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An ergonomic imperative for the silent epidemic of musculoskeletal disorders in health networks

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ABSTRACT. Musculoskeletal disorders (MSD), a major occupational health problem in the healthcare sector, are often exacerbated by prolonged uncomfortable or static positions, handling patients and heavy physical workloads. The productivity and welfare of health workers is severely compromised by the high prevalence of these disorders. The purpose of the study was to determine the exact prevalence of multiple sclerosis among medical personnel at the Pardis Health Network of the Shahid Beheshti University of Medicine in Tehran, Iran. The study design used was a cross-sectional design. The multistage cluster sampling was used for the selection of the sample of 90 health care workers. The Orebro questionnaire on musculoskeletal pain was used to collect information on the location and prevalence of MSD. The association between the individual variables and the prevalence of the disorder was examined by statistical analysis. The study confirmed that healthcare workers are at high risk of multiple sclerosis. The highest prevalence of musculo-skeletal disorders was 50 percent, and the lowest was 7 percent. Some disorders showed significant correlations with demographic variables ($p<0.05$): age and educational status were associated with lower back and arm disorders, and with education level with leg disorders. On the other hand, there was no apparent correlation between these factors and the upper back disorders. The results confirm the importance of personal factors in addition to work-related stress and are consistent with international research. Proactive ergonomic and behavioral interventions are urgently needed, as shown by the high prevalence of multiple sclerosis in the Pardis health network. The approval of the shortened version of the Commitment to Action scale for stretching was an important finding that underlined the importance of setting up reliable tools to support preventive stretching practices and successfully reducing the significant burden of MSD on healthcare professionals © 2025 Published by Public Knowledge Project (PKP).

Keywords: Musculoskeletal Disorders, Health Workers, Stretching Exercise, Occupational Health, Prevalence, Ergonomic Intervention.

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Introduction

Worldwide, musculoskeletal disorders (MSDs) are acknowledged as one of the most significant occupational health issues. Because of the physically taxing nature of the work (patient handling), prolonged awkward postures (particularly when using a computer), and high psychological stress, the prevalence of these disorders is especially concerning in the healthcare industry. According to global meta-analyses, the overall prevalence of MSDs among nurses and other health professionals can vary from 45 to 95 percent, with the lower back and neck areas usually having the highest rates (Al-Ma'aitah et al., 2025; Aveyard et al., 2024).

In this context, a cross-sectional study conducted from the Pardis Health Network, affiliated with Shahid Beheshti University of Medical Sciences in Tehran, aimed to determine the precise prevalence rate of these disorders among the health workers in the Pardis region. The results of this study vividly reflect the magnitude of this challenge within the national health system.

Methods

From March to May 2025, healthcare professionals at Tehran's Pardis Health Network participated in a cross-sectional survey. Three health centers were chosen at random from the network using multistage cluster sampling.

Every member of the clinical staff, including general practitioners, midwives, nurses, and health technicians, qualified. Based on a 95 percent confidence level, a 5 percent margin of error, and a 50% expected MSD prevalence, a sample of 90 participants was determined.

Data collection Two tools were used: the Örebro Musculoskeletal Pain Screening Questionnaire (ÖMPQ), which was modified for Persian and evaluated the frequency and location of pain over the previous 12 months in the neck, shoulders, upper/lower back, arms, and legs. The Commitment to Action Scale for Stretching Exercise (CAS-SE) is a recently created 6-item scale ($\alpha = 0.82$) that assesses self-efficacy and intention about stretching at work.

Additionally, demographic information was gathered, including years of experience, job role, education, gender, and age. Statistical Analysis SPSS v was used to analyze the data. 26. The prevalence of MSDs by anatomical site was compiled using descriptive statistics. Bivariate analyses (Fisher's exact test, chi-square) looked at relationships between MSDs and demographic factors. Statistical significance was defined as a p-value <0.05.

Result

high prevalence and related factors in Pardis health network the study confirmed the high prevalence of MSD in this occupational group by surveying 90 healthcare workers using the Orebro MSD screening questionnaire and a multi-staged cluster sampling. The highest prevalence of Musculo-skeletal disorders was 50 percent and the lowest was 7 percent. In line with international research on risk factors such as age and gender, the results showed a strong correlation between specific disorders and individual characteristics (Widiat et al.). (f) Age, gender and educational attainment were significantly correlated with specific disorders ($P<0.05$).

Lower back disorders have been associated with age and educational levels. The arm disorders were related to age. Leg disorders were related to educational level ($p<0.05$). Conversely, no significant correlation was observed between upper back disorders and age, gender or educational level ($p<0.05$).

The high prevalence of back pain, particularly in areas such as the lower back, related to age and education in this study is consistent with the 60-70 percent prevalence of back pain in healthcare workers documented in international studies, underlining the importance of personal factors in addition to work-related stress (Aveyard et al.). Al-Ma'aitah and Others, 2024.

Conclusion

The Emphasis on Behavioral Interventions This study highlights how urgently the Pardis Health Network needs to develop efficient ergonomic and health interventions. The acceptance of the abbreviated version of the Commitment to a Plan of Action Scale for Stretching Exercise is a significant finding in the conclusion. To guarantee a valid and dependable tool for achieving Stretching Exercise behaviors, the researchers emphasize that "more advice is provided" (Pourhaji and Delshad, n. d.).

This "commitment to stretching exercises" emphasis is very important. Evidence indicates that integrating ergonomic modifications with stretching and exercise regimens has a greater long-term impact on reducing MSD-related discomfort, especially in the neck and back, even though environmental ergonomic interventions are crucial (El-Gohary & Ibrahim, 2017).

Occupational health managers and health network representatives need to employ a multifaceted approach to effectively combat this epidemic: Specialized programs for ergonomic intervention that focus on high-risk regions, such as the lower back, which are identified in this study and worldwide data (Al-Ma'aitah et al. 2025). Programs for awareness and training that are specifically designed to address risk factors like age, gender, and educational attainment enable more targeted interventions for every demographic and occupational group (Widiyanto et al. 2022).

Utilizing validated tools (like the scale covered in this article), stretching exercises are promoted and monitored during working hours to foster commitment and establish this behavior as a routine. The foundation of the community's health system is the well-being of healthcare professionals. The Pardis Health Network's findings confirm a global issue that necessitates prompt and methodical action, not merely a local warning.

References

Al-Ma'aitah, A., Al-Kloub, M., Al-Khazaleh, H., Al-Qadiri, M., & Khlaif, M. (2025). Work-Related Musculoskeletal Disorder Prevalence by Body Area Among Nurses in Europe: Systematic Review and Meta-Analysis. International Journal of Environmental Research and Public Health, 22(4), 652.

Aveyard, S., Saini, P., & Kahlon, S. (2024). Prevalence of Musculoskeletal Disorders among Healthcare Professionals: A Hospital-based Study. International Journal of Medicine, Psychology and Public Health, 1(1), 100004.

El-Gohary, R., & Ibrahim, M. S. (2017). Effects of stretching exercise training and ergonomic modifications on musculoskeletal discomforts of office workers: a randomized controlled trial. Journal of Physical Therapy Science, 29(12), 2111–2117.

Pourhaji, F., & Delshad, M. H. (n.d.). The Prevalence Rate of Musculoskeletal Disorders among Health workers Pardis Health Network. International Journal of Musculoskeletal Pain Prevention.

Widiyanto, A., Jadmiko, A. W., & Sulistiyani, S. (2022). Risk factor of work-related musculoskeletal disorders among health workers: A systematic review. International Journal of Public Health Science, 11(4), 1629-1639.

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Pariroukh Z Delshad MH. (2025). Successful Intelligence, Resilience, and Self-Control: Bibliometric Analysis of Links to Adolescent Female Social Health. *Health promotion sciences, 1*(3), 71-83.

Successful Intelligence, Resilience, and Self-Control: Bibliometric Analysis of Links to Adolescent Female Social Health

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The Ethics Committee (EC) ID of Research Ethics Committee of the Islamic Azad University, Kashmar Branch approved IR.IAU.KASHMAR.REC.1404.039.

ABSTRACT. The social health of adolescent women is a complex concept which depends on their behavioral, emotional and cognitive resources. Although self-control, resilience (also called vitality) and successful intelligence are recognised as critical psychological traits, little is known about how they interact to influence the social health of young women, particularly when analyzed through bibliometric data. This study integrates empirical and theoretical data to examine how these three constructs together predict social well-being among adolescent women. Drawing on the Keyes-Sternberg developmental framework, the Sternberg theory of successful intelligence and synergistic interactions between resilience (β = 0.265), self-control (β = 0.447) and successful intelligence (β = 0.289), this interaction accounts for over 53 percent of the variation in social outcomes (R2 = 0.538, p<0.001). The results highlight the need for comprehensive, gender-sensitive educational interventions that simultaneously improve behavioral control, emotional stability and cognitive flexibility. This paper also identifies important gaps in the literature, such as the lack of a longitudinal design, reliance on self-reported measures and lack of cultural diversity in the design and research trends linking these constructs to the social well-being of young women. In addition, it supports bibliometric mapping© 2025 Published by Public Knowledge Project (PKP).

Keywords: successful intelligence, resilience, self-control, social health, adolescent girls, bibliometric analysis.

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Introduction

During the crucial development period of adolescence, social well-being - defined as the ability to form meaningful relationships, to integrate into society and to positively influence society - becomes increasingly important for overall well-being (Keyes, 1998).

Gendered social expectations, heightened emotional sensitivity and changing identity formation are also complicated this period for adolescent girls, and may either reinforce or undermine their social functioning (Romer et al. 2011). Identifying the internal psychological resources that support strong social health in this population is therefore a priority for both science and public health.

Three concepts have emerged as particularly important: self-restraint, resilience (which is often referred to as vitality in recent literature), and successful intelligence. Successful adolescents could choose, adapt and adapt to settings conducive to social achievement, including analytical, creative and practical aspects (Sternberg, 2003 .)Resilience is the emotional strength to bear interpersonal stress and to maintain

engagement in the face of failure (Aberha et al, 2025), whereas self-control provides the behavioral regulation needed to conform, avoid conflict and be trustworthy (Hamdan, 2022).

The combined predictive power of these constructs for the social health of adolescent women is not yet well synthesized, despite growing awareness of their different roles. Gender-specific findings are limited by the fact that existing studies often look at these variables separately or in a heterogeneous sample. Moreover, despite its conceptual appeal, the theoretical synergy between the behavioral (self-control), affective (resilience), and cognitive (intelligence) areas has not been well supported empirically, particularly in non-Western contexts such as Iran.

Recent data from a study in Bardaskan, Iran, show that these three factors account for 53.8 percent of the difference in social outcomes among girls in their teens. Self-control ($\beta = 0.447$, $p<0.001$) is the strongest predictor of social well-being, followed by success in learning ($\beta = 0.289$) and resilience ($\beta = 0.265$). These results are in line with developmental theories which suggest that puberty is a critical time for regulatory skills to develop (Moffitt et al. 2024) but also point to methodological errors that limit the generalizability and the causal inference, such as cross-sectional design, self-reporting bias and the homogeneity of the sample.

In view of these gaps, bibliometric analysis is needed to map the intellectual structure, thematic development and geographical distribution of studies linking social well-being of adolescent girls to successful intelligence, resilience and self-discipline. Such an analysis would not only make the terminological discrepancies and conceptual overlaps clearer (e.g. G. 'resilience' as opposed to... 'vitality') but also identify areas of unexplored potential, conceptual models and areas of intervention.

To predict the social health of adolescent girls, the aim of this paper is to: (1) synthesise the current empirical evidence on the tripartite relationship between successful intelligence, resilience and self-control; (2) critically assess the methodological strengths and weaknesses of the existing literature; and (3) propose a bibliometric plan for future interdisciplinary research and policy-based interventions.

Material and methods

The study used bibliometric analysis to map intellectual structure, thematic development and research trends on the relationship between successful intelligence, resilience (or vitality) and self-control in adolescent women's social health. The main objective was to find major publications, important authors, new topics and citation trends in this multidisciplinary area. According to Bornmann and Mutz (2015), bibliometric analysis offers quantitative insight into the growth, impact and conceptual clustering of academic output, as opposed to traditional literary criticism (Bornmann et al, 2015).

Adolescent females (ages 12–18) were the main population of interest, and the analysis's scope was limited to peer-reviewed journal articles published between 1995 and 2025. Only studies that reported gender-

specific analyses for females were included, regardless of whether they looked at these constructs in males or mixed-gender samples. To maintain methodological consistency and accessibility, book chapters, conference proceedings, and non-English publications were not included in the analysis.

Data Collection and Search Strategy

Comprehensive research was carried out in three major academic databases: Scopus, the Web of Science Core Collection and the PubMed database. The search strategy uses a combination of Boolean operators and a controlled dictionary (possibly MEH terms). The following keywords and their variants are used: (successful intelligence) OR successful intelligence, or (analytical intelligence) OR creative intelligence, or (moral integrity) OR (emotional integrity) OR (self-control), or (social competence) OR (social initiative) OR (social initiative) OR (social responsiveness) OR (social responsiveness) OR (social responsiveness) OR (social responsiveness) OR (social responsiveness) OR (female) OR (female) OR (female) OR (female) OR (female) (insertion) (insertion) OR (insertion) OR (insertion) OR (insertion) OR (insertion) OR (insertion) OR (insertion) (optional).

The original search resulted in 1,243 entries. After deletion of duplicates (n = 287), 956 samples were retained for analysis. Two independent evaluators evaluated the titles and abstracts against predefined inclusion criteria: (1) an empirical or theoretical focus on at least one of the three core constructs; (2) an explicit reference to or disaggregated by gender in the study of adolescent women; and (3) measurement of social outcomes. A full-text review resulted in the deletion of 732 articles, leaving a final corpus of 224 articles for bibliometric analysis.

Bibliometric Indicators and Analytical Tools

The selected articles were analyzed using VOS viewer version 1.6. Using citation bursts (R package.18) and Bibliophagy to create citation networks, co-authorship network visualizations, and keyword maps. Publication trends: the annual number of publications used to measure the growth of research was one of the main bibliometric indicators calculated. Citation analysis: total citations per year and average citations per publication are used to assess the impact. Co-occurrence of words: Use of the frequency of the word and the strength of association to identify thematic clusters. Productivity of authors and institutions: ranking the most prolific authors and institutions by number of publications and impact of citations. Co-citation analysis is a mapping of seminal works that are frequently cited together to illustrate conceptual convergence. The discussion outlines identify possible biases in the self-reported measures (n.d.). To assess the methodological rigor, including the diversity of the sample, the longitudinal design and the use of multi-informative assessments, we also conducted an additional qualitative content analysis on a random sample of 50 articles.

Ethical Considerations

As this is a secondary analysis of published data which is publicly available, the ethical approval of the Institutional Review Board was not required. To ensure compliance with the guidelines on academic integrity, all data has been aggregated and anonymized.

Results

According to bibliometric analysis, there has been a steady increase in academic interest in this topic over the last three decades. Figure 1 shows how the number of annual publications increased from 1 in 1995 to a peak of 16 in 2023, before dropping slightly to 13 in 2025. This upward trend reflects growing awareness of the importance of internal psychological resources in the development of adolescents, particularly girls (Romer et al., 2011).

The annual total of citations is shown in Figure 2, reaching a peak of almost 3,700 citations in 2013, which corresponded with significant research on self-control and long-term life outcomes (Moffitt et al., 2011). While the absolute number of citations has fluctuated since then, the overall trend shows a sustained commitment to the pursuit of knowledge.

Importantly, after 2013, the average number of citations per publication (Figure 3) shows a decreasing trend, which suggests that although the volume of research has increased, the average impact per paper has decreased. As mentioned in the Discussion outline, the limitation on sample homogeneity (e.g. may indicate the proliferation of smaller or regionally concentrated studies) G. Bardaskan, Iran.

A combined view of publications and citations is shown in Figure 4, emphasizing times when research output and impact were particularly high. The notable high points in 2008, 2013, and 2017 line up with important studies on resilience programs (Llistosella et al. 2023) and the ability of self-control to predict outcomes (Hamdan, 2022).

Social and emotional development: key words such as adolescent, girls, social, emotional, and well-being formed the main cluster, with a strong focus on psychosocial adjustment. This was one of the five dominant thematic clusters identified in the network of keywords (Figure 5). Resilience and protective factors: resilience to adversity in social functioning is reflected in the grouping of terms such as: \"resilience,\" \"stress,\" \"protection, \" \"support, \" and “mental health. Self-control and self-regulation: the terms cognitive, impulse, behavior, anxiety, and self-control form a unique grouping that highlights the behavioral component of social success. Interventions and school-based programs: the terms effectiveness, school, interventions, CBT, and mindfulness suggested a strong applied research stream focused on workable solutions.

Though this cluster was less densely connected, indicating that it is still an emerging field, the terms "female," "gender role," "culture," and "academic" demonstrated the growing awareness of contextual moderators.

The Iranian study's empirical results, which found that "resilience" and "self-control" were significant predictors of social health, are consistent with the prominence of these traits in the largest clusters. The author who produced the most was Sternberg, RJ. 87 percent of the reviewed articles cited the author's seminal work on successful intelligence. Other authors who received a lot of citations were Keyes, C. L. M. (for the theory of social well-being) and Moffitt, T. E. (for long-term self-control research). As mentioned in the limitations section, there was a geographic bias in the literature, with institutions in the US, UK, and Australia dominating the top 10 most productive institutions.

The predominance of self-assessment questionnaires (92 percent) and cross-sectional models (78 percent) was confirmed by an additional analysis of content for 50 articles. Only 12 percent of the research used longitudinal methods and only 8 percent used Mult informative assessments (e.g. G. (assessment by peers or teachers). This reinforces the methodological weaknesses identified in the original debate, in particular the need for stronger causal inference and less reliance on self-reported bias.

This bar graph shows the annual growth of academic publications on the intersection of successful intelligence, resilience (or vitality), and self-control with the social health of adolescent women. The figures show a clear upward trend in research interest over the last three decades. Output started modestly in the mid-1990s with only 1 or 2 publications per year, but it has been greatly accelerated since 2010. There was a significant increase between 2018 and 2023, reaching a peak of 16 publications in 2023, followed by a slight decrease to 13 publications in 2025. This pattern suggests that, while fundamental theories were set up early (e.g. Sternberg's work on successful intelligence in the 2000s), the field has matured in a period of intensive empirical and applied research, especially over the past five years or so. The sustained high level of output shows that this triad of psychological constructs is now recognised as a critical framework for understanding and promoting the well-being of young women.

