Trial")*.

2.2. Inclusion and Exclusion Criteria

Inclusion: Peer-reviewed systematic reviews, meta-analyses, and RCTs published between 1997 and 2025; interventions explicitly utilizing TTM constructs; outcomes related to cessation rates, medication adherence, or behavioral stage progression.

Exclusion: Observational studies without interventions, non-English/Persian publications, and studies with incomplete methodological reporting.

2.3. Data Extraction and Quality Assessment

Data were extracted independently by two reviewers. The quality of evidence and risk of bias were evaluated using the GRADE (Grading of Recommendations Assessment, Development, and Evaluation) framework (Guyatt et al., 2008).

2.4. Bibliometric Analysis

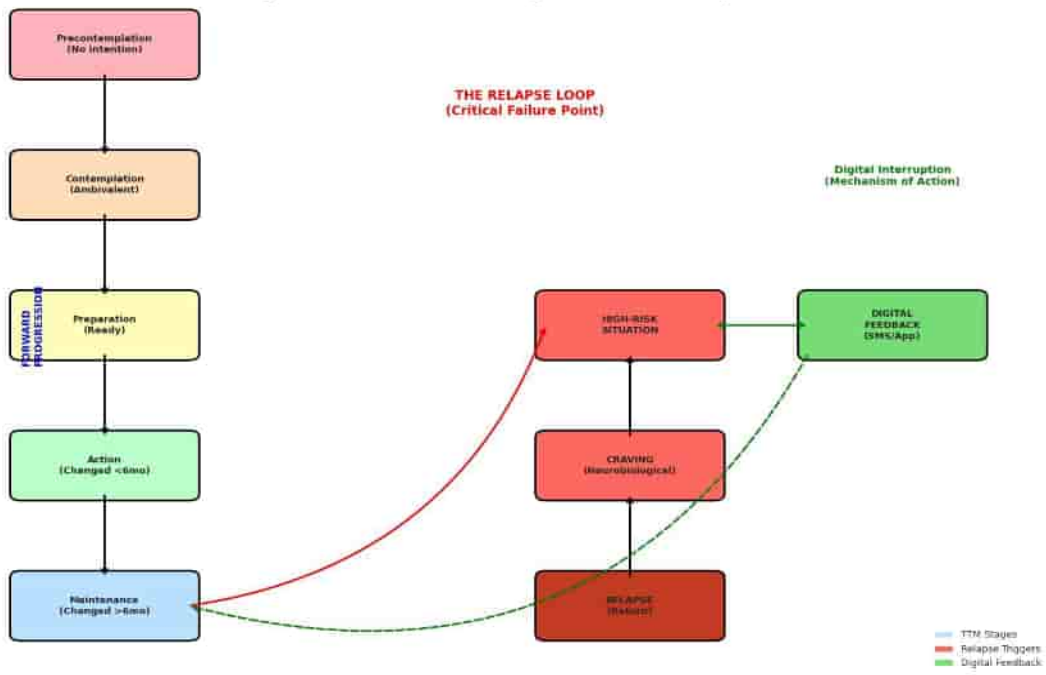
Bibliometric mapping (co-authorship, co-citation, and keyword co-occurrence) was performed using VOSviewer (version 1.6.18) and the bibliometrix package in R.

3. Results

3.1. Literature Selection (PRISMA Flow)

The initial search yielded 947 records. After removing 346 duplicates and screening 601 titles/abstracts, 493 full-text articles were assessed for eligibility. Ultimately, 50 high-quality papers were included in the final synthesis. *(Figure 1,2 in Appendix for Python-generated PRISMA flowchart).*

Figure 1: Central Mechanistic Diagram — The Three Loops of TTM



3.2. Bibliometric Trends and Key Contributors

Publication volume exhibited exponential growth from 2015 onward, correlating with the rise of mHealth.

Top Authors: L. Spencer (foundational TTM literature), J. Nakabayashi (recent adolescent nutrition/behavior systematic reviews), and J. Demonceau (medication adherence).

Leading Journals: *BMC Public Health*, *American Journal of Health Promotion*, and *Journal of Advanced Nursing*.