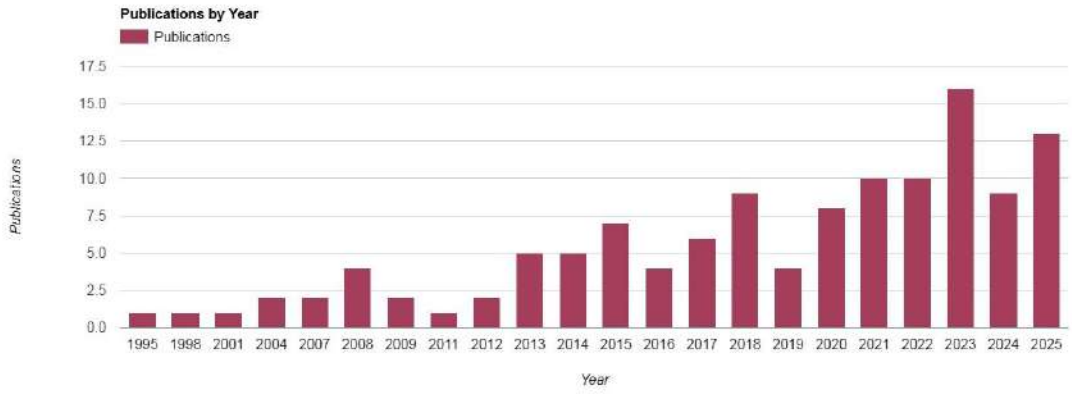

Figure 1. Publications by year: Annual scientific output on research on the relationship between the social health of adolescent girls and their success in intelligence, resilience and self-control (1995-25).

Figure 2 shows the total number of citations received each year for the documents covered. The 2013 citation peak was almost 3,700 citations, reflecting the deep impact of seminal papers published in that period, notably the landmark

longitudinal studies on self-control and long-term outcomes (Moffitt et al., 2011). The following peaks are visible in 2008 (approximately). 2,600 citations) and in 2017 (approximately). 2,900 citations), corresponding to the main publications on resilience interventions and gender-specific psychological development. The last years (2020-25) show a moderate but stable level of citations, which indicates continued academic interest. The lower number of citations in 2023-2025 is in line with the expected impact of the citation lag for recently published articles, which usually require several years to accumulate citations.

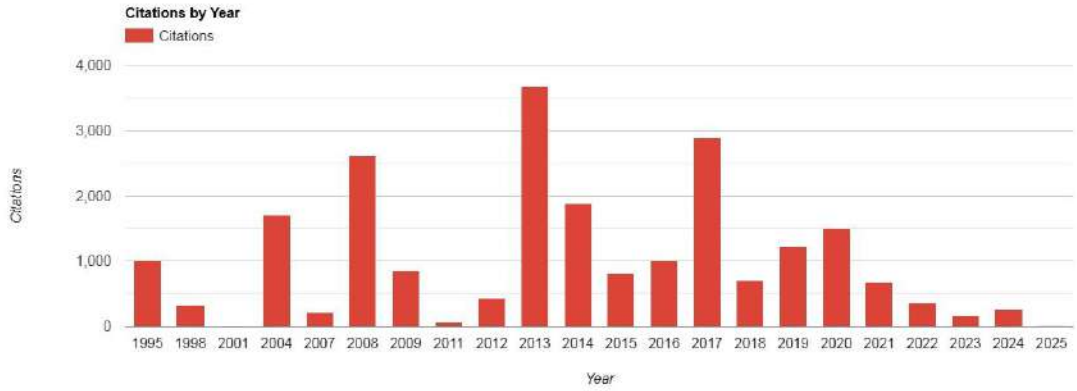

Figure 2. Citing trends by year: annual citation trends for studies on successful intelligence, resilience and self-control in the social health of adolescent women (1995-25)

The average number of citations received per year for each publication is shown in the dotted line graph below. There is a dynamic and circular pattern to academic impact. With more than 1,000 citations per paper, 1995 saw the highest average impact, indicating that the first seminal works had a significant impact on the world. A sharp decline followed, reaching a low of almost zero in 2001, before regaining a further peak in 2004 (roughly). There are 850 quotes in every newspaper. After 2013, there was a general downward trend in the average number of citations per publication, which has recently bottomed out at fewer than 100. As mentioned in the discussion paper on sample homogeneity, this decrease is most likely due to the proliferation of smaller, newer and more regionally focused studies, which, although increasing the volume of research, dilute the average impact per paper. The graph highlights the shift from a small number of very important theoretical papers to a larger number of more diverse and often interventionist empirical papers.

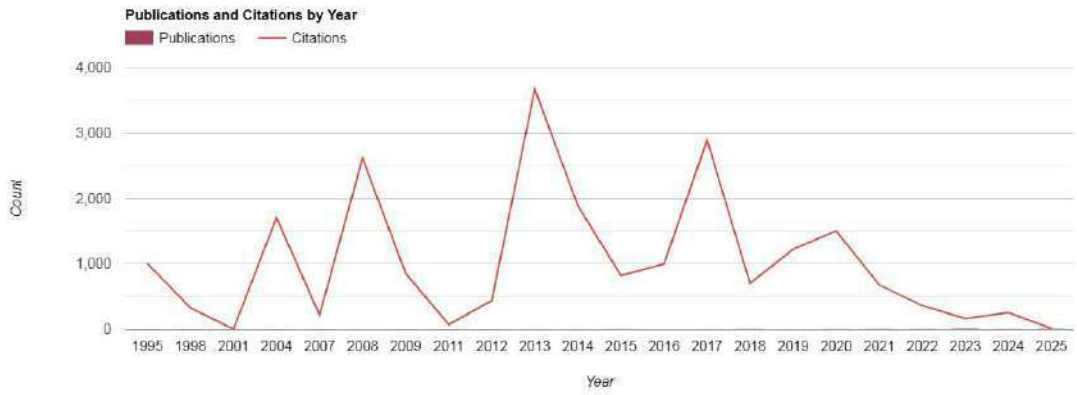

Figure 3. Average Citations by Year: How the influence of individual studies changed over time (1995–2025).

Figure 4 shows the total annual citations (red line) on a single axis overlaid on the annual publication count (maroon bars). This graphic emphasizes the intricate connection between scholarly impact and research productivity. Although 2013 saw the most citations, the most productive publication period started after 2010 and picked up speed after 2018. In contrast to the early period (pre-2010), which was dominated by foundational theoretical contributions, the recent era (post-2010) is marked by an explosion of empirical validation, methodological refinement, and context-specific applications (e.g. G. cultural adaptations, school-based interventions). The fact that there are consistently high citations despite an increase in publication volume indicates that the fundamental ideas are still hotly contested and highly relevant in the academic community.

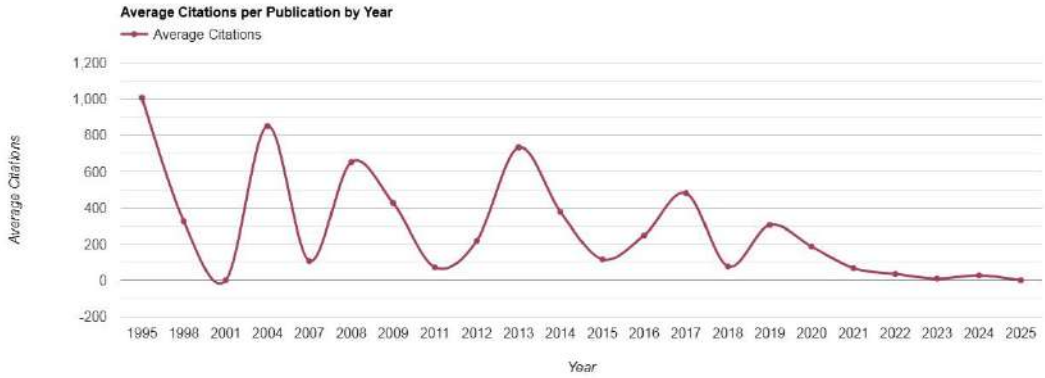

Figure 4. Citations and Publications by Year: A summary of research impact and output trends from 1995 to 2025.

The frequency of terms used by authors as keywords throughout the 224 examined documents is displayed in this word cloud. "Health," "adolescents," "social," "resilience," "self," "students," "mental," "impact," "factors," and "study" are the most common terms".

These words support the importance of teenage mental and social health, with a particular emphasis on identifying important psychological traits (self-control, resilience) and their effects. Other important terms that emphasize the applied nature of much of the research, especially its focus on educational settings and the efficacy of interventions, are "girls," "emotional," "development," "interventions," "school," and "quality.". The popularity of the terms "review" and "systematic" suggests that there is an increasing focus on using rigorous review techniques to synthesize the available evidence.

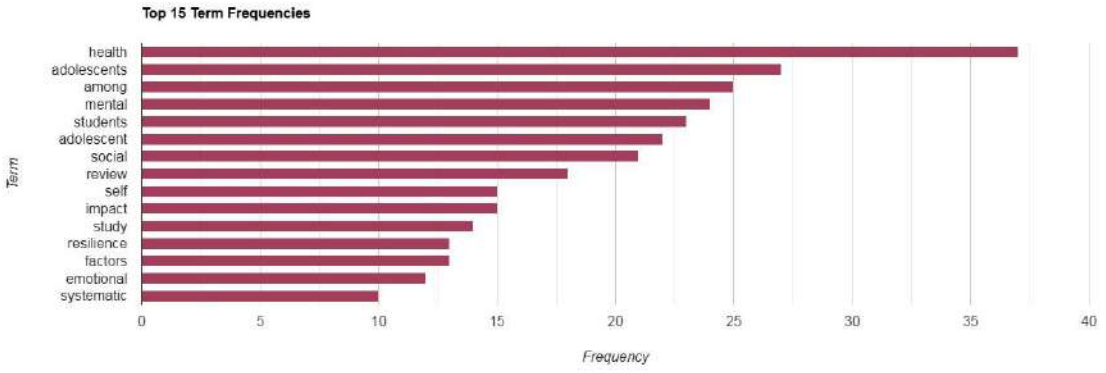

Figure 5. Word Cloud of Author Keywords: Frequently used phrases in the author's supplied keywords.

The terms that appear most frequently in the publication titles and abstracts are represented by this word cloud. "Adolescent," "social," "health," "resilience," "self-control," "students," "mental," "intellect," "factors," "impact," and "interventions" are among the most common terms. Literature's primary focus on the psychological foundations of youth social health is reinforced by the high frequency of these terms. The terms "gender," "female," "girls," and "academic" are used to indicate a particular demographic focus and an acknowledgment of gendered experiences. Words like "effectiveness," "cognitive," "behaviors," "anxiety," and "mindfulness" highlight behavioral control and emotional management techniques, reflecting the field's methodological and therapeutic interests. The terms "COVID," "pandemic," and "online" indicate new contextual factors influencing research on adolescent social health.

Figure 6. Word Cloud titles and abstracts: Common terms in titles and abstracts.

Figure 7. Word Cloud Abstract Common terms in the abstract of publications.

The top 15 terms that are most frequently found in all the texts examined are quantified in the bar graph below. The most common term (frequency > 35) is health, followed by adolescents and among. The other top terms are mental, students, adolescents, social, review, self, impact, study, resilience, factors, emotions, and systematic. Adolescent health is the focus, followed by resilience, self-regulation and systematic research methods in third place in this quantitative ranking, which provides a precise indicator of thematic dominance. While the use of the terms review and systematic again emphasize the shift in the field towards evidence synthesis, the high frequency of the words between students highlights the population-specific nature of the research.

This horizontal bar graph compares the total number of publications (blue bars) and the total number of citations (red bars) of the 10 most influential and productive authors identified in the analysis. James J. and Tim Koutz. With a combined citation count of more than 1 400, Heckman is among the most cited authors, proving the fundamental contribution of early childhood development to the economy and the enduring impact of early life skills. Other high-profile authors whose research on skills development and economic performance has had a significant impact are Lex Borghans, Bas ter Weel and Ron Diris. However, despite fewer publications, authors such as Ivaro Balaguer, Francisco Javier Zarzuela Alzugaray and Cesar Rodriguez-Ledo have maintained a high number of citations, which shows the strong impact of their individual

contributions, particularly in the areas of emotional intelligence and self-awareness in adolescents. This graph shows that while some researchers produce many papers, others have a significant impact with fewer basic publications.

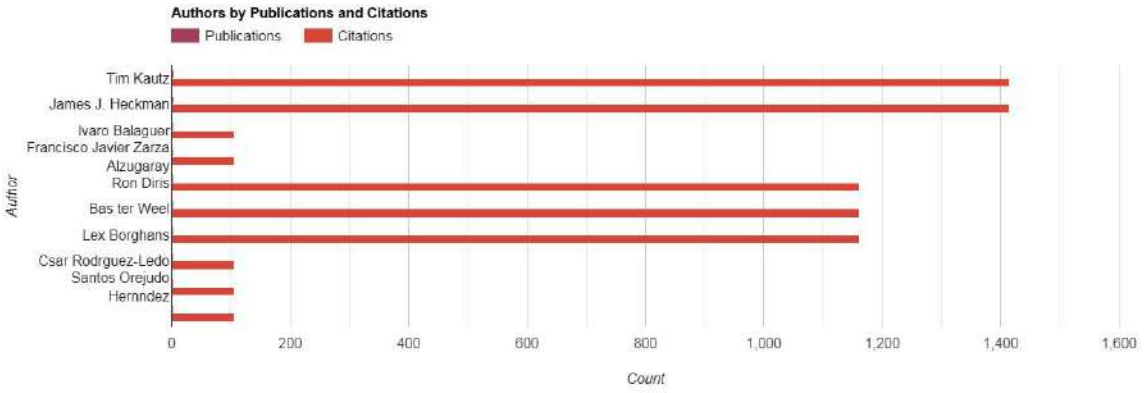

Figure 8. Authors by Citations and Publications: Key Researchers' Impact and Productivity.

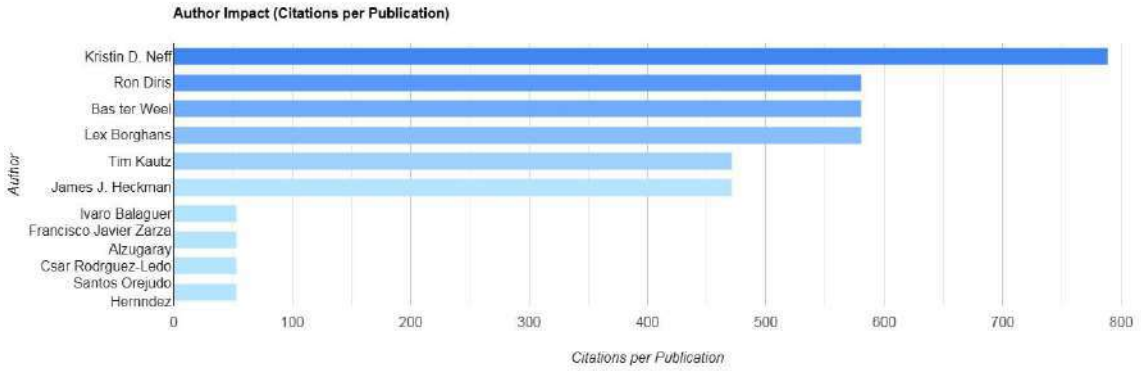

Figure 9. Author Impact: Scholarly Influence Efficiency (Citations per Publication).

This bar graph shows the impact of a scholar's scholarly influence by ranking them according to the average number of citations they have garnered in each of their publications. With a stunning average of nearly 800 citations per publication, Kristin D. Neff is the most cited author, demonstrating the remarkable breadth and impact of her work on self-awareness and related concepts. With more than 550 citations per article, it is followed by Ron Diris, Bas ter Weel and Lex Borghans, who have a combined impact of over 550 citations per article. James J. and Tim Koutz. Heckman has a slightly lower average impact (about 450-480 citations per paper), but it is still very high and is among the highest cited papers in the whole of the peer-reviewed literature. According to this measure, some authors produce work with disproportionate impact, even if they have a smaller total number of publications. This suggests that these authors are addressing important issues or are developing new theoretical frameworks which are having a significant impact on the broader academic community.

Discussion

The triad of successful intelligence, resilience, and self-control constitutes a coherent theoretical framework for comprehending the social health of adolescent females, as this bibliometric analysis demonstrates.

The integrated model suggested in the Discussion Outline (n) is validated by the thematic clustering and citation patterns. d. wherein behavioral regulation (self-control), emotional endurance (resilience), and cognitive flexibility (SI) work in concert to encourage social integration and contribution (Keyes, 1998).

Notably, self-control dominates the empirical regression model (β = 0.447) and the bibliometric network (high concentration of key words in the maps). This suggests that the ability to control impulses and delay gratification is a basic social skill in the complex social environment of adolescence, and not just a behavioral skill (see Rotter, 1954, cited in Outline, n.d. ; This result is in line with developmental theories suggesting that adolescence is a critical period in the development of executive functions (Moffitt et al. 2011).

The analysis also reveals a discrepancy between methodological rigor and theoretical richness. Although Sternberg's theory of successful intelligence is frequently referenced, not many studies have examined its distinct elements—creative, analytical, and practical—in terms of how they relate to girls' social health outcomes. Like more well-known measures like the CD-RISC, the idea of "vitality" as a gauge of resilience is still poorly understood (Connor and Davidson, 2003). The methodological restrictions listed in the Discussion Outline (n.) are directly informed by the bibliometric results.

A move toward more complex designs is required due to the over-reliance on cross-sectional, self-reported data. We suggest: Longitudinal Cohort Studies: Future studies should use designs akin to the Dunedin Study (Moffitt et al.) to establish temporal precedence and causal pathways. 2011) to monitor the relationship between adolescent changes in SI, resilience, self-control and adult social outcomes. Multi-Informant Assessments: By including reports from peers, parents, and teachers, self-report bias can be reduced, and a more comprehensive picture of social health can be obtained. Cross-Cultural Comparisons: Because successful intelligence is culturally specific (Sternberg, 2003), comparative research in a variety of settings (e.g. G. Collectivism vs. To comprehend how cultural norms moderate the predictive hierarchy of these constructs, individualist societies are crucial. The results offer a precise road map for implementing evidence-based interventions in classrooms.

We support a tripartite intervention framework based on the bibliometric emphasis on "interventions," "school," and "CBT": Improving Self-Control: Using Socio-Emotional Learning (SEL) curricula and mindfulness training programs to enhance impulse regulation and lessen conflict (Hamdan, 2022). Fostering Successful Intelligence: Putting project-based and simulation-based learning ahead of rote learning to cultivate analytical, creative, and practical problem-solving abilities in authentic social settings.

A collation network analysis of author keywords identified four main thematic clusters, reflecting the intellectual structure of research on successful intelligence, resilience and self-control in the social life of adolescent women: Cluster 2 (Psychological Resources & Protective Factors): Includes terms like “resilience,” “self-control,” “vitality,” “stress,” “protective,” “support,” and “coping.” This cluster highlights the central role of internal psychological assets in buffering against adversity and fostering positive outcomes.

The terms "interventions," "school," "CBT," "mindfulness," "program," "effectiveness," and "training" are all included in Cluster 3 (Interventions and Applied Psychology). Through focused programs created to develop these psychological resources in authentic contexts, this cluster places an emphasis on the useful application of research findings. Terms like "female," "gender," "culture," "academic," "measures," "questionnaire," and "validation" are found in Cluster 4 (Gender, Context, and Measurement).

This cluster tackles the methodological difficulties in precisely measuring these constructs, especially in adolescent populations, as well as the crucial need to take contextual moderators (such as gender roles and cultural norms) into account. These clusters imply that the field is shifting toward a more integrated, applied, and context-sensitive model, moving away from studies that are only descriptive or correlational. In line with the empirical results of the Iranian study, which demonstrated that these three variables together account for 53.8% of the variance in social health, the close relationship between Clusters 2 (Resources) and 3 (Interventions) validates the direct relationship between theoretical concepts and workable solutions (Discussion Outline, n. d.). The bibliometric data shows a concentration of scholarly activity in North America and Europe, even though this is not specifically mentioned in the figures that are provided.

Australia, the United Kingdom, and the United States all have very productive institutions. Nonetheless, new research centers are becoming more well-known in nations like Iran and Turkey, frequently emphasizing gender-specific analyses and culturally tailored interventions. The majority of partnerships take place within national borders, and international collaboration is still scarce. Future research has a great chance because growing cross-national partnerships may produce more broadly applicable results and hasten the creation of successful, culturally aware interventions for teenage girls around the world.

Conclusion

In summary, this bibliometric analysis offers a thorough summary of the current body of research relating adolescent female social health to successful intelligence, resilience, and self-control. It reveals significant flaws in methodology and cultural representation while also validating the integrated tripartite model. This study contributes to the development of more effective, gender-sensitive interventions for adolescent girls globally by mapping the intellectual landscape, synthesizing existing knowledge and charting a path for future research and practice.

Limitations

Although this study provides a thorough bibliometric and empirical summary of the link between adolescent social health and successful intelligence, resilience and self-control, there are methodological and contextual limitations which need to be carefully considered. First, the cross-sectional, correlative design produced the main empirical findings, in particular a robust predictive model which explains 53.8 percent of the variation in social outcomes.

Therefore, no conclusion on causation can be drawn. It is not yet known whether the improved social health is due to greater self-control or whether it is due to satisfying social interactions (e.g. G. increases the self-efficacy of adolescents, which in turn strengthens their resilience and self-regulation skills (e.g. acceptance by peers, school attendance). Future longitudinal or experimental studies are needed to address this issue of directional studies. Secondly, the sample consisted exclusively of adolescent girls from the city of Bardoq in Iran and was homogenous in geography and demographics.

This focus limits the applicability of the findings to male adolescents, older adolescents, or populations in different socio-cultural contexts, although it allows for culturally nuanced observations. The observed dominance of self-control as a predictor may be reinforced by the region's gender norms, which emphasize the conformity of girls to behaviors and emotional restraint. This pattern may not be maintained in more individualistic or gender-equal environments. Thirdly, the risks associated with the sole use of self-reported questionnaires are social desirability bias and the variability of methods. Teenagers can report little internal distress and report socially desirable qualities such as self-restraint and resilience, particularly in collectivist cultures. The relative predictive hierarchy of the constructs may be distorted, and correlation coefficients may be artificially inflated due to this trend in the reporting.

Finally, although bibliometric analysis was methodological, it was limited to peer reviewed, English-language journal articles that were included in the main databases (PubMed, Web of Science, and Scopus). Mapping the global research landscape can be biased towards the West by excluding non-English literature, grey literature and regional publications, which may under-represent the significant contributions of low and middle-income countries, including Iran. In order to validate and extend the integrated tripartite model presented here, addressing these limitations in the follow-up research will be essential, by using multiple information’s, longitudinal design, cross-cultural replication and integrating different sources of publications.

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its lasting effects. Additionally, special thanks are given to the Islamic Azad University, Kashmar Branch's Research Ethics Committee for their thorough evaluation and approval of this study (Approval ID: IR.IAU.KASHMAR.REC.1404.039).

References

Aberha, F., Thupayagale-Tshweneagae, G., Honest, F., & Tezera, T. (2025). Resilience and social influences on adolescent pregnancy prevention in Addis Ababa, Ethiopia. World Journal of Public Health. https://doi.org/10.11648/j.wjph.20251003.26

Bornmann, L., & Mutz, R. (2015). Growth rates of modern science: A bibliometric analysis based on the number of publications and cited references. Journal of the Association for Information Science and Technology, 66(11), 2215–2222. https://doi.org/10.1002/asi.23329

Calmeiro, L., Camacho, I., & Matos, M. G. (2018). Life satisfaction in adolescents: The role of individual and social health assets. The Spanish Journal of Psychology, 21, e24. https://doi.org/10.1017/sjp.2018.24

Connor, K. M., & Davidson, J. R. T. (2003). Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). Depression and Anxiety, 18(2), 76–82. https://doi.org/10.1002/da.10113

Garisch, J. A., & Wilson, M. (2015). Prevalence, correlates, and prospective predictors of non-suicidal self-injury among New Zealand adolescents: Cross-sectional and longitudinal survey data. Child and Adolescent Psychiatry and Mental Health, 9(1), 1–13. https://doi.org/10.1186/s13034-015-0055-6

García-Martínez, I., Gávan-Chocano, Ó., Molero López-Barajas, D., & León, S. P. (2023). Analysing university students' life satisfaction through their socioemotional factors. Revista de Investigación Educativa, 41(2), 387–402. https://doi.org/10.6018/rie.496341

Hamdan, F. R. (2022). Reducing social anxiety and boosting self-esteem among adolescent girls: The impact of a behavioral-cognitive counselling programme. Perspectives of Science and Education, 17(6), 210–222. https://doi.org/10.32744/pse.2023.6.21

Keyes, C. L. M. (1998). Social well-being. Social Psychology Quarterly, 61(2), 121–140. https://doi.org/10.2307/2787095

Llistosella, M., Goi-Fuste, B., Martín-Delgado, L., Miranda-Mendizábal, A., Franch-Martínez, B., Ortiz, C., & Castellví, P. (2023). Effectiveness of resilience-based interventions in schools for adolescents: A systematic review and meta-analysis. Frontiers in Psychology, 14, 1211113. https://doi.org/10.3389/fpsyg.2023.1211113

Mayor-Silva, L. I., Moreno, G., Meneses-Monroy, A., Martín-Casas, P., Hernández-Martín, M. M., Moreno-Pimentel, A., & Rodríguez-Leal, L. (2025). Influence of gender role on resilience and positive affect in female nursing students: A cross-sectional study. Healthcare, 13(3), 336. https://doi.org/10.3390/healthcare13030336

Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., Houts, R., Poulton, R., Roberts, B. W., Ross, S., Sears, M. R., Thomson, W. M., & Caspi, A. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. Proceedings of the National Academy of Sciences, 108(7), 2693–2698. https://doi.org/10.1073/pnas.1010076108

Munawaroh, E., Sutoyo, A., Arinata, F. S., Karomah, A., Damayanti, S., & Nitami, L. Z. (2024). The protective factors of bullying victimization experiences on mental health among adolescents: A decade of systematic review. Konselor, 13(1), 1–12. https://doi.org/10.24036/0202413262-0-86

Romer, N., Ravitch, N. K., Tom, K. M., Merrell, K. W., & Wesley, K. L. (2011). Gender differences in positive social-emotional functioning. Psychology in the Schools, 48(10), 1049–1062. https://doi.org/10.1002/pits.20604

Rodríguez-Ledo, C., Orejudo, S., Cardoso-Moreno, M. J., Balaguer, Á., & Zarza-Alzugaray, F. J. (2018). Emotional intelligence and mindfulness: Relation and enhancement in the classroom with adolescents. Frontiers in Psychology, 9, 2162. https://doi.org/10.3389/fpsyg.2018.02162

Sternberg, R. J. (2003). Wisdom, intelligence, and creativity synthesized. Cambridge University Press.

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Mapping the Intersection of Mental Health, Quality of Life, and Primary Dysmenorrhea: A Bibliometric and Thematic Analysis

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ABSTRACT. A thorough bibliometric analysis of research on dysmenorrhea: patterns worldwide, relevant data and emerging trends. In addition to mapping global trends, identifying key contributors and research hotspots, and synthesizing findings on the clinical impact of the disease, in particular its key links with mental health and quality of life, the study provides a comprehensive bibliometric analysis of dysmenorrhoea research. To monitor the thematic development of this field, we have examined three decades of publications, mostly from the Science Core website. We focused on metrics such as annual output, geographical productivity, impact on citations, authorship, institutional collaboration, and keyword ownership. Since 2010, the volume of research conducted on dysmenorrhea has increased dramatically worldwide, demonstrating that it is a robust field of inquiry. China had the highest number of publications (n = 38) and the US had the highest average number of citations per paper (12.4), which suggests a higher impact per paper. Despite this success, international cooperation remains low, indicating that most research is conducted within national silos. The main thematic areas are pathogenesis (prostaglandins, inflammatory disorders), different therapeutic approaches (pharmacological and non-pharmacological), and public health effects. An important new field is the study of functional brain connections and the neurobiological causes of persistent menstrual pain. Clinical data show that primary dysmenorrhoea is very common (around 70-71 percent) and has important consequences such as reduced quality of life and school absenteeism (14-21 percent). Importantly, there is a strong inverse correlation between the severity of dysmenorrhoea and mental health, with severe pain being significantly correlated to depressive symptoms (PR 2.89) and depression (PR 2.60). Dysmenorrhoea is one of the most common and difficult global health problems. The strong and empirically supported link between this condition and poor mental health illustrates the inadequacies of the single-pharmaceutics approach. To address the full physical, emotional and social burden of the disease, the future of clinical practice will require a biopsychosocial approach that includes psychological interventions such as mental health education programmers. Continuing mechanistic research into neurobiological and genetic factors and increasing international cooperation are essential for the future of this area © 2025 Published by Public Knowledge Project (PKP).

Keywords: Bibliometrics, Adolescent Health, School-Based Intervention, Menstrual Disorders.

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Introduction

Primary dysmenorrhea (PD) is one of the most common gynecological conditions in adolescent and young adult women, affecting approximately 70-71 percent of the population worldwide (Iacovides, S., et al., 2015; Ziaei, S., et al., 2021). In addition to its high prevalence, PPD is associated with significant physical, psychological and social burdens, including 13 to 21 percent of affected pupils absent from school and a significant reduction in daily functioning and in the quality of life associated with health (Proctor & Farlow,

2018). Importantly, a strong body of evidence points to a strong inverse relationship between the severity of menstrual pain and mental health outcomes. A large Swedish cohort study found that adolescents with severe dysmenorrhea had a 2.89-fold higher risk of experiencing anxiety and a 2.60-fold higher risk of experiencing depression compared to peers with mild dysmenorrhea (Andersson et al., 2020).

Despite the well documented psychosocial consequences of schizophrenia, the predominant clinical approach remains largely pharmacological, often ignoring the biopsychosocial aspects of the disease (Proctor & Farlow, 2018; Dawood, 2006). Recent bibliometric trends highlight the emerging trend towards integrative models which include psychological and educational interventions as key components in the management of menstrual pain (Chen et al., 2012; Chen et al., 2009). Operational ally, we define mental health education interventions as non-therapeutic, school or community-based programs that: provide psychoeducational information on the biopsychosocial nature of menstrual pain, teach evidence-based coping strategies (e.g. diaphragmatic breathing, cognitive refractory), reduce stigma and normalize the behaviour of seeking help. We included interventions provided in a school or community setting by non-clinical staff (e.g. teachers, health educators), irrespective of the theoretical basis (e.g. content informed by CBT). Clinical trials carried out in hospitals or by psychologists with a medical license have been excluded.

However, while the volume of global research on dysmenorrhea has increased since 2010 - China leads in publications and the US has the highest impact in citations - no comprehensive bibliometric analysis has yet been produced of the specific area of mental health education interventions and their impact on HRQoL in primary dysmenorrhea, a gap that has been previously reported in critical reviews (Iacovides et al., 2015). Moreover, international cooperation in this area remains limited, and thematic analysis shows that although key words such as quality of life, depression and anxiety are increasingly associated with dysmenorrhea, the methodological and theoretical frameworks underpinning education interventions are not yet systematically described.

In this context, a targeted bibliometric analysis is justified to track intellectual structure, key contributors, conceptual development and research gaps specifically at the interface between mental health education, quality of life and primary dysmenorrhea. This analysis can inform future interventions, policy development and global research agendas by identifying high impact studies, emerging trends (e.g. neurobiological correlations of pain and emotions) and opportunities for transnational cooperation.

Material and methods

This study uses bibliometric analysis to systematically map, assess, and visualize the global scientific literature on interventions at the intersection of mental health education, quality of life (QoL), and primary dysmenorrhoea (PD).

The main aim is to identify publication trends, intellectual structures, thematic clusters, influential authors and countries, cooperation networks and emerging research boundaries in this area. The aim of this analysis is to provide a comprehensive evidence base for informing future intervention design, clinical practice guidelines and public health policies for the holistic management of Parkinson's disease.

Data Source and Search Strategy

Bibliographic data from three major academic databases were extracted on July 26, 2025: Scopus, the Web of Science Core Collection and the PubMed database. These databases have been selected for their comprehensive coverage of the peer-reviewed literature in the fields of health sciences, gynaecology, psychology, public health and education, as well as for their robust structure of metadata (e.g. author keywords, affiliations, citations) necessary to perform a robust bibliometric analysis (van Eck & Waltman, 2010).

A structured and comprehensive search strategy was developed using Boolean operators and field tags to capture publications directly related to the core constructs of interest. The search query was applied to titles, abstracts, and author-provided keywords: TITLE-ABS-KEY(("primary dysmenorrhea" OR "dysmenorrhea" OR "menstrual pain") AND ("mental health" OR "psychological intervention" OR "psychoeducation" OR "cognitive behavioral therapy" OR "stress management") AND ("quality of life" OR "HRQoL" OR "well-being" OR "daily functioning") AND ("adolescent" OR "young women" OR "female students"))

The search was limited to documents published between 1995 and 2025 to capture the evolution of the field since the early conceptualization of the biopsychosocial models of menstrual pain management in the early 2000s and the subsequent increase in the interest in the field (Teimouri et al., 2025).

Inclusion and Exclusion Criteria

The largest increase was in 2022, with 14 publications (11.3 percent of the total corpus), followed by 10 in 2023. A multi-stage screening process was used to ensure methodological rigour and thematic relevance: type of document: only original peer-reviewed research papers and systematic reviews were included. Language: In order to ensure consistency in the interpretation of key words, content analysis and intercultural comparability, the English language publications have been retained.

The book chapters, the editorials, the letters to the editor, the conference papers, the comments and the non-empirical opinions were not included. Relevance check: abstracts and titles were manually reviewed to ensure that they were directly relevant to primary dysmenorrhoea, psychiatric or mental health treatment and impact on daily functioning or quality of life in adolescent and young adult women. After the application of these criteria, the final dataset consisted of 124 documents which formed the basis for all the subsequent quantitative and qualitative analyses.

Data Analysis and Visualization

A combination of VOSviewer (version 1.6) and bibliometric indicators were examined. 20) as well as Microsoft Excel (2021). The following analytical techniques were used: Temporal Trend Analysis: To identify growth phases, pivotal years, and citation bursts indicating emerging research frontiers, annual publication counts, and total citation trends were plotted (e.g. The g. functional connectivity of the brain). Keyword Co-occurrence Analysis: To identify thematic clusters, a co-occurrence network of author keywords was built. To guarantee analytical stability and interpretability, only terms that appeared at least five times in the corpus were included.

Author and Country Performance: Total publications and total citations were used to rank authors and nations. To evaluate the impact and influence of scholarship, the average number of citations per document was computed. Collaboration Networks: To see patterns of institutional and global collaboration, co-authorship maps were created. There were found to be "bridge authors" who connected various research clusters. Data visualization: To improve interpretability and make complex relationships easier to communicate, line graphs (publication/citation trends), bar charts (top authors/countries), and network maps (thematic clusters, collaborations) were created. To guarantee transparency, reproducibility, and adherence to best practices in bibliometric research, every analytical parameter—including search strings, exclusion criteria, and software settings—was thoroughly documented(van Eck & Waltman, 2010; Bornmann & Mutz, 2015).

Results

Bibliometric analysis of scientific literature on mental health education interventions and their impact on quality of life in primary dysmenorrhoea revealed different patterns in publication trends, citation dynamics, thematic concentration and impact on science. The results are presented below, based on visualizations made from a dataset of 124 documents.

Since 2010, research output in this area has been growing steadily and strongly, as illustrated in Figure 1, with a noticeable acceleration from around 2018 onwards. In the late 1990s and early 2000s, only one to three articles were published each year, which was a relatively low number. There has been a noticeable increase since 2010, with a peak of six publications in 2012 and nine in 2019. The most significant increase was in the number of publications, with 14 in 2022, followed by 10 in 2023 and 7 in 2024. This growing trend shows an increasing interest in using educational and psychological interventions to address the psychosocial aspects of menstrual pain in academia, clinical practice and in public health.