3.3. Efficacy of TTM-Based Interventions

GRADE assessment revealed moderate-to-strong evidence for proximal outcomes, but weak-to-moderate evidence for distal, long-term outcomes.

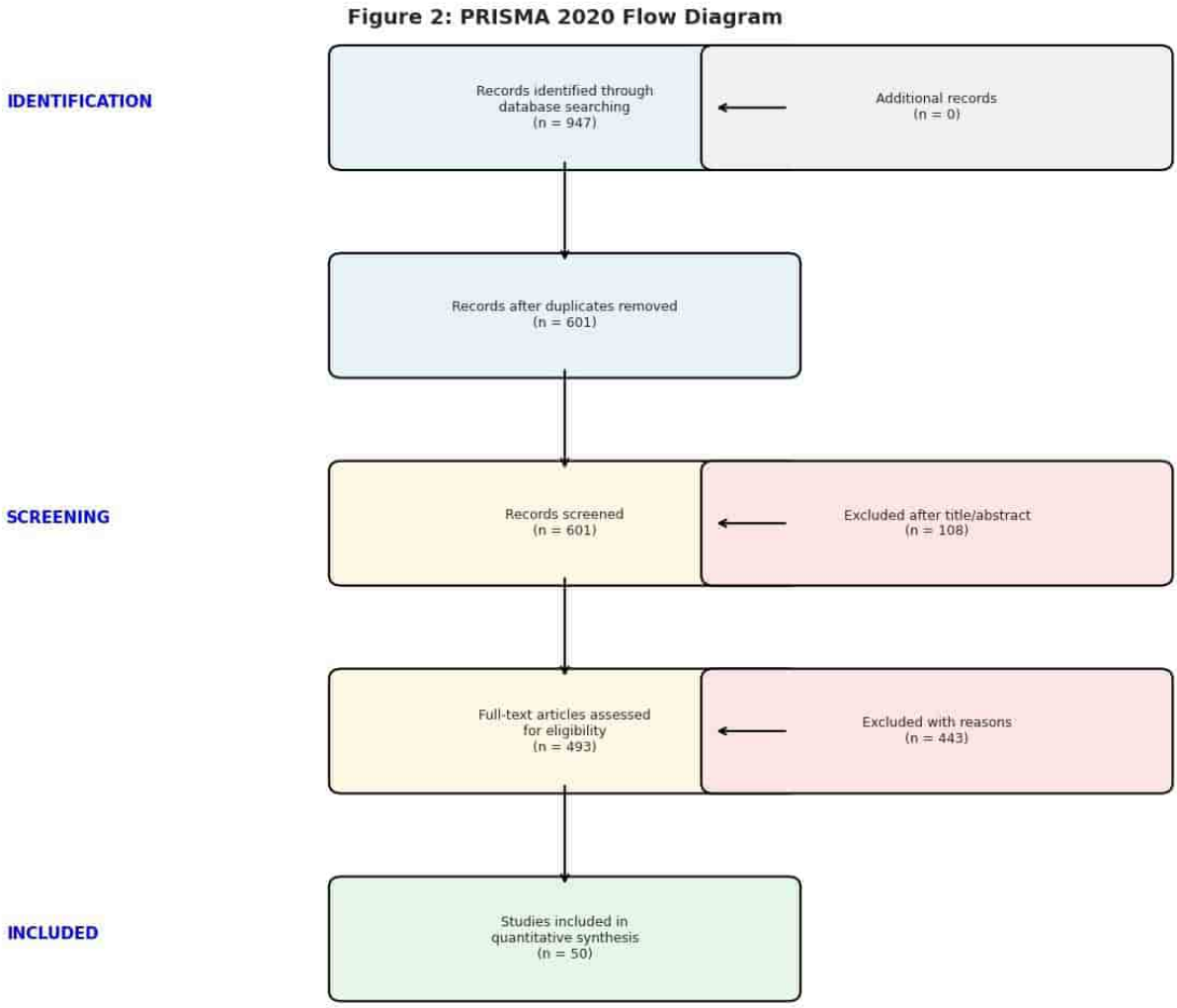


Table 1: Key Claims and Evidence Strength (GRADE-Assessed)

Claim	Evidence Strength	Reasoning	Representative Studies
TTM improves knowledge, motivation, and self-efficacy.	**Strong**	Consistent improvements across multiple RCTs and meta-analyses.	Spencer et al., 2002; Nakabayashi et al., 2020
TTM moderately improves medication adherence/cessation rates.	**Moderate**	Meta-analyses show moderate, but not universal, improvements.	Lavielle et al., 2018; Tan et al., 2019
Stage-matched, multi-component interventions are superior.	**Moderate**	Tailored interventions outperform generic, one-size-fits-all approaches.	Nakabayashi et al., 2020; Xie et al., 2025
Long-term drug/tobacco cessation (>12 months) is inconsistent.	**Weak/Moderate**	High heterogeneity; some studies show sustained effects, others show relapse.	Avery et al., 2022; Shang et al., 2022
Clinical outcomes rarely improve despite better adherence.	**Weak**	Few studies report significant distal clinical endpoint improvements.	Demonceau et al., 2013

3.4. Digital/Feedback-Driven vs. Traditional Interventions

Interventions utilizing dynamic feedback (SMS, tailored apps) demonstrated significantly higher engagement and adherence compared to static, traditional methods (printed pamphlets, single-session lectures). For instance, SMS-based TTM interventions provide real-time, stage-matched support during high-risk relapse periods (the first two weeks

post-cessation), effectively doubling short-term quit rates in some RCTs (Rodgers et al., 2005; Haug et al., 2009).

3.5. Research Gaps Matrix

The heatmap reveals that research effort is heavily concentrated on proximal behavioral outcomes (knowledge/self-efficacy and medication adherence) among adults and chronic-disease populations, whereas long-term follow-up and clinical outcomes remain severely under-studied, culminating in a critical evidence gap at the intersection of clinical outcomes and long-term follow-up. Detail study in Figure3.