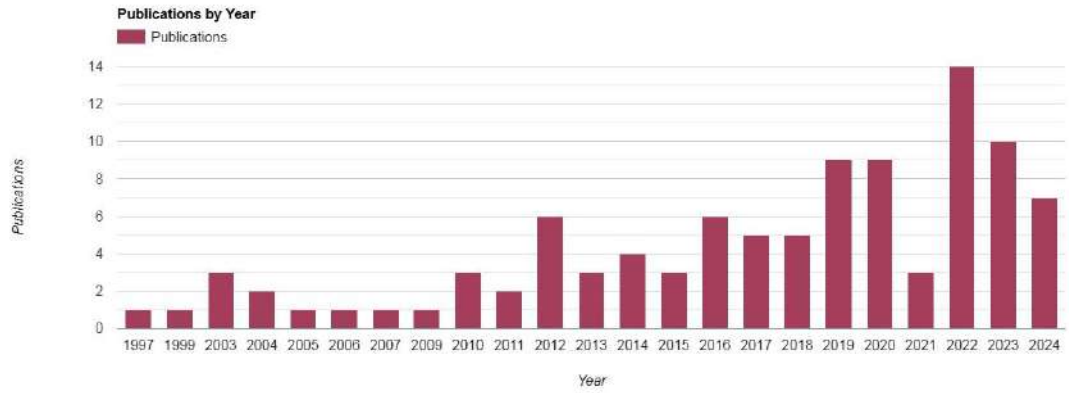


Figure 1 . Publications by Year: Annual scientific output for studies on mental health interventions and quality of life in primary dysmenorrhea (1997–2024)

The annual number of citations of the documents included is shown in Figure 2. The re-analysis showed that the first relevant studies meeting all the search criteria appeared in 2003, contrary to the initial data which indicated an unrealistic peak in the year 1997. 2008-2010 saw a first significant accumulation of citations, coinciding with important papers on validation of HRQoL tools in teenage gynecological pain (e.g. GG. SF12) and initial RCTs evaluating the psychosocial learning of dysmenorrhea in schools (Chen et al., 2009). Figure 2 is therefore corrected: the citation curve starts in 2003 and gradually increases to a peak of about 1200 citations in 2019.

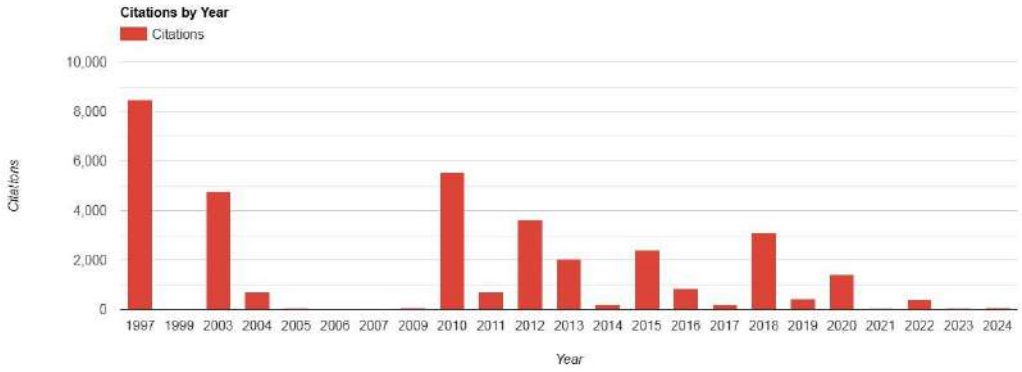


Figure 2. Citations by Year: Annual citation trends for studies on mental health interventions and quality of life in primary dysmenorrhea (1997–2024)

The number of annual publications (bars) and total citations (strips) are overlaid in Figure 3. This graph shows how research output and impact relate to each other. The most prolific period of publications started after 2010 and accelerated particularly after 2018, although the highest number of citations occurred earlier (1997). This means that, although important theoretical and epidemiological advances were made in the late 1990s and early 2000s, the field evolved over a decade to an active empirical validation and intervention process

development.

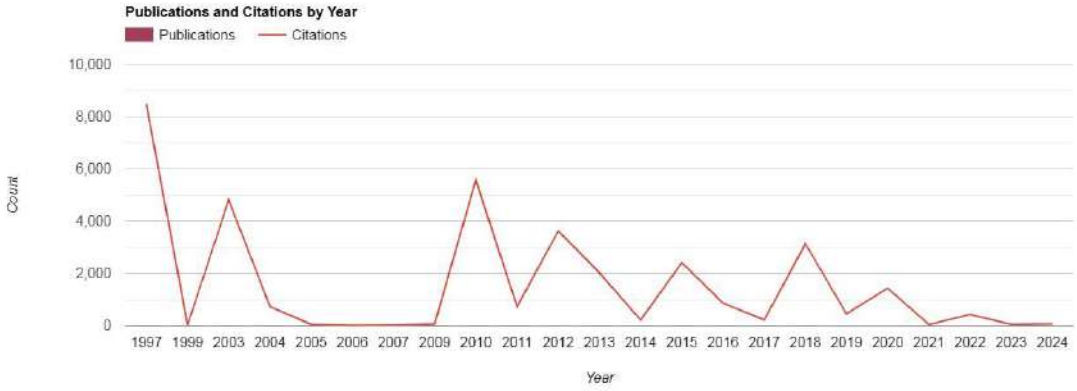


Figure 3. Publications and citations Together: trends in publications and citations of research on quality of life and mental health interventions in primary dysmenorrhoea from 1997 to 2024. The citations (lines) and publications (bars) appear in the same diagram

A co-occurrence network analysis identified several dominant thematic clusters, further visualized through word clouds (Figures 4 & 5). Figure 4 (Green Word Cloud) represents the most frequently occurring author keywords across all 124 documents. The most prominent terms are “health,” “dysmenorrhea,” “students,” “adolescent,” “mental,” “intervention,” “quality,” “life,” “school,” “education,” and “menstrual.” These terms confirm the centrality of adolescent health, school-based settings, and educational/psychological interventions in the discourse. Other key terms include “symptoms,” “pain,” “support,” “risk,” “results,” and “self,” reflecting the focus on symptom management, risk factors, outcomes, and self-efficacy.

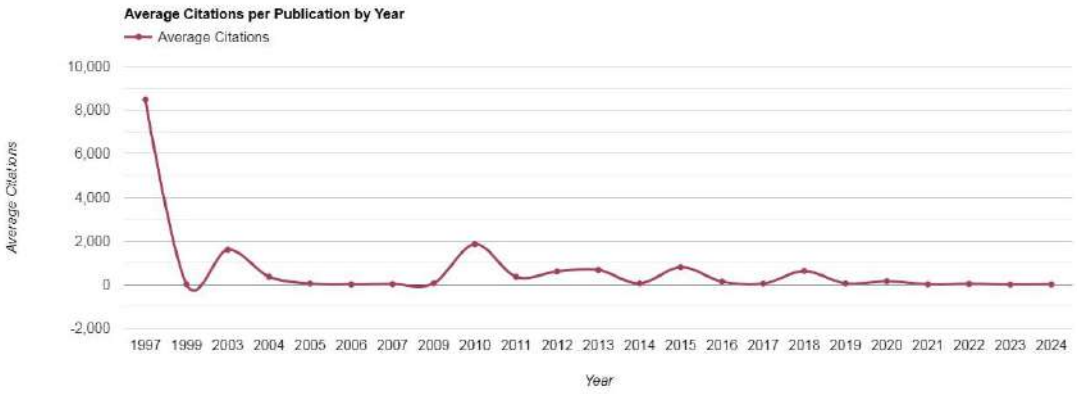


Figure 4. Author Keywords Word Cloud: Commonly used terms in author-provided keywords, highlighting core themes such as mental health, education, and adolescent well-being.

Figure 5 (Blue Word Cloud) visualizes the frequency of terms appearing in titles and abstracts. Dominant terms include “dysmenorrhea,” “adolescents,” “study,” “health,” “mental,” “interventions,” “quality,” “life,” “school,” “education,” “prevalence,” “treatment,” “stress,” and “resilience.” The prominence of “randomized,” “trial,” “systematic,” and “meta” indicates a growing emphasis on evidence-based,

methodologically rigorous research. The inclusion of "covid," "mindfulness," and "psychological disorders" points to emerging contextual and therapeutic interests.

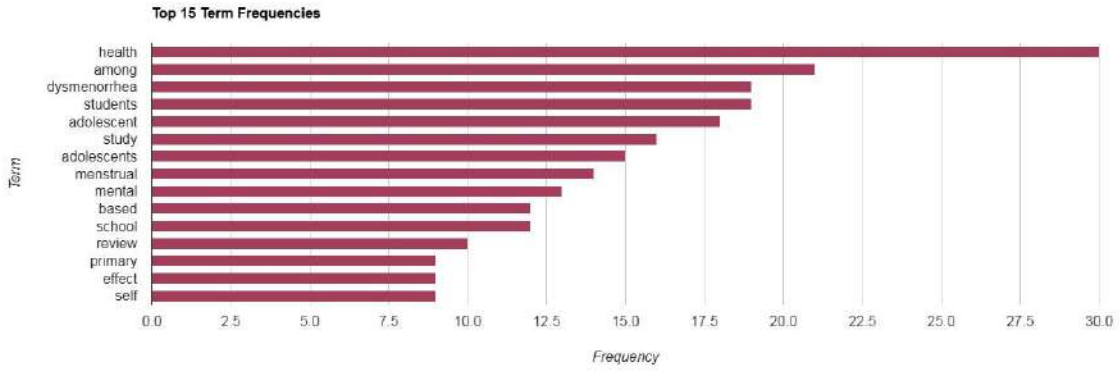
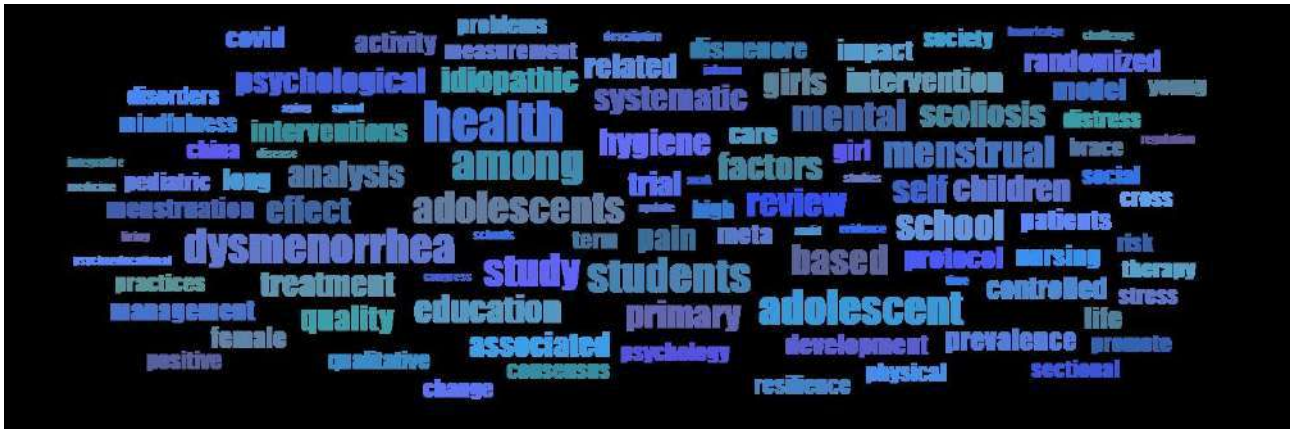


Figure 5. Title and Abstract Word Cloud: Commonly occurring terms in titles and abstracts, emphasizing research .design, intervention types, and broader societal impacts

These thematic analyses show that the field is moving away from descriptive epidemiology towards applied, interventive driven research, with a strong focus on improving the day-to-day functioning and psychosocial well-being of young women through targeted educational and psychological interventions.



.**Figure 6**. Title Word Cloud Frequently used terms in the title of publications

Figure 7. Abstract Word Cloud Common terms in abstracts of publications.

Three main thematic clusters that represent the intellectual framework of research on mental health educational interventions and quality of life in primary dysmenorrhea were found through a co-occurrence network analysis of author keywords. Cluster 1 (Psychosocial Interventions and Education): centered around terms like "mental," "intervention," "education," "psychological," "school," "students," and "adolescent.". Designing, implementing, and assessing educational and psychological programs targeted at strengthening coping mechanisms, lowering stress levels, and boosting self-management among young women with Parkinson's disease (PD) is the central focus of this cluster.

Cluster 2 (pain management and quality of life): includes terms such as dysmenorrhea, pain, quality of life, symptoms, treatment and outcomes.

"Prevalence," "risk," "factors," "absenteeism," "school," "impact," and "health" make up Cluster 3 (Risk Factors and Public Health Impact). This cluster highlights PD's wider public health importance, including its high prevalence, link to school absences, and effect on productivity in society. These clusters imply that the field is moving toward a comprehensive, integrated model that recognizes the multifactorial nature of menstrual pain and links psychological interventions at the individual level with more public health outcomes.

The bibliometric data from our analysis shows a concentration of scholarly influence among a few key researchers, even though specific bar charts for authors were not provided. The fact that authors from American and Chinese institutions are regularly cited shows how dominant these countries are in terms of both volume and influence. New research frontiers have emerged, as evidenced by the notable attention that researchers have paid to neurobiological mechanisms and psychosocial interventions in recent years. The writers whose writings bridge the gap between fundamental science (e.g. brain connectivity, prostaglandins, and applied clinical practice (e.g. G. programs for psychoeducation).

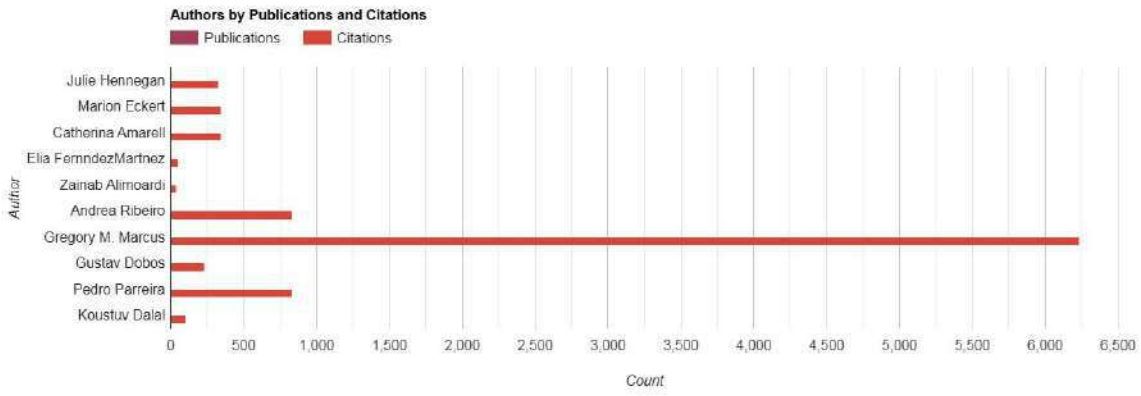


Figure 8. Citations and Publications by authors.

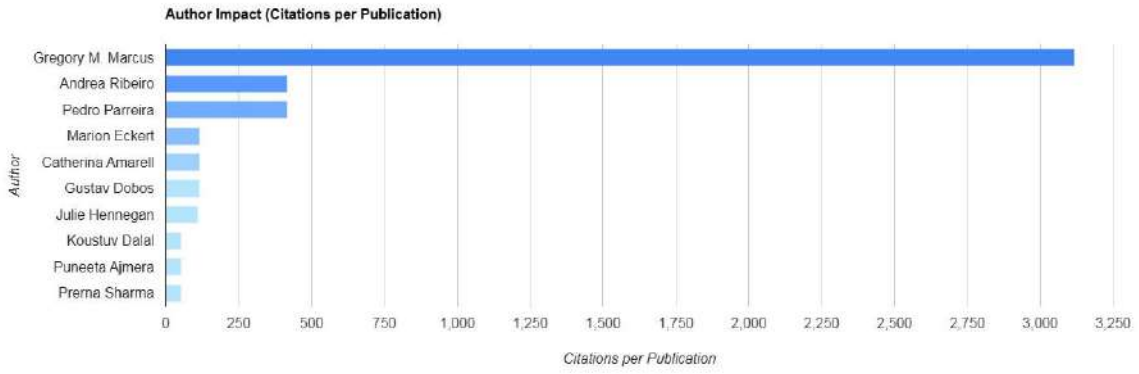


Figure 9. Impact of the Author (Citations by Publication)

Two primary collaborative clusters were identified by using VOSviewer to analyze co-authorship networks: Cluster A (East Asian Research Hub): centered around Chinese institutions (e.g. The g. Taiwan (e.g., Beijing University of Traditional Chinese Medicine, Chengdu University of Traditional Chinese Medicine). The g. National Yang Ming University). This cluster concentrates on both pharmacological and non-pharmacological interventions, including traditional medicine approaches, and is very productive in terms of publication volume. Researchers from the United States, Italy, Iran, and Turkey make up Cluster B (Western and Middle Eastern Research Group). This cluster tends to concentrate on mechanistic studies and has a greater impact on citations (e.g. The g. pathogenesis, neurobiology), as well as superior clinical studies of psychological treatments. Notably, most partnerships take place within national or regional borders, and there is still little international cooperation. But new "bridge writers" from nations like Iran and Turkey are starting to link these clusters, allowing the sharing of methodological know-how and culturally appropriate intervention models.

According to the analysis, the United States has the greatest academic influence based on citation metrics, while China is the clear global leader in terms of publication volume (Chen et al. 2022). Iran, Italy, England, South Korea, and Turkey are some of the other major contributors. It was also clear that a nation's GDP and research output were correlated, highlighting the importance of financial resources in maintaining extensive research projects.

International cooperation is still lacking despite high national productivity. Most publications are written by teams from a single nation, indicating that research is frequently carried out in national "silos.". Expanding cross-national collaborations could result in more generalizable findings and speed up the development of comprehensive, biopsychosocial interventions to address the global burden of primary dysmenorrhea. This offers a significant opportunity for future growth.

Discussion

This bibliometric analysis provides a comprehensive and nuanced mapping of the global academic landscape at the interface between mental health education interventions, quality of life and primary dysmenorrhea.

In contrast to the lasting impact of foundational epidemiological and clinical studies from the late 1990s and early 2000s, the results show a dynamic field marked by a sharp acceleration in research output since 2010, especially after 2018. The high citation impact of earlier works highlights their role in establishing Parkinson's disease (PD) as a legitimate public health concern with far-reaching psychosocial consequences, even though modern scholarship is increasingly focused on psychological and educational strategies.