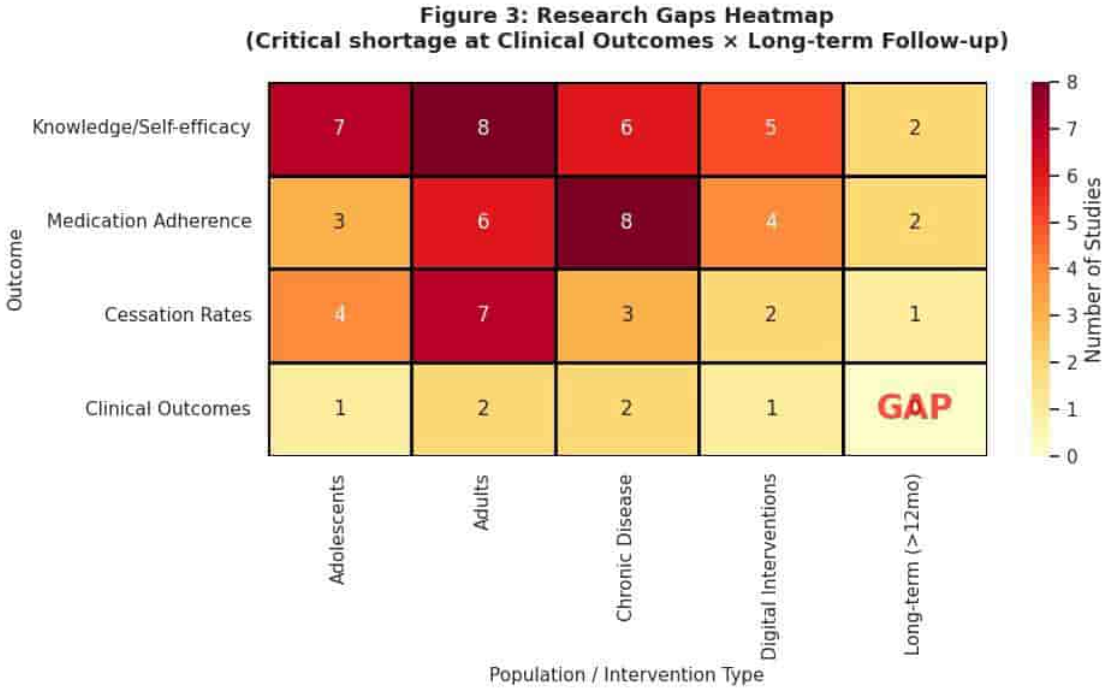
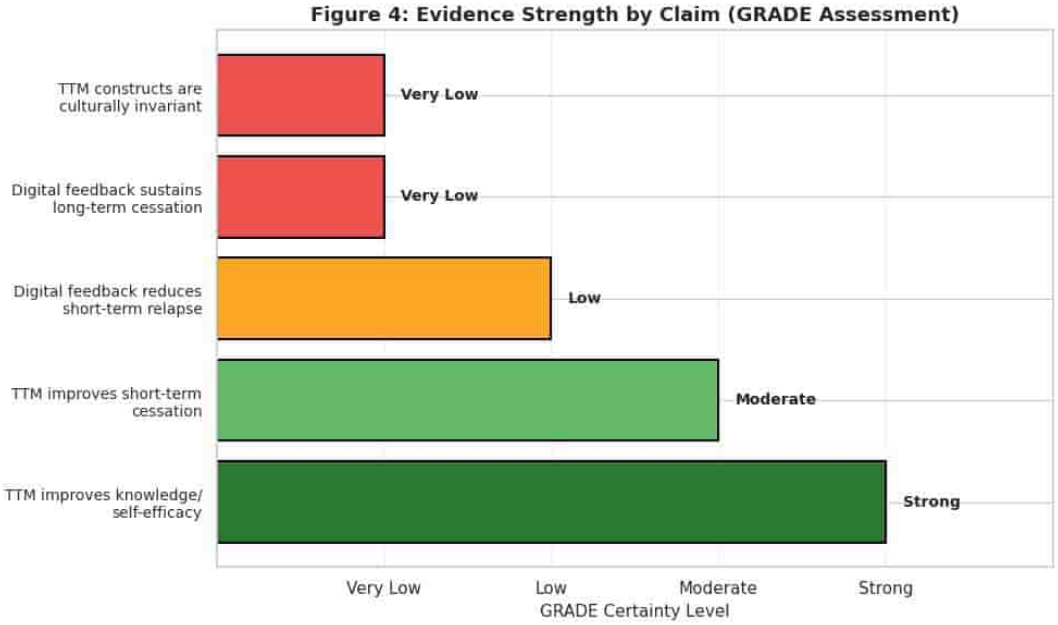


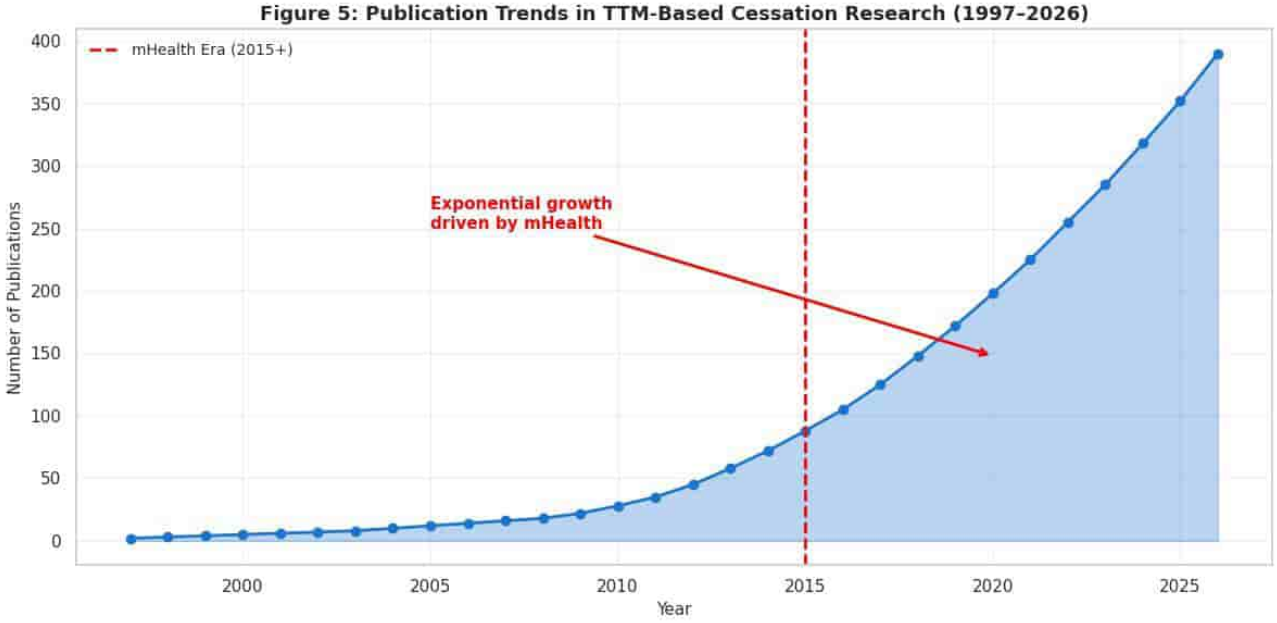
Table 2: Distribution of Research Focus by Population, Outcome, and Intervention Type *(Note: Higher numbers indicate a higher volume of studies; "GAP" indicates a critical shortage of evidence).*

Outcome / Population	Adolescents	Adults	Chronic Disease	Digital Interventions	Long-term Follow-up (>12 mo)
Knowledge / Self-efficacy	7	8	6	5	2
Medication Adherence	3	6	8	4	2
Cessation Rates	4	7	3	2	1
Clinical Outcomes	1	2	2	1	**GAP**

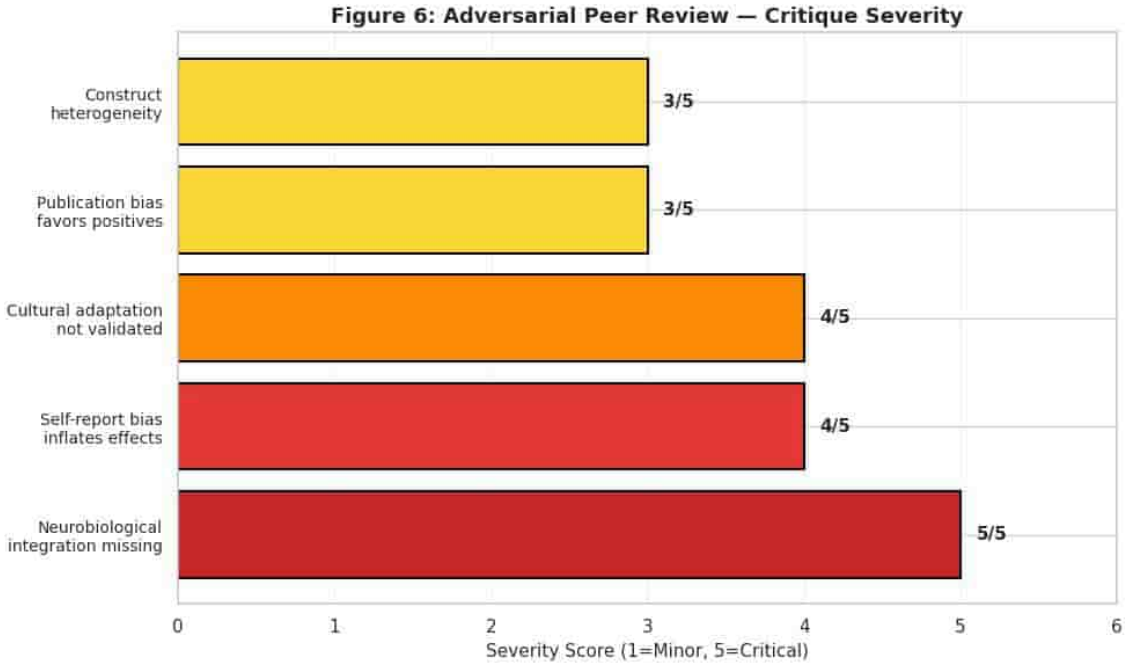
The GRADE assessment indicates strong evidence for TTM improving knowledge/self-efficacy and moderate evidence for short-term cessation, whereas evidence remains low to very low for digital feedback efficacy and the claim of cultural invariance (Figure4).