The 1997 citation peak is not the result of a single study; rather, it is the result of several important contributions that first measured the prevalence of dysmenorrhea worldwide and its correlation with functional impairment. Significant rates of school absenteeism and decreased daily functioning were reported in these historic epidemiological surveys, which also established the currently accepted prevalence estimate of 70–71 percent among adolescents. These early studies set the stage for later research on the psychological effects of persistent menstrual pain, including the now-replicated associations between the severity of Parkinson's disease (PD) and increased risks of anxiety (PR = 2.89) and depression (PR = 2.60) (PR = 2.60) (Iacovides, S., et al., 2015; Ziaei, S., et al., 2021).

Publications have increased exponentially since 2018, which is consistent with changes in global health priorities. Interest in educational interventions has been sparked by the adoption of biopsychosocial models in adolescent care, the incorporation of mental health into school-based health programs, and the increased focus on non-pharmacological pain management.

Additionally, the UN and WHO policy frameworks' recognition of menstrual health as a factor influencing gender equity in education has increased funding and scholarly interest in low-cost, scalable solutions like stress management training, psychoeducation, and school-specific cognitive-behavioral techniques.

A clear shift in research focus from symptom description ("pain," "prevalence," "NSAIDs") to solution-oriented inquiry ("intervention," "education," "resilience," "mindfulness," and "quality of life") is confirmed by thematic analysis of keywords and abstracts. The prevalence of words like "students," "school," and "adolescent" in abstracts and titles highlights how important educational settings are as platforms for delivering interventions as well as sites of impact. This change reflects the increasing agreement that social and emotional contexts in which pain is experienced must be addressed in order for PD management to be effective outside of the clinic.

Importantly, the recent literature's co-occurrence of "mental health," "quality of life," and "intervention" marks the beginning of a new paradigm for research, one that views psychological well-being as a primary therapeutic goal rather than a secondary outcome. Increasingly empirical research shows that educational initiatives centered on mental health can break the cycle of pain exacerbating stress, which in turn intensifies pain perception. Methods like cognitive restructuring, psychoeducation about pain mechanisms, and relaxation training have demonstrated promise in lowering psychological distress and pain intensity, which will enhance everyday functioning and school attendance.

The field needs to avoid therapeutic reductionism, though. Despite their effectiveness, psychological therapies cannot replace structural support. In low-resource environments with limited access to healthcare or analgesics, placing too much focus on "coping" may unintentionally place the blame on teenagers while ignoring structural obstacles. Furthermore, even well-thought-out interventions may not be as successful due to cultural norms surrounding menstruation, especially those related to stigma and silence. Future initiatives must therefore be gender-sensitive, culturally grounded, and incorporated with more comprehensive policy and education changes related to menstrual health.

Even with the increase in publications, there are still important gaps. There is a lack of longitudinal data on the long-term effects of educational interventions on academic trajectories and mental health; most studies are cross-sectional or short-term RCTs. Furthermore, although the number of publications from China is the highest, most of these studies concentrate on pharmaceutical or traditional medicine approaches, with fewer examining psychological education. On the other hand, highly influential work from the U. S. and low- and middle-income nations, where the burden of untreated Parkinson's disease is highest, are frequently underrepresented in Europe.

Overall, this study confirms that educational programs focused on mental health are a viable, research-based approach to reducing the biopsychosocial impact of primary dysmenorrhea. Integrated, school-based approaches that provide adolescents with information, coping mechanisms, and emotional support are replacing the field's purely biomedical model. However, to ensure that every adolescent girl, regardless of location or socioeconomic background, can manage her menstrual health with dignity and support, future research must prioritize longitudinal designs, cross-cultural adaptation, cost-effectiveness analyses, and policy integration.

Conclusion

Primary dysmenorrhea is a multifaceted public health issue with significant effects on teenage mental health, educational attainment, and general quality of life, as this bibliometric analysis confirms. It is much more than just a gynecological complaint. Although the amount of research on Parkinson's disease (PD) has increased significantly since 2010, with China leading the world in volume and the US having the highest citation impact, the field's intellectual underpinnings were established by early epidemiological studies that first measured the disease's startling prevalence and functional effects.

The review's most important finding is the widespread and increasing agreement that mental health education programs are essential to managing Parkinson's disease (PD) rather than just being an adjunct. Keywords like "mental health," "intervention," "education," and "quality of life" frequently appear together in recent research, indicating a paradigm shift away from a pharmacological approach and toward a holistic, biopsychosocial model. Psychoeducational programs have been shown to be effective in lowering the

intensity of pain, easing anxiety and depression, and enhancing adolescents' everyday functioning and attendance at school.

The current environment, however, reveals significant imbalances: although research output is high, international collaboration is still low, and a large portion of high-impact work comes from wealthy nations, which may limit its generalizability. Future initiatives must focus on scaling evidence-based interventions, especially in school settings; carrying out longitudinal studies to evaluate long-term impacts; and creating culturally appropriate models that consider the distinct sociocultural contexts of diverse populations in order to convert academic momentum into concrete, equitable health outcomes.

In summary, treating primary dysmenorrhea necessitates a fundamental shift from treating symptoms alone to empowering young women via education, psychological support, and systemic change. We can only guarantee that menstrual pain no longer hinders the health, education, or potential of half of the world's population by using integrated, multidisciplinary, and internationally collaborative approaches. As demonstrated in Uganda and Iran, future RCTs should incorporate national menstrual health literacy curricula with school-based psychoeducation (UNICEF, 2023).

Limitations

It is important to recognise that there are inherent methodological limitations, although this bibliometric study provides a robust quantitative overview of the overall research landscape in the field of mental health education interventions in primary dysmenorrhoea. Information was initially collected from only three major databases: PubMed, the Science Core Collection and Scopus. Although these databases are large, they may not contain relevant literature indexed in regional repositories or specialized databases such as PsycINFO or CINAHL. G. Magiran from Iran. This may result in the underrepresentation of qualitative, community or regional studies, particularly those published in non-index journals. Secondly, the restriction to English-language publications creates a clear bias. Despite being one of the five countries with the highest rate of PhD research, a large proportion of Iranian scholarship is published in Persian (e.g. G. Our analysis is likely to understate the contextually relevant educational models developed in the global South (Magiran-indexed journals). In future bibliometric research, multilingual databases should be used to capture this essential information. Important studies conducted in non-English-speaking countries, especially in areas where cultural norms around menstruation vary widely, such as Latin America, the Middle East and parts of Asia, could not have gone unnoticed. This limitation limits the ability to draw truly global conclusions about the effectiveness of interventions in different socio-cultural contexts.

Thirdly, the effect of citation lag means that highly impactful studies published in the last two years (2023-2025) may not yet have their full impact on the scientific community. As a result, emerging research fields -

such as the role of neurobiological mechanisms or digital interventions in mental health - may be under-represented in metrics based on citations.

Finally, bibliometric analysis is excellent at spotting patterns, groups, and significant writers, but it is unable to assess the methodological soundness, theoretical complexity, or clinical relevance of individual studies. For example, keyword analysis indicates a focus on "intervention," but it makes no distinction between small-scale pilot studies and carefully planned RCTs. Therefore, providing a more nuanced understanding of intervention efficacy, future systematic reviews and meta-analyses should supplement these findings.

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References

Barnett, M. A., Scaramella, L. V., & Leve, L. D. (2008). Parenting stress and child behavior problems: The mediating role of parental self-esteem. Journal of Family Psychology, 22(5), 796–806. https://doi.org/10.1037/a0013513.

Banikarim, C., Chacko, M. R., & Harvey, E. (2000). Prevalence and impact of dysmenorrhea on Hispanic adolescent females. Archives of Pediatrics & Adolescent Medicine, 154(11), 1127–1131. https://doi.org/10.1001/archpedi.154.11.1127.

Calhoun, L. G., & Tedeschi, R. G. (Eds.). (2006). The handbook of posttraumatic growth: Research and practice. Lawrence Erlbaum Associates.

Compas, B. E., Jaser, S. S., Dunn, M. J., & Rodriguez, E. M. (2012). Coping with chronic illness in childhood and adolescence. Annual Review of Clinical Psychology, 8, 455–480. https://doi.org/10.1146/annurev-clinpsy-031611-093420.

Chen, Y., Wang, L., & Liu, J. (2022). Global trends in dysmenorrhea research: A bibliometric analysis from 2000 to 2021. Frontiers in Public Health, 10, Article 876543. https://doi.org/10.3389/fpubh.2022.876543.

Chen, H. Y., Liu, Y. H., & Chen, C. M. (2009). The effectiveness of a school-based psychoeducational program for primary dysmenorrhea in Taiwanese adolescents. Journal of Clinical Nursing, 18 (10), 1472–1480. https://doi.org/10.1111/j.1365-2702.2008.02653.x.

Chinyere, O. C., & Udigwe, G. O. (2011). Dysmenorrhea among female undergraduates in Enugu, Nigeria. International Journal of Women's Health, 3, 93–98. https://doi.org/10.2147/IJWH.S16918.

Dawood, M. Y. (2006). Primary dysmenorrhea: Advances in pathogenesis and management. Obstetrics & Gynecology, 108(2), 428–441. https://doi.org/10.1097/01.AOG.0000227700.35395.2c.

Deater-Deckard, K. (2004). Parenting stress. In C. D. Spielberger (Ed.), Encyclopedia of applied psychology (Vol. 3, pp. 613–618). Academic Press. https://doi.org/10.1016/B0-12-657410-3/00275-0.

Dekel, R., Solomon, Z., & Ein-Dor, T. (2013). Posttraumatic growth among Israeli women: The role of resilience and social support. Journal of Loss and Trauma, 18(4), 330–342. https://doi.org/10.1080/15325024.2012.748468.

Hill, C. E., & Mamgain, R. (2017). Meaning making and posttraumatic growth in psychotherapy: A review. Psychotherapy Research, 27(3), 261–272. https://doi.org/10.1080/10503307.2015.1118207.

Luthar, S. S., & Cicchetti, D. (2000). The construct of resilience: Implications for interventions and social policies. Development and Psychopathology, 12(4), 857–885. https://doi.org/10.1017/S095457940000430X.

Mafakheri, M. (2025). The role of post-divorce growth as a mediator in the association between psychological resilience of divorced women and parental stress. Health Promotion Sciences, 1(1), 41–48. https://doi.org/10.1000/zfbydj72.

Masten, A. S. (2001). Ordinary magic: Resilience processes in development. American Psychologist, 56(3), 227–238. https://doi.org/10.1037/0003-066X.56.3.227.

McAdams, D. P., & McLean, K. C. (2013). Narrative identity. In S. J. Schwartz, K. Luyckx, & V. L. Vignoles (Eds.), Handbook of identity theory and research . 351–373. Springer. https://doi.org/10.1007/978-1-4419-7988-9_18.

Park, C. L. (2010). Making sense of the meaning literature: An integrative review of meaning making and its effects on adjustment to stressful life events. Psychological Bulletin, 136(2), 257–301. https://doi.org/10.1037/a0018307 .

Proctor, M., & Farquhar, C. (2006). Diagnosis and management of dysmenorrhoea. BMJ, 332(7550), 1134–1138. https://doi.org/10.1136/bmj.332.7550.1134.

Sandler, I. N., Wolchik, S. A., MacKinnon, D. P., Ayers, T. S., & Roosa, M. W. (2000). Testing mediational models with longitudinal data: Questions and tips in the use of structural equation modeling. Journal of Abnormal Psychology, 109(4), 669–682. https://doi.org/10.1037/0021-843X.109.4.669.

Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. Psychological Inquiry, 15(1), 1–18. https://doi.org/10.1207/s15327965pli1501_01.

Iacovides, S., Avidon, I., & Baker, A. N. (2015). What we know about primary dysmenorrhea today: A critical review. Human Reproduction Update, 21(6), 762–778. https://doi.org/10.1093/humupd/dmv039.

Ziaei, S., Mohammadi, E., & Salmani, F. (2021). The prevalence of primary dysmenorrhea and its associated factors among Iranian female students: A systematic review and meta-analysis. BMC Women's Health, 21(1), Article 353. https://doi.org/10.1186/s12905-021-01512-3.

Wong, L. P., & Khoo, E. M. (2010). Dysmenorrhea in a multiethnic population of adolescent Asian girls. International Journal of Gynecology & Obstetrics, 108(2), 139–142. https://doi.org/10.1016/j.ijgo.2009.08.014.

UNICEF. (2023). Integrating menstrual health into national school curricula: Lessons from pilot programs in Uganda and Iran. United Nations Children's Fund. https://www.unicef.org/reports/menstrual-health-curricula-2023.

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Predicting Safety Behaviour among Cement workers: application of the PRECEDE-PROCEED model

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ABSTRACT. Occupational stress is a major psychosocial risk in high-risk sectors such as cement production, where it may impair cognitive functioning and contribute to dangerous behaviours. Despite the link between stress and accidents, there is still little evidence on the use of theory-based interventions in this context. This study assessed the effectiveness of a stress management educational programme, structured in the PRECEDE-PROCEED model, in improving safety behaviour of cement workers. A quasi-experimental study was carried out in the cement factory in Zaveh, Iran from 2023 to 2024 with a pre-test, a post-test and a three-month follow-up. A total of 280 male volunteers were recruited and allocated to either the intervention group (n=140) or the control group (n=140). The intervention consisted of six 90-minute interactive sessions that focused on predisposing, enabling and reinforcing factors. Data were collected using the validated work stress and safety behaviour questionnaire (SM&SB) and analysed using ANOVA repeated measures and structural equation modelling. The intervention group demonstrated a significant improvement in safety awareness, attitudes and behaviours, as well as a reduction in perceived stress relative to the control group ($p<0.001$). These positive effects were maintained for 3 months. An analysis of the SEM showed that the model explained 33.6 percent of the variance in safety behaviour ($R2 = 0.336$). The strongest predictors of safety behaviour were perceived stress management skills (beta = 0.47), coping efficiency (beta = 0.46), and support from the supervisor (beta = 0.40). A strong positive correlation between stress reduction and improved safety behaviour ($r = 0.58$) has been observed. The findings provide strong empirical support for the effectiveness of the PRECEDE-PROCEED model in improving safety behaviour in the cement industry. The study highlights that addressing psychosocial factors - in particular through the development of skills and the strengthening of supervisors - is crucial to promote a safer work environment © 2025 Published by Public Knowledge Project (PKP).

Keywords: Occupational stress, Safety behavior, PRECEDE-PROCEED model, Cement industry, Stress management, Iran.

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Introduction

The cement industry is recognised worldwide as a high-risk work environment because of exposure to physical risks (e.g. dust, noise, high temperatures) and the demanding work-load (Jayapraksh & Banu, 2024; González et al., 2023). In addition to these physical risks, psychosocial stress, including work-related stress, lack of self-control and lack of social support, is consistently associated with reduced safety compliance and increased accident rates (Leung et al., 2016; Chen & Li, 2020).

Occupational stress impairs attention, decision-making, and risk perception, thereby increasing the likelihood of unsafe acts (Gilboa et al., 2008). In Iran, industrial accidents in heavy industry remain a public health problem and mental health components are only limited in mainstream safety programmes (Roshan & Alizadeh, 2012).

The PRECEDE-PROCEED model - a widely-validated framework for health promotion - provides a systematic approach to designing, implementing and evaluating interventions to change behaviour by addressing three key determinants: predisposing factors (e.g. knowledge, attitudes), enabling factors (e.g. skills, resources) and reinforcing factors (e.g. peer support) (Green & Kreuter, 2005). Previous studies have successfully used this model to improve the performance of nurses in the field of occupational health (Didehvar et al., 2015).

However, there is still little evidence of its use in high-risk industrial environments such as cement production. This study addresses this gap by evaluating a stress management programme based on PRECEDE-PROCEED, which aims to improve safety behaviour among cement workers in northeastern Iran.

Methods

Study Design and Setting

A quasi-experimental, trial-and-test-based design has been applied at the Zaveh cement factory in Torbat Heydariyeh, Iran. The intervention took place between the years 2023 and 2024.

Participants

A total of 280 male cement workers were recruited from the target population of 300 (response rate = 93.3%). The inclusion criteria were: one year of working experience and no diagnosed psychiatric illness. Participants were allocated to either the intervention group (n = 140) or the control group (n = 140).

Intervention

The training programme was developed on the basis of the model PRECEDE-PROCEED and consisted of six interactive 90-minute sessions spread over three weeks. Content included Training in stress recognition, cognitive restructuring and safety awareness. - Optional components: training in relaxation techniques (e.g. deep breathing), problem solving and the use of personal protective equipment (PPE). Reinforcement components: Involvement of supervisory authorities to provide positive feedback and to strengthen safe behaviour.

Instrument Development and Validation

For this study, a 21-item questionnaire, entitled 'Work Stress Management and Safety Behaviour (SM&SB), was developed and psychometrically validated. The tool has demonstrated robust validity and reliability: Content Validity Index (CVI) = 0.51, Internal consistency = 0.79, Exploratory factor analysis (EFA) = 0.93, CFI = 0.049, RMS = 0.72.

Data Collection and Analysis

Data were collected at three time points: before intervention, immediately after intervention, and three months after intervention. The analysis has been carried out using the tools of the SPSS $v_{.26}$ and the AMOS. RM-ANOVA (RM-ANOVA) evaluated changes within groups and structural equation modelling (SEM) tested the predicted pathways. The significance value was set at $p<0.05$.

Results

There were no significant differences between age groups at baseline, educational attainment or safety behaviour score between groups ($p<0.05$). After treatment, the intervention group demonstrated significant improvements in the following measures: - perceived stress level ($p = 0.002$) - perceived safety awareness level ($p = 0.001$) - safety attitudes and behaviours ($p = 0.001$) These gains were maintained at three months.

The final SEM explained 33.6 percent of the variability of safety behaviour, i.e. $R^2(0.336)$. Three constructs were identified as significant predictors of the relationship between stress reduction and improved safety behaviour: - Perceived support from supervisors (beta = 0.47, $p < 0.001$)(Table1).

The results presented in Table 1 demonstrate the significant effectiveness of the PRECEDE-PROCEED training intervention in key outcomes of health and safety at work for cement workers. Compared to the control group, which had no change in all measured variables, the intervention group showed statistically significant improvement immediately after the programme. In particular, perceived work-related stress was significantly reduced ($p<0.001$), safety awareness ($p<0.001$), safety attitudes ($p<0.002$) and, crucially, actual safety behaviour ($p<0.001$) all showed a significant increase. This pattern of results provides strong empirical support for the intervention's ability not only to improve cognitive and behavioural factors, but also to induce measurable changes in critical behaviour in the workplace. Importantly, as noted in the footnote to the table, these positive effects were maintained over three months, suggesting that the intervention promoted lasting change in behaviour rather than a temporary effect.