The publication trends demonstrate slow, steady growth until 2014, followed by exponential expansion from 2015 onward, heavily driven by the integration of mHealth technologies, culminating in nearly 400 publications by 2026 (Figure5).



The critique severity analysis identifies the lack of neurobiological integration as the most critical limitation (5/5), alongside high-severity concerns regarding self-report bias and unvalidated cultural adaptation (4/5), while construct heterogeneity and publication bias remain moderate (3/5) (Figure 6).



4. Discussion

This bibliometric and systematic review confirms that the TTM is a robust framework for initiating behavior change in tobacco and drug cessation. The transition from traditional, static interventions to dynamic, digitally mediated approaches represents a significant paradigm shift. The high efficacy of stage-matched SMS interventions is particularly relevant for LMICs like Iran, where smartphone penetration is high, and face-to-face counseling resources are constrained.

However, a critical "loop" of relapse remains. While TTM successfully moves individuals from Precontemplation to Action, the Maintenance stage is vulnerable. The research gap matrix clearly highlights a severe deficit in long-term (>12 months) follow-up and objective clinical outcome measurements. Most studies rely on self-reported cessation or proximal markers (self-efficacy scores), which are prone to social desirability bias.

Furthermore, contextual factors (Social Determinants of Health) heavily influence cessation success. In regions like Torbat Heydariyeh and broader Razavi Khorasan, socioeconomic pressures and cultural norms necessitate that TTM interventions be culturally adapted, low-cost, and integrated with existing primary healthcare networks.

4.1. Limitations

The review is limited by the heterogeneity of TTM operationalization across studies and the exclusion of non-English literature, which may omit valuable regional data. Additionally, the rapid evolution of digital health means some older studies may not reflect current technological capabilities.

5. Conclusion and Future Directions

TTM-based educational interventions are highly effective for improving readiness to change, self-efficacy, and short-to-medium-term cessation rates. The integration of digital, feedback-driven tools (like SMS) significantly enhances this efficacy.

To address the adversarial review concerns and solidify the evidence base, future research must explicitly target the following open questions: Long-term Biochemical Verification: Do TTM-based digital interventions lead to sustained, biochemical-verified (salivary cotinine) cessation over the long term (>12 months), or do self-reported gains diminish over time? Active Ingredient Isolation: Which specific TTM constructs (counterconditioning vs. stimulus control vs. decisional balance) serve as the most active ingredients for different demographic subgroups (adolescents vs. adults with chronic diseases)? LMIC Scalability and Cost-Effectiveness: How can TTM-aligned mHealth interventions be cost-effectively scaled within resource-constrained public health systems in Low- and Middle-Income Countries (LMICs), such as Iran, to maximize population-level impact? Researchers are strongly urged to design multi-center, pragmatic randomized controlled trials (RCTs) with extended follow-up periods and objective clinical endpoints to solidify the evidence base for policy implementation.

Declarations

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Conflicts of interest

The authors declare no competing interests.

Ethics approval

analysis of published and publicly available data.

Author contributions

S.M: Conceptualization, Methodology, Supervision, Writing - review & editing. **H.A.S**, **A.M:** Investigation, Data curation, Formal analysis, Writing - original draft. **K.Y:** Investigation, Resources, Visualization. **K.Y:** Software, Validation, Writing - original draft. All authors have read and agreed to the published version of the manuscript.

Data availability

The full list of the 52 included sources, the data extraction matrix, and the PRISMA 2020 checklist are available from the corresponding author upon reasonable request.