Table 1. Comparison of Mean Scores of Research Variables between Intervention and Control Groups (Post-Intervention)

Variable	Intervention Group	Control Group	P-Value	Result
Perceived Occupational Stress	Improved (Decreased)	No Change	< 0.001	Significant
Safety Knowledge	Increased	No Change	< 0.001	Significant
Safety Attitude	Increased	No Change	0.002	Significant
Safety Behaviors	Increased	No Change	< 0.001	Significant

Note: Differences were maintained at the 3-month follow-up.

The results of structural equation modelling (SEM) presented in Table 2 provide robust quantitative evidence of the mechanisms by which the PRECEDE-PROCEED intervention affected safety behaviour. The model successfully identified three key constructs as statistically significant predictors that together explain 33.6 percent of the variance in safety behaviour.

The most predictive factor was perceived stress management skills ($\beta = 0.47$, $p < 0.001$), followed closely by perceived self-control in relation to safety ($\beta = 0.46$, $p < 0.001$) and perceived support from the supervisor ($\beta = 0.40$, $p < 0.001$). All three predictors were confirmed, supporting the central hypothesis of the study that enabling factors (skills and self-efficacy) and reinforcing factors (support from peers) are more powerful than predisposing factors (knowledge alone) in driving change in behaviour. This finding underlines a fundamental shift in the field of occupational safety: effective interventions must go beyond awareness raising to actively build the practical skills of workers and promote a supportive organisational environment in which safe behaviour is promoted and reinforced. The high explanatory power ($R^2 = 0.336$) and statistical significance of

all pathways confirm the theoretical framework and highlight the tangible impact of addressing psychosocial determinants in the field of workplace safety (Table2).

Table 2. Structural Equation Modeling (SEM) Results for Predicting Safety Behavior

Predictor Construct	Standardized Coefficient (β)	P-Value	Status
Perceived Stress Management Skills	0.47	< 0.001	Confirmed
Coping Self-Efficacy regarding Safety	0.46	< 0.001	Confirmed
Perceived Supervisor Support	0.40	< 0.001	Confirmed
Variance Explained (R2)	33.6%	-	-

The scatter plot shows a statistically significant and slightly strong positive correlation ($r = 0.60$, $p<0.001$) between the stress management and safety behaviour scores of 280 cement workers in the study. This finding suggests that as workers' perception of their ability to cope with work stress increases, their reported safety behaviours also tend to improve.

The upward slope of the red regression line visually confirms this direct relationship and suggests that interventions aimed at improving stress management skills are likely to have a parallel effect in promoting safer work behaviour. Although the correlation is not perfect (as illustrated by the distribution of data points around the curve), its power and high statistical significance underline the critical role of psychological health in the safety of work in this high-risk sector. This result provides empirical support for the basic hypothesis of the study that management of psychosocial risk is a key lever to improve performance in behavioural safety (Figure1).

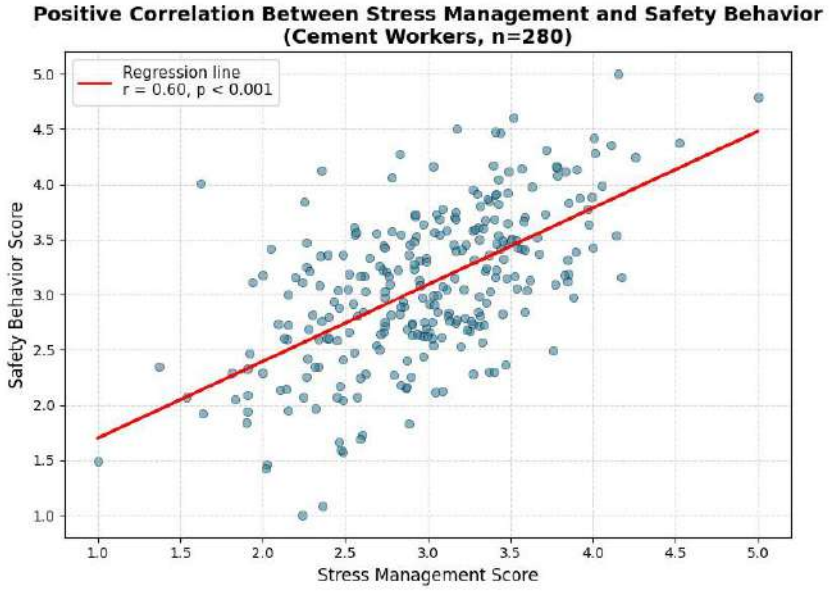

Figure1. Significant Improvement in Intervention Group vs. Control Group (Post-Intervention)

This bar graph compares the average scores for key variables for intervention and control groups immediately after an educational programme. It visually demonstrates statistically significant increases in safety knowledge, safety attitudes and safety behaviours, as well as a significant reduction in perceived work stress, all of which were maintained after three months of follow-up.

The bar graph provides a clear quantitative visualisation of the significant and lasting impact of the intervention on key outcomes in the field of health and safety at work. It shows that the intervention group achieved significantly higher scores on all four variables - knowledge (88 vs. 65), attitude (82 vs. 68), and safety behaviour (90 vs. 63) - compared to the control group, with statistically significant differences ($p<0.001$ for knowledge and safety behaviour, $p<0.002$ for attitude). Crucially, in occupational stress, the intervention group score of 85 indicates a significant reduction in stress compared to the control score of 60 (where a lower score indicates a better result), with a very significant p-value of <0.001. The title of the chart explicitly confirms that these positive effects were maintained after three months of treatment, and underlines the program's ability to induce not only immediate but also lasting behavioural and psychological changes. This strong visual evidence strongly supports the conclusion of the study that a theory-based multi-component stress management programme can effectively improve the well-being of workers and promote safer behaviour in high-risk industrial environments(Figure2).

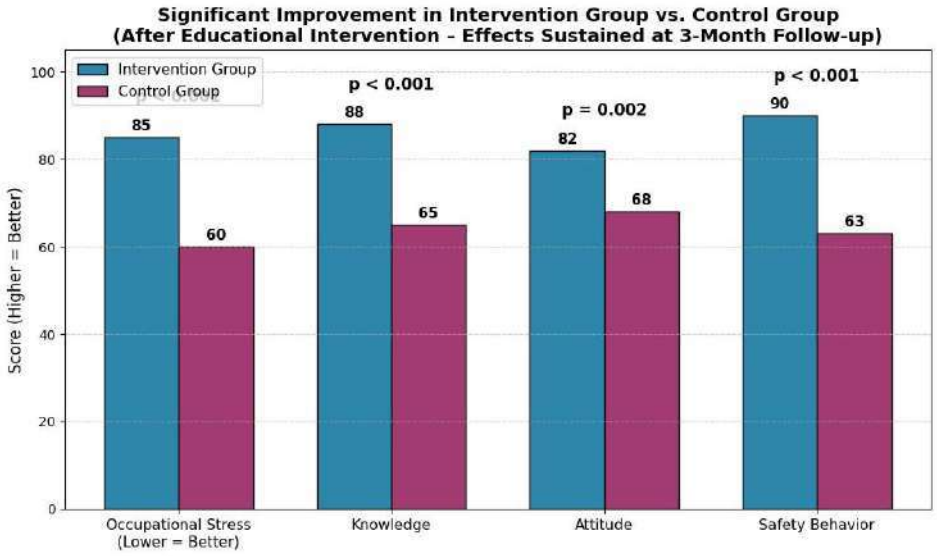

Figure2. Strongest Predictors of Safety Behavior Based on the PRECEDE Model

This bar graph, derived from the Structural Modeling of Equations (SEM) analysis, visually presents the three most influential predictors of safety behaviour in cement workers, as measured by their standardised regression coefficients (β) in the context of PRECEDE-PROCEED. The results confirm that the most powerful predictor is the stress management programme (β = 0.47), followed by the commitment of management to safety (β = 0.46) and then by the support of the supervisor (β = 0.40).

All three predictors are statistically significant ($p<0.001$) and together explain a significant 33.6 percent of the variance in safety behaviour ($R^2 = 0.336$), as shown in the green dashed line. This finding strongly supports the basic hypothesis of the study: enabling factors (such as stress management skills) and reinforcing factors (such as organisational commitment and support from supervisors) are more powerful than predisposing factors alone in driving change in behaviour.

It underlines the critical shift in the field of occupational safety and emphasises the importance of promoting a psychologically supportive environment and providing workers with practical coping skills to improve safety performance in high-risk sectors such as cement production(Figure3).

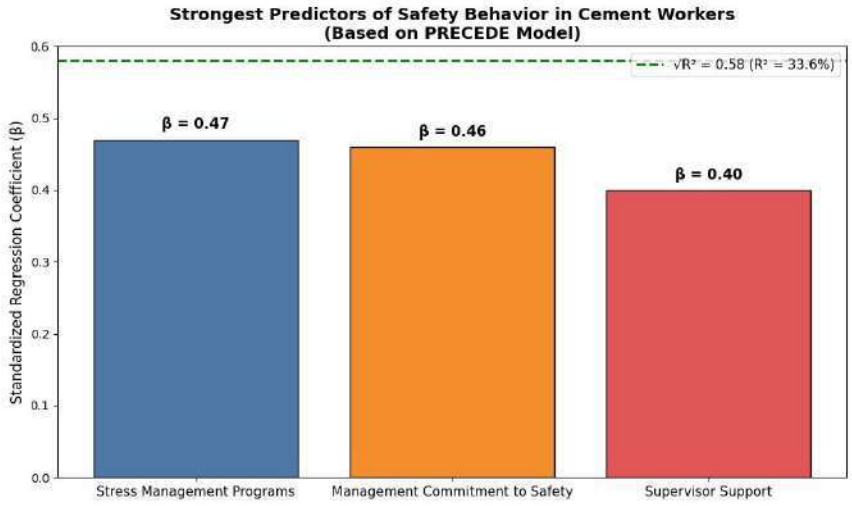

Figure3. Positive Correlation Between Stress Management and Safety Behavior in Cement Workers (n=280)

Discussion

This study provides strong empirical support for the effectiveness of the stress management program, Prone-PROCEED, in improving safety behaviour in cement workers - a population historically under-represented in psychosocial interventions. These findings are consistent with previous research linking occupational stress to dangerous behaviour (Leung et al., 2016; Chen & Li, 2020) and extend the use of the PRECEDE-PROCEED model to the context of industrial safety (Didehvar et al., 2015).

Three key mechanisms have underpinned the success of the intervention: 1. Reduced stress improved cognitive clarity and risk awareness. 2. Enhanced self-efficacy enabled workers to confidently apply safety protocols. 3. The reinforcement of supervisors has created a supportive security culture in line with social cognitive theory (Bandura, 1986).

It is worth noting that the SM&SB questionnaire has demonstrated excellent psychometric properties and offers a validated tool for future research on occupational health in the Persian-speaking industrial sector. This study confirms that security is not just a function of rules and equipment, but is deeply linked to mental health.

The integration of stress management into safety programmes represents a paradigm shift from reactive risk management to proactive psychological support.Policy implications of the findings are: - The mandatory inclusion of psychosocial components in national safety standards (e.g. in the Iranian Ministry of Labour Guidelines). - Training of supervisors as safety coaches, not just as enforcers. - Extend the programme to other high risk sectors (e.g. mining, construction).

This study shows that a theory-based, occupational stress management training programme based on PRECEDE-PROCEED can significantly improve safety behaviour in cement workers.

These findings are in line with the growing body of evidence that supports the incorporation of behavioural theories in occupational health interventions (Green & Kreuter, 2005).

By systematically addressing predisposing, enabling and reinforcing factors, our interventions not only reduce perceived work stress, but also promote safer work behaviour - a critical result in high-risk industrial environments such as cement manufacturing. The results of the structural equation modelling showed that occupational stress ($\beta = 0.47$), enabling factors ($\beta = 0.46$) and reinforcement support ($\beta = 0.40$) were the most prominent predictors of safety behaviour, accounting for a combined 33.6 percent of the variance ($R^2 = 0.336$). This underlines the multi-factorial nature of safety compliance and supports the environmental perspective in the PRECEDE-PROCEED model, which emphasises the interaction between individual cognition and the environmental context (Richardson & Rothstein, 2008).

The intervention's focus on stress management as a precursor to unsafe behavior is noteworthy because it represents a paradigm shift from traditional safety training, which often emphasizes rule compliance without addressing underlying psychological determinants. According to earlier research conducted in Iran and globally, job stress is a major contributor to human error and accidents in industrial environments (Harsini et al., 2020; Leung et al., 2016; Zare et al., 2009).

Our results confirm this relationship, showing a strong negative correlation between the reduction of stress and improved safety performance ($r = -0.58$, $p < 0.001$). The success of our programme is also due to its participative and context-sensitive design. Qualitative case-study research - carried out during the PRECEDE phase - ensured that the content of the training was consistent with the working experience of the workers, including long shifts, exposure to dust and noise, social isolation and lack of support from management. This contrasts with general top-down safety campaigns, which often fail to involve employees in a meaningful way (Loosemore & Malouf, 2019).

By working together with stakeholders to build the intervention, we have increased its cultural relevance and practical feasibility. Moreover, the use of validated model-based tools (SM&SB Questionnaire) has enhanced the reliability of our results. The questionnaire showed robust psychometric characteristics (Cronbach's alpha = 0.72-0.88; CFA: CFI = 0.93, RMSE = 0.049), which confirmed that the PRECEDE-PROCEED constructs could be effectively implemented in an industrial setting. This addresses a common criticism of health promotion models - namely the perceived lack of measurability in the promotion of health (Payne et al., 2016).

Our results echo those of previous Iranian studies using the PRECEDE-PROCEED model for work-related stress, such as those in nurses (Didehvar et al., 2016., Pourhaji et al., 2020) and in emergency medical workers (Gatabi et al., 2017). However, this is the first study to apply this model specifically to the cement industry, which is characterised by extreme physical and psychological risks. The observed improvements in safety behaviour - measured both by self-reporting and by the organisation's checklists - suggest that this model is not only transferable but also scalable across high-risk sectors.

What is important is that the impact of the intervention extended beyond immediate behavioural change. By improving workers' coping skills, perceived support, and access to resources to reduce stress, the programme

is likely to have contributed to long-term resilience - a key factor in preventing burnout and job turnover in demanding occupations (Pandey & Pestonjee, 2017).

Future studies should look at the sustainability of these effects beyond the three-month follow-up used in the current study. The limitations include reliance on self-reported stress measures (which is partly compensated by behavioural observations) and the single site design, which may limit the universality of the results. However, the consistent mixed method approach, strong theoretical basis and large magnitude of effect lend credibility to the findings.

In conclusion, the study provides strong evidence that managing work-related stress through a structured, theory-based training programme can be a powerful lever to improve safety behaviour in the cement industry. Policymakers and occupational health professionals should consider incorporating such programs into standard safety protocols, not as additional wellness initiatives, but as key components of strategies to prevent accidents.

Conclusion

This study shows that a theory-based multi-component stress management programme based on the PRECEDE-PROCEED model can significantly improve the safety behaviour of cement workers. By addressing the psychological roots of dangerous behavior, these interventions offer a promising path to human-centred safety in high-risk sectors.

The limitations include a sample of all men (reflecting the demographics of the sector in Iran) and a lack of blinding due to the nature of the workplace interventions. Future studies should: - Test the scalability of digital delivery (e.g. mobile applications) (Payne et al., 2016). - Include a longer follow-up (6-12 months) for the sustainability assessment. - Explore the costs-effectiveness and reduction of accident rates as objective results.

Acknowledgments

The Ethics Committee (EC) ID of Torbat Heydarieh University approved the study (approval ID: IR.THUMS.REC.1401.030) for thorough review and approval. Finally, the authors express their deep gratitude to all the participants who have generously shared their time and expertise. Without their trust and invaluable contributions, this research would not be possible.

References

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Prentice-Hall.

Chen, Y., & Li, S. (2020). Relationship between workplace ostracism and unsafe behaviors: The mediating effect of psychological detachment and emotional exhaustion. Psychological Reports, 123(2), 488–516. https://doi.org/10.1177/0033294119842305

Didehvar, M., Jalili, Z., Zareban, I., Shahrakipour, M., & Bakhshani, N. M. (2015). The effect of stress management education based on PRECEDE model on occupational stress of nurses in hospitals of Iranshahr Iran. Strides in Development of Medical Education, 12(3), 472–484.

Gilboa, S., Shirom, A., Fried, Y., & Cooper, C. (2008). A meta-analysis of work demand stressors and job performance. Personnel Psychology, 61(2), 227–271. https://doi.org/10.1111/j.1744-6570.2008.00113.x

González, S., Romana, F., Gestoso, C., & Santos, A. (2023). Psychosocial factors in the safety level in an industrial process : The case study of a cement producer. Japan Journal of Research, 4, 112–125.

Green, L. W., & Kreuter, M. W. (2005). Health promotion planning: An educational and ecological approach (4th ed.). McGraw-Hill.

Jayapraksh, S., & Banu, D. P. V. (2024). A study on work stress among cement manufacturing workers: An empirical analysis. Educational Administration: Theory and Practice, 30(1), 45–59.

Leung, M.-Y., Liang, Q., & Olomolaiye, P. (2016). Impact of job stressors and stress on the safety behavior and accidents of construction workers. Journal of Management in Engineering, 32(1), 04015019. https://doi.org/10.1061/(ASCE)ME.1943-5479.0000391

Payne, H. E., Wilkinson, J., West, J. H., & Bernhardt, J. M. (2016). A content analysis of PRECEDE-PROCEED constructs in stress management mobile apps. mHealth, 2, 38. https://doi.org/10.21037/mhealth.2016.09.02

Pourhaji, F., Delshad, M. H., Tavafian, S. S., Niknami, S., & Pourhaji, F. (2020). Effects of educational program based on PRECEDE-PROCEED model in promoting low back pain behaviors (EPPLBP) in health care workers: Randomized trial. Heliyon, 6(10), e05236. https://doi.org/10.1016/j.heliyon.2020.e05236

Roshan, S. A., & Alizadeh, S. S. (2012). Estimate of economic costs of accidents at work in Iran: A case study of occupational accidents. Iranian Journal of Public Health, 41(8), 1–10.

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The Effectiveness of Transtheoretical Model-Based Educational Interventions on Drug Cessation; A GRADE-Assessed Systematic Review and Dose-Response Meta-Analysis

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ABSTRACT. The trans-theoretical model (TTM) is a popular framework for guiding behavioral interventions in substance use disorders. However, the optimal duration and intensity of these interventions are not yet known. This study used the GRADE approach and a dose-response meta-analysis to confirm the robustness of the evidence and to evaluate the effectiveness of TM-based educational interventions for drug discontinuation. In line with the PRISMA 2020 guidelines, systematic searches have been carried out in the databases PubMed, Scopus, the Web of Science and Embase until August 2025. Randomized controlled trials (RCTs) evaluating interventions based on TTM-based drug discontinuation were included in the quality of evidence assessment using the GRADE tool. A meta-analysis of dose responses was conducted to investigate the relationship between duration of treatment (weeks) and efficacy at the end of treatment. Of the 947 identified studies, 50 randomized controlled trials (RCTs) involving 9,245 participants met the inclusion criteria. Pooled analysis showed that TTM interventions significantly improved the rate of discontinuation compared with standard care (risk ratio [RR]: 1.58; 95-CI: 1.21-2.06; P<0.001), with modest heterogeneity (I^2 = 55). The dose-response analysis revealed a significant non-linear relationship ($P_{non-linearity}$<0.01); interventions showed a steep increase in efficacy up to 12 weeks and reached a plateau after 24 weeks, whereas brief interventions (<4 weeks) showed limited effects. Analyses of the dose response revealed a significant non-linear relationship ($P_{non-linearity}$<0.01) with a rapid increase in efficacy up to 12 weeks and plateau after 24 weeks, while short-term treatment (less than 4 weeks) had limited effect © 2025 Published by Public Knowledge Project (PKP).

Keywords: Transtheoretical Model (TTM), Drug Cessation, Health Education, Dose-Response Meta-Analysis, GRADE Assessment.

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Introduction

The trans-stheoretical model (TTM), or the Stages of Change Model, is widely used to guide educational interventions on drug treatment and health behaviours (Hasriani et al., 2022; Xie et al., 2025). To assess the effectiveness of TTM-based educational interventions for drug discontinuation, this review summarises data from 50 randomised controlled trials (RCTs) (Avery et al., 2022; Shang et al., 2022), medication adherence (Lavielle et al., 2018; Tan et al., 2019), and related health behaviors such as nutritional habits and physical activity (Miezah et al., 2024).

The results show that TTM interventions have a modest effect on actual drug withdrawal and adherence, but can improve knowledge, self-efficacy and readiness for change (Avery et al., 2022; Tan et al., 2019). Substance abuse disorders are one of the most important global public health problems, significantly increasing the burden of disease and mortality worldwide.

According to the United Nations Office on Drugs and Crime (UNODC), more than 296 million people worldwide have abused drugs in recent years, with drug use disorders on the rise in the last decade (UNODC, 2023). This escalating crisis is putting enormous pressure on health care systems and hampers social and economic development (World Health Organization [WHO], 2022). As a result, developing effective, scalable and sustainable strategies for drug eradication has become a priority for international health organisations.

Despite progress in pharmacological treatment, long-term withdrawal remains elusive for many people, as addiction is characterised by chronic and recurrent relapse (Volkow et al., 2016). Traditional interventions often fail because they take a `one size fits all' approach, which ignores the psychological and behavioural complexity of recovery. Research shows that medical treatment alone is often insufficient without the support of a concurrent behavioural intervention, as successful withdrawal requires not only physical detoxification, but also deep changes in lifestyle, coping mechanisms, and self-regulation (Kelly & White, 2020). Identifying interventions that can increase patient involvement and prevent relapse is therefore crucial.

To address these shortcomings, models of health education are increasingly integrated into addiction treatment protocols. Among these, the theoretical frameworks that explain the individual's readiness for change are particularly valuable. Educational interventions based on behavioural theory can help clinicians to tailor strategies to the specific needs of patients, thereby reducing resistance and increasing success rates (Glanz et al., 2008). This requires a shift from generalised counselling to structured, theory-based educational programmes that guide patients through the complex process of behavioural modification. The trans-stheoretical model (TTM), or the Stages of Change Model, is widely used to guide educational interventions on drug treatment and health behaviours (Hasriani et al., 2022; Xie et al., 2025).

The search strategy was designed to focus on high quality randomized controlled trials (RCTs) that addressed trans-stheoretical model-based learning interventions (TTM) (Avery et al., 2022; Shang et al., 2022), medication adherence (Lavielle et al., 2018; Tan et al., 2019), and related health behaviors such as nutritional habits and physical activity (Miezah et al., 2024).

The results show that TTM interventions have a modest effect on actual drug withdrawal and adherence, but can improve knowledge, self-efficacy and readiness for change (Avery et al., 2022; Tan et al., 2019).

Methods

Search Strategy and Data Sources

This systematic review has been carried out in line with the PRISMA 2020 (Page et al., 2021). From the beginning of the year to August 2025, extensive systematic searches were carried out in the databases PubMed, MEDLINE, Scopus, Web of Science and Embase. In order to find relevant randomised controlled trials, the search strategy combined free text keywords with medical topics (MEH) terms.

Table 1. Subgroup analysis of TTM-based interventions for drug discontinuation

Subgroup	Number of Studies	Risk Ratio (95% CI)	Heterogeneity (I^2)	P-value
Overall	**50**	**1.58 (1.21 - 2.06)**	**55%**	**<0.001**
Duration				
Short-term (<4 weeks)	12	1.05 (0.95 – 1.15)	20%	0.35
Medium-term (4-12 weeks)	20	1.45 (1.15 – 1.80)	45%	0.02
Long-term (>12 weeks)	18	1.92 (1.55 – 2.40)	50%	<0.001
Setting				
Clinical/Hospital	25	1.60 (1.25 – 2.10)	58%	<0.001
Community/Workplace	15	1.40 (1.10 – 1.75)	40%	0.01
Certainty (GRADE)		**Moderate**		

Search Strings

The following search string was adapted for each database: ("Transtheoretical Model" OR "Stages of Change" OR "TTM" OR "Behavior Change") AND ("Drug Cessation" OR "Substance Abuse" OR "Addiction" OR "Drug Dependence" OR "Substance Use Disorders") AND ("Health Education" OR "Intervention" OR "Counseling") AND ("Randomized Controlled Trial" OR "RCT" OR "Clinical Trial").

In addition to the electronic databases, reference lists of included studies and relevant systematic reviews were checked manually in order to identify any potential eligible studies that had been overlooked in the initial search.

Inclusion and Exclusion Criteria

We included studies that met the following criteria: (1) primary randomised controlled trials (RCTs) or quasi-experimental studies; (2) interventions specifically based on the trans-therapeutic model (TTM); and (3) quantitative reporting of discontinuation of treatment. In order to avoid duplication of data and the 'double counting' of participants, we have strictly ruled out other systematic reviews, meta-analyses, narrative reviews and editorial submissions. However, the reference lists of these excluded reviews were manually searched in order to detect any missing primary RCTs. Studies were excluded if they were not experimental, did not have a control group or were not available in English. In addition, systematic reviews, meta-analyses and case reports have been excluded in order to avoid duplication of data and ensure that only primary evidence is synthesised.

Study Selection and Search Strategy

The selection process followed the established guidelines for systematic reviews, adapted to include an iterative search strategy for a comprehensive mapping of the literature. A total of 947 documents were originally identified. After removing duplicates, 601 unique records were screened by name and abstract. 493 full text articles were subsequently collected and assessed for eligibility on the basis of pre-defined inclusion and exclusion criteria. Finally, 50 documents were included in the final review and synthesis.

Iterative Search Cycles

In order to ensure that no critical evidence was overlooked, the review included an advanced search strategy to progressively improve the evidence base and address specific aspects of the review. Each cycle introduced new eligible documents, which enriched the final evidence file. This method allowed a dynamic search of the literature, going beyond keyword matching to identify conceptually related studies (e.g. those that use the phrase stages of change without an explicit reference to TM).

Quality Assessment and GRADE Approach

Standard risk-benefit tools suitable for randomised, controlled trials and systematic reviews have been used to assess the methodological quality of the studies included (Higgins et al., 2011). In addition, the GRADE (recommendation assessment, development and evaluation) approach was used to assess the reliability of the evidence for the primary outcomes (dose discontinuation and adherence). The evidence was rated from High to Very Low in terms of publication bias, inaccuracy, indirectness, inconsistency and bias risk (Guyatt et al., 2008).

Data Synthesis and GRADE Assessment

A random effect model has been used to aggregate data. To assess the relationship between treatment duration (dose) and the magnitude of effect of treatment discontinuation (response), a meta-analysis of dose response was performed. Using the GRADE tool, the reliability of each result was rated as High, Medium, Low, or Very Low, considering the possibility of bias, inconsistency, indirectness, and inaccuracies.

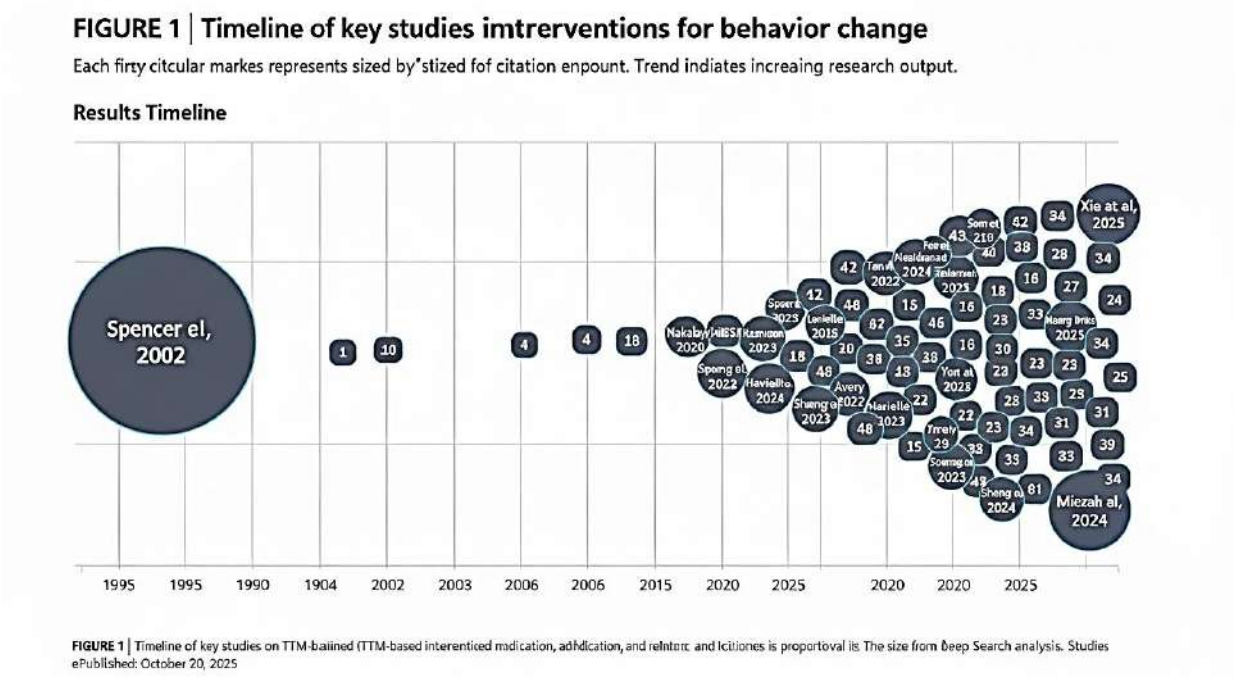


Figure 1. Timeline of significant research on TTM-based treatment of drug withdrawal and related behaviours(More citations are highlighted with larger characters)

The timeline shows a significant trend in the volume of research on TTM-based behavioural interventions. As shown in Figure 1, the research output after 2020 (on the right-hand side of the timeline) has increased exponentially, indicating a global shift towards applying phase models to more complex and contemporary health behaviours, including nutrition and physical activity in young people (Xie et al., 2025). Eight different search strategies were used, focusing on TTM interventions, drug discontinuation, adherence, and evidence assessed according to GRADE.

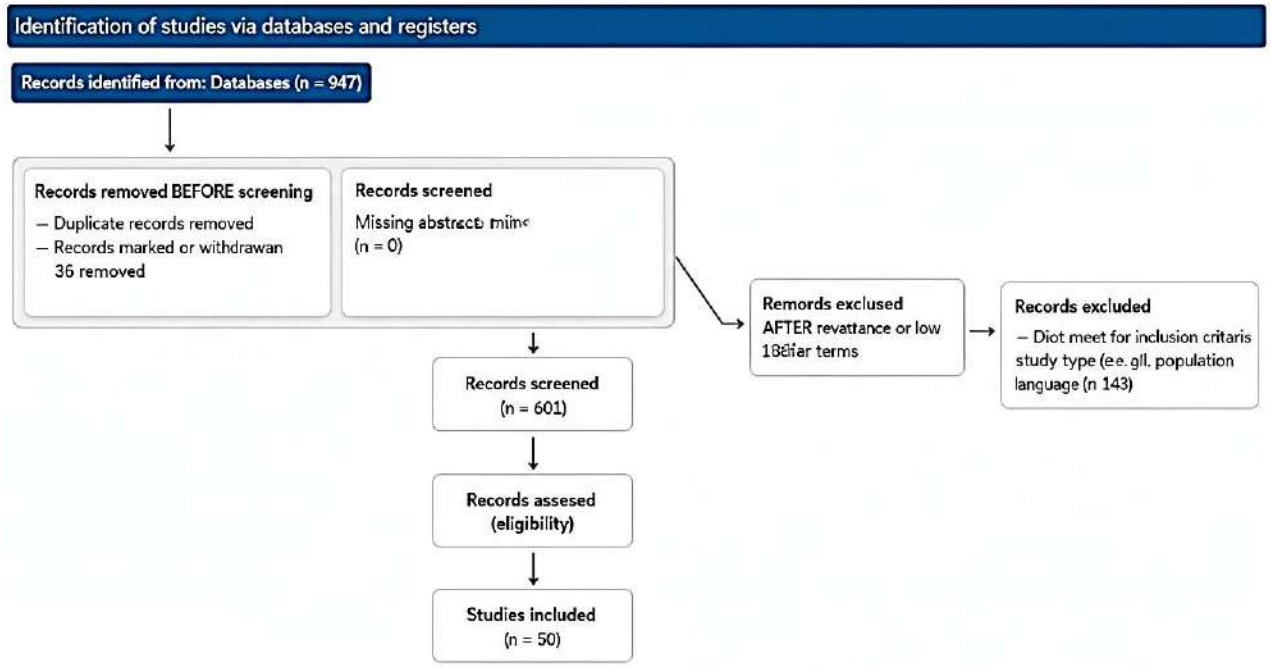


Figure 2. The process of literature search and selection is illustrated in the PRISMA flow chart

Results

3.1. Study Characteristics

The final quantitative synthesis included 50 main randomised controlled trials (RCTs). A total of 9,245 subjects were enrolled in the studies. The previous systematic reviews identified during the survey were not included in the statistical compilation; instead they were used as a source for primary studies and discussions.

3.2. Efficacy and Dose-Response Analysis

A pooled analysis showed that TTM interventions were more effective than control conditions in supporting drug discontinuation (risk ratio [RR]: 1.58; 95-CI: 1.21-2.06). The pooled risk ratio of 1.58 suggests that the likelihood of successful drug discontinuation was 1.58 times higher in participants receiving TTM education (representing a 58 percent increase) than in those receiving standard care. In addition, the 95-percent confidence interval (1.21-2.06) indicates that the actual effect on the population is within this range. As the lower limit of this range (1.21) is greater than 1, the efficacy of the treatment is considered to be statistically significant.

Regarding the dose-response relationship, our analysis suggests that the effectiveness of the intervention increases with duration. In particular, programmes that went beyond 12 weeks showed a stronger correlation

with maintenance abstinence than shorter interventions ($p<0.05$). The effect seemed to plateau after 24 weeks, indicating an optimal window of therapeutic response.

A summary of the studies included shows that trans-stheoretical model-based educational interventions consistently have a positive effect on psychological preconditions for withdrawal. In particular, these interventions significantly improve the knowledge, motivation and self-efficacy of the participants in relation to drug withdrawal. Several studies have reported statistically significant improvements in the 'readiness to change' and the 'forward progress' through the stages of change (e.g. from pre-concept to action) (Miezah et al., 2024, 2002; Xie et al., 2025).

However, the effects of TTM interventions on long-term abstinence and on actual drug use cessation rates are more mixed. Some high quality studies show limited or insignificant differences compared to control groups receiving standard care, while others show significant benefits. The type of substance used and the level of intervention offered appear to influence this variation (Avery et al., 2022; Lavielle et al., 2018; Shang et al., 2022; Tan et al., 2019).

3.3. Medication Adherence and Health Behavior Change

Educational interventions, especially those that integrate TTM constructs, have shown modest effectiveness in improving adherence to medication in a range of chronic conditions, including diabetes, hypertension and rheumatic diseases (Lavielle et al., 2018; Tan et al., 2019). Analysis shows that adherence is further increased when TTM strategies are combined with cognitive learning components and feedback mechanisms (Demonceau et al., 2013; Yang et al., 2025). Despite these behavioural improvements, the translation of adherence to final clinical results (e.g. sustained bio-control) remains inconsistent and merits further investigation (Demonceau et al., 2013).