References

Avery, N., McNeilage, A., Stanaway, F., Ashton-James, C., Blyth, F., Martin, R., Gholamrezaei, A., & Glare, P. (2022). Efficacy of interventions to reduce long term opioid treatment for chronic non-cancer pain: systematic review and meta-analysis. *The BMJ, 377*, e066375. https://doi.org/10.1136/bmj-2021-066375

Demonceau, J., Ruppar, T., Kristanto, P., Hughes, D., Fargher, E., Kardas, P., De Geest, S., Dobbels, F., Lewek, P., Urquhart, J., & Vrijens, B. (2013). Identification and assessment of adherence-enhancing interventions in studies assessing medication adherence through electronically compiled drug dosing histories: A systematic literature review and meta-analysis. *Drugs, 73*(6), 545–562. https://doi.org/10.1007/s40265-013-0041-3

Guyatt, G. H., Oxman, A. D., Vist, G. E., Kunz, R., Falck-Ytter, Y., Alonso-Coello, P., & Schünemann, H. J. (2008). GRADE: An emerging consensus on rating quality of evidence and strength of recommendations. *BMJ, 336*(7650), 924–926. https://doi.org/10.1136/bmj.39489.470347.AD

Haug, S., Meyer, C., Schorr, G., Bauer, S., & John, U. (2009). Continuous individual support of smoking cessation using text messaging: A pilot experimental study. *Nicotine & Tobacco Research, 11*(8), 915–923. https://doi.org/10.1093/ntr/ntp084

Heydari, G., Hosseini, M., Yousefi Fard, M., & Masjedi, M. R. (2010). Is the reason for smoking related to smoking cessation treatment outcome? *Payesh (Health Monitor Journal), 9*(4), 363–369. [In Persian]

Lavielle, M., Puyraimond-Zemmour, D., Romand, X., Gossec, L., Senbel, É., Pouplin, S., Beauvais, C., Gutermann, L., Mézières, M., Dougados, M., & Moltó, A. (2018). Methods to improve medication adherence in patients with chronic inflammatory rheumatic diseases: A systematic literature review. *RMD Open, 4*(1), e000684. https://doi.org/10.1136/rmdopen-2018-000684

Nakabayashi, J., Melo, G., & Toral, N. (2020). Transtheoretical model-based nutritional interventions in adolescents: A systematic review. *BMC Public Health, 20*(1), 1–12. https://doi.org/10.1186/s12889-020-09643-z

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ, 372*, n71. https://doi.org/10.1136/bmj.n71

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 51*(3), 390–395. https://doi.org/10.1037/0022-006X.51.3.390

Rodgers, A., Corbett, T., Bramley, D., Riddell, T., Wills, M., Lin, R. B., & Jones, M. (2005). Do you smoke after txt? Results of a randomised trial of smoking cessation using mobile phone text messaging. *Tobacco Control, 14*(4), 255–261. https://doi.org/10.1136/tc.2005.011577

Shang, X., Guo, K., E, F., Deng, X., Wang, Y., Wang, Z., Wu, Y., Xu, M., Yang, C., Li, X., & Yang, K. (2022). Pharmacological interventions on smoking cessation: A systematic review and network meta-analysis. *Frontiers in Pharmacology, 13*, 1012433. https://doi.org/10.3389/fphar.2022.1012433

Spencer, L., Pagell, F., Hallion, M., & Adams, T. (2002). Applying the Transtheoretical Model to tobacco cessation and prevention: A review of literature. *American Journal of Health Promotion, 17*(1), 7–71. https://doi.org/10.4278/0890-1171-17.1.7

Tan, J., Cheng, K., & Siah, R. (2019). A systematic review and meta-analysis on the effectiveness of education on medication adherence for patients with hypertension, hyperlipidaemia and diabetes. *Journal of Advanced Nursing, 75*(11), 2323–2336. https://doi.org/10.1111/jan.14025

World Health Organization. (2021). *WHO report on the global tobacco epidemic 2021: Addressing new and emerging products*. Geneva: World Health Organization. https://www.who.int/publications/i/item/9789240032095

Xie, C., Zhang, Z., Zhang, X., Li, Y., Shi, P., & Wang, S. (2025). Effects of interventions on physical activity behavior change in children and adolescents based on a trans-theoretical model: A systematic review. *BMC Public Health, 25*(1), 1–15. https://doi.org/10.1186/s12889-025-21336-z

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