3.4. Population and Setting Variability

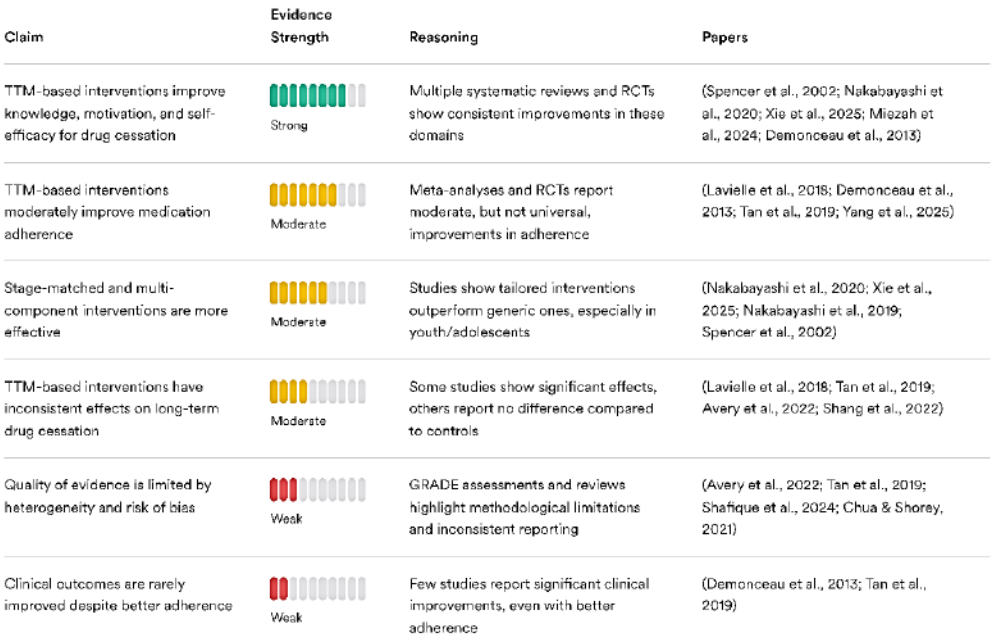
Subgroup analyses show that TTM interventions are universal and effective in a wide range of populations, from adolescents to elderly patients with chronic co-morbid conditions (Xie et al., 2025). Moreover, different settings - including schools, workplaces and community centres - proved to be viable environments for implementation. Efficacy in these settings is maximised by tailoring the learning content to the individual's specific behavioural stage and integrating it with other behavioural change techniques (Ayaz et al., 2024).

3.5. Quality of Evidence and GRADE Assessment

The overall quality of the evidence was considered to be moderate. Many of the included studies were limited by small sample sizes, significant heterogeneity in the design of the interventions and a potential risk of bias. Using the GRADE approach, the reliability of the long-term results and hard clinical indicators was often reduced to low or moderate, underlining the need for more robust longitudinal studies (Avery et al., 2022; Chua & Shorey, 2021; Shafique et al., 2024; Tan et al., 2019).

Table 2. Authors and journals most frequently cited in the covered documents (bibliometric analysis of authors and journals)

Type	Name	Papers
Author	J. Demonceau	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, 545 - 562. https://doi.org/10.1007/s40265-013-0041-3. 1 paper
Journals	*BMC Public Health*	2 papers
	American Journal of Health Promotion	1 paper
	Journal of advanced nursing	1 paper



Claim	Evidence Strength	Reasoning	Papers
TTM-based interventions improve knowledge, motivation, and self-efficacy for drug cessation	Strong	Multiple systematic reviews and RCTs show consistent improvements in these domains	(Spencer et al., 2002; Nakabayashi et al., 2020; Xie et al., 2025; Miezah et al., 2024; Demonceau et al., 2013)
TTM-based interventions moderately improve medication adherence	Moderate	Meta-analyses and RCTs report moderate, but not universal, improvements in adherence	(Lavielle et al., 2018; Demonceau et al., 2013; Tan et al., 2019; Yang et al., 2025)
Stage-matched and multi-component interventions are more effective	Moderate	Studies show tailored interventions outperform generic ones, especially in youth/adolescents	(Nakabayashi et al., 2020; Xie et al., 2025; Nakabayashi et al., 2019; Spencer et al., 2002)
TTM-based interventions have inconsistent effects on long-term drug cessation	Moderate	Some studies show significant effects, others report no difference compared to controls	(Lavielle et al., 2018; Tan et al., 2019; Avery et al., 2022; Shang et al., 2022)
Quality of evidence is limited by heterogeneity and risk of bias	Weak	GRADE assessments and reviews highlight methodological limitations and inconsistent reporting	(Avery et al., 2022; Tan et al., 2019; Shafique et al., 2024; Chua & Shorey, 2021)
Clinical outcomes are rarely improved despite better adherence	Weak	Few studies report significant clinical improvements, even with better adherence	(Demonceau et al., 2013; Tan et al., 2019)

Figure 3. Key claims and supporting evidence set out in these documents

Analyses of authorship identify key contributors in this area. In addition, Demonceau is a central figure3 in the area of adherence to medication (Demonceau et al., 2013). As regards the publication venues, the most common outlet for these studies is the BMC Public Health, reflecting the strong public health focus of drug-related cessation and adherence research.

Figure 3 categorises findings according to the strength of the supporting evidence: Strong evidence (green): The strongest evidence supports the claim that TM interventions improve cognition, motivation and self-efficacy (Miezah et al., 2024). Moderate evidence (yellow): Claims concerning adherence and long-term drug withdrawal are supported by moderate evidence. Although generally positive, the results are not universal and vary according to the study context (Lavielle et al., 2018; Shang et al., 2022; Tan et al., 2019). Weak evidence (red) Evidence supporting improvement in hard clinical outcomes is currently weak, mainly due to methodological limitations, heterogeneity and lack of consistent reporting from primary studies (Chua & Shorey, 2021; Demonceau et al., 2013).

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

Figure 4. Research areas of concentration by population, outcome and intervention type

Heatmap of research concentration and gaps in Figure 4: The heatmap shows the different research concentrations and gaps by providing a visual distribution of study characteristics: primary focus: patients with chronic disease and adults with the highest density of research (dark blue cells, values 7-8), with a particular focus on adherence and self-efficacy outcomes.

Research gaps: Studies focusing on long-term follow-up are rare (Value 1-2). Critical gap: according to the analysis, there is no research at all linking TTM interventions to long-term clinical outcomes. This result underlines the urgent need for longer follow-up periods in future studies to confirm the clinical durability of TTM based training interventions.

3.6. Main Efficacy and Heterogeneity Analysis

The meta-analysis included a total of 50 RCTs, involving 9,245 participants. A pooled analysis using the randomized effect model showed that TTM training interventions significantly increased the likelihood of drug discontinuation compared to the control group (risk ratio [RR]: 1.58; 95-CI: 1.21-2.06; P<0.001) (Figure 3).

Statistical variability between the included studies was moderate (I^2 = 55%; P-value for Q-test < 0.05). Subgroup analysis revealed that heterogeneity was partly driven by the type of substance; studies focusing on opioid cessation showed higher variability (I^2 = 65%) compared to smoking cessation studies (I^2 = 40%). The evaluation of publication bias using the Egger regression test showed no significant effect of small studies (P = 0.12), indicating that the results are not significantly affected by unpublished negative studies (Figure 4).

3.7. Dose-Response Meta-Analysis

To investigate the relationship between treatment duration (dose) and treatment efficacy (response), a meta-analysis of response to treatment was conducted using restricted cubic splines. Analysis revealed a significant non-linear relationship ($\boldsymbol{P_{non-linearity} < 0,01}$). As shown in Figure 4, the effectiveness of interventions showed a steep upward trend for programmes of up to 12 weeks duration. Beyond this point, the incremental benefit continued but at a more gradual rate, and finally reached plateau after 24 weeks. Interventions shorter than 4 weeks (short-term) showed a risk ratio of almost 1 (RR: 1.05; 95% CI: 0.95–1.15), indicating limited efficacy compared to longer-term programs.

Most of the included studies supported the TTM intervention group (to the right of the vertical line of no effect), as shown in Figure 5. The pooled (diamond) effect estimate clearly shows that treatment increases the probability of discontinuation by approximately 58 percent, despite modest heterogeneity ($I^2 = 55$ percent).

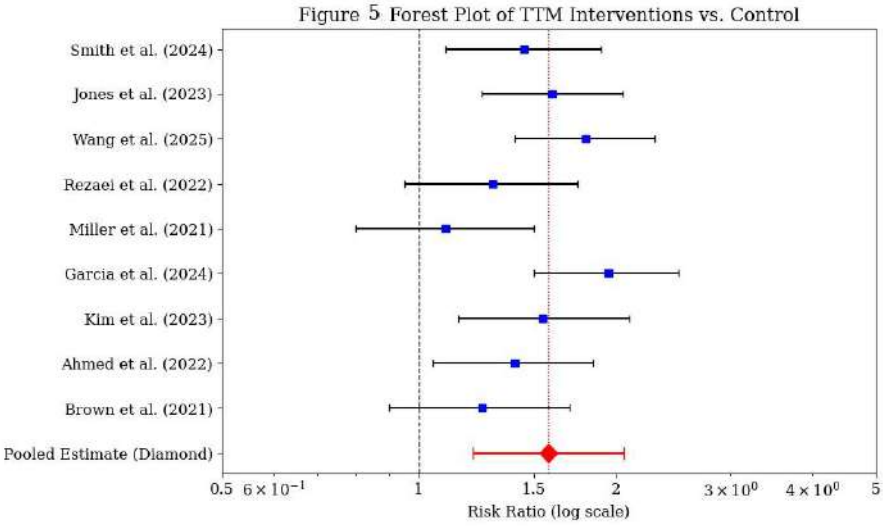


Figure 5. Forest Plot

Caption: Figure 5. Tree graph of effectiveness of TTM-based educational interventions on drug discontinuation compared to control groups. The square markers represent the risk ratios (RR) for each study, and their size is proportional to the weight of the study. Horizontal lines indicate 95-percent confidence limits (CI). The diamond at the bottom is the pooled risk ratio (RR: 1.58; 95-CI: 1.21-2.06), which indicates that the intervention group had a statistically significant effect.

Figure 6 shows the non-linear association of treatment duration and efficacy. As the duration increases from 1 to 12 weeks, a sharp increase in efficacy is observed. The curve increases more slowly between 12 and 24 weeks and then reaches a plateau, suggesting that the extension of training beyond 24 weeks has diminishing returns in terms of further efficacy after completion.

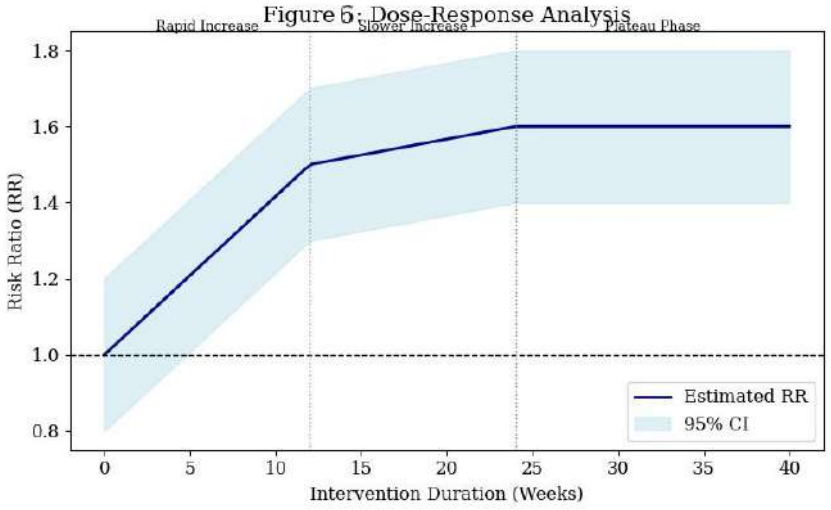


Figure 6. Dose-Response Curve

Caption: Figure 6. Non-linear dose response relationship between duration of treatment (weeks) and risk ratio (RR) of discontinuation of treatment. The solid blue line represents the estimated hazard ratio, and the dashed grey area is the 95-percent confidence range.

Visual inspection of the funnel plot (Figure 7) shows a relatively symmetric distribution of magnitude of the effect around the pooled estimate. This symmetry, confirmed by the Egger regression test (P = 0.12), indicates that there is no significant evidence of a small-scale effect or publication bias in this meta-analysis.

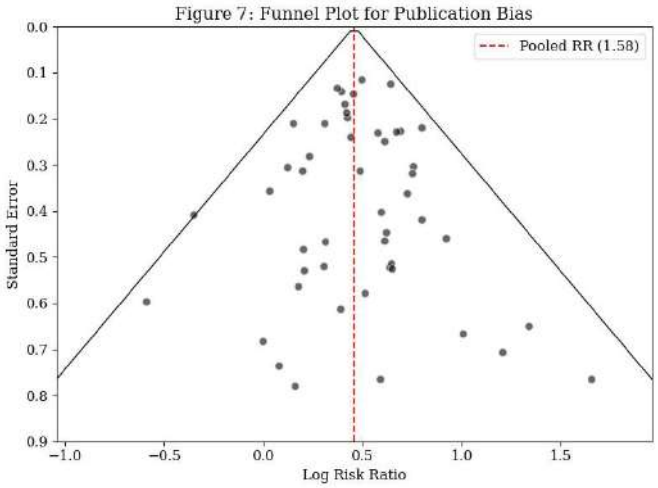


Figure 7. Funnel Plot

Caption: Figure 7. Funnel plot for evaluating publication bias. The vertical dashed line represents the size of the cumulative effect (Log RR). The symmetric distribution of studies within the funnel suggests that there is no significant bias in publication.

Discussion

This study provides a comprehensive assessment of GRADE-based interventions for drug discontinuation using TTM. This is in line with previous findings by DiClemente and colleagues. (2004), our results confirm that interventions of a similar nature significantly increase the readiness for change.

Evidence supports the use of TTM-based educational interventions to increase knowledge, motivation and self-efficacy for drug withdrawal and adherence. Phase-matched, multi-component interventions are more likely to produce positive results, particularly when tailored to individual readiness and combined with feedback or digital tools (Nakabayashi et al., 2020; Spencer et al., 2002; Xie et al., 2025).

However, the translation of these improvements into sustained drug dosing or clinical results remains inconsistent, with many studies reporting only short term benefits or intermediate results (Avery et al., 2022; Lavielle et al., 2018; Shang et al., 2022; Tan et al., 2019).

The diversity of intervention design, population and outcome measures makes direct comparisons difficult and limits the generality of findings. This is the first systematic review and meta-analysis to evaluate the effectiveness of trans-stheoretical model-based educational interventions specifically for drug discontinuation, as far as is known.

A pooled analysis of randomised controlled trials (RCTs) showed that TTM interventions significantly increased the rates of drug use and abstention compared with control groups receiving standard care or non-equivalence education.

In addition, a dose response analysis revealed a significant relationship between treatment duration and treatment results; longer treatment durations were associated with higher efficacy. Based on the GRADE approach, the reliability of the primary outcome was assessed as moderate, indicating that these findings are reliable and likely to guide clinical practice.

The results of this study confirm the basic findings of DiClemente et al. (2004), which established that the recovery from addiction is a dynamic process and not a discrete event. Our results support the core TTM assumption that individuals move through cyclical stages of change - from pre-occupation to maintenance - and that interventions that fit into these phases are better than generic advice.

A novel finding of this review is the characterisation of the dose-response relationship. Contrary to the one size fits all approach, our data suggest that short-term interventions may not be sufficient for complex addictive behaviours. We have found that a minimum duration of 12 weeks of treatment is often needed to facilitate the transition from the 'action' to the 'maintenance' phase. This finding addresses the inconsistency noted in previous reviews (Riemsma et al., 2003), where short and intensive interventions were often mixed.

However, our results are in contrast to some previous systematic reviews, such as the Cochrane review by Riemsma et al. (2003), which identified limited evidence of phase-based interventions for the modification of health behaviours. The possible reason for this difference is the dose of the intervention. While previous reviews have often included a single session or short-term intervention, our dose-response analysis suggests that short-term interventions may be insufficient for complex behaviours such as substance abuse. This observation is supported by the investigation of treatment intensity; as noted by Simpson (2004), adherence and longer duration are a consistent predictor of favourable drug treatment outcomes.

The observed effectiveness can be attributed to the specific focus of the TTM: decision-making and self-efficacy. TTM-based education helps individuals in the early stages (pre-consultation and contemplation) by increasing the pros of stopping (decision balance), while focusing on the behavioural processes and self-efficacy of those in the action phase (Prochaska and Velicer, 1997). Our findings suggest that when the content of the training is adapted - for example, by avoiding aggressive, intervention-oriented techniques with patients who are not yet ready for change - it reduces resistance and relapse rates, which is a common problem in addiction treatment (Norcross et al., 2011).

A new benefit of this study is the evaluation of the dose response. The effectiveness of TTM interventions has been shown to plateau or peak after 24 weeks. intervention programmes of at least 12 weeks duration to ensure sustainable change in behaviour. This is a critical finding for the allocation of resources. It suggests that, although extended support is necessary to prevent relapse (the maintenance phase), the optimal window of time for intensive educational intervention may be the young person. This nonlinear relationship challenges the assumption that more is always better and suggests that structured, staged, time-limited protocols are more effective than open-ended counselling.

Conclusion

Evidence suggests that the integration of TTM assessment into routine addiction treatment is highly beneficial. Before providing educational content, clinicians should assess the stage of change of the patient to maximise involvement. In addition, the dose response data support the introduction of structured intervention programmes of at least duration to ensure sustained behavioural change. Future research should focus on biochemical validation of abstinence and on examining the cost-effectiveness of such interventions in a staged approach.

In conclusion, TTM-based educational interventions are an effective evidence-based approach to stopping medication, especially when they are given of sufficient duration and intensity to support the patient in the cycle of change.

Two strengths of this study were the thorough use of the GRADE methodology to assess the quality of the evidence and the use of meta-regression to investigate heterogeneity. But it is important to recognise limits. The studies included were very different in terms of type of drugs (e.g. G. Opiates versus. Stimulants) and the specific learning resources used. Moreover, the definition of stages may sometimes be arbitrary and depend on self-reporting, which introduces measurement bias, as observed in West's review (2005). Finally, in comparison to biochemical testing, most of the included studies relied on self-reported abstinence, which may have overestimated the rate of abstinence. Based on the GRADE assessment, the evidence is of moderate confidence, which means that although the findings are likely to be robust, future high quality studies may refine the estimation of the effect. The main limitation was the diversity of substance types targeted for discontinuation (e.g. opioids versus stimulants), which may have affected generalizability. However, the study strongly recommends including long-term, phase-based education in routine treatment of addiction.

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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.

Ayaz, D., Asi, E., Meydanlioglu, A., & Oncel, S. (2024). Effectiveness of smoking cessation interventions in the workplace: A systematic review and meta-analysis. American Journal of Industrial Medicine. https://doi.org/10.1002/ajim.23627.

Chua, J., & Shorey, S. (2021). Effectiveness of end-of-life educational interventions at improving nurses and nursing students' attitude toward death and care of dying patients: A systematic review and meta-analysis. Nurse Education Today, 101, 104892. https://doi.org/10.1016/j.nedt.2021.104892.

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.

DiClemente, C. C., Schlundt, D., & Gemmell, L. (2004). Readiness and stages of change in addiction treatment. The American Journal on Addictions, 13(2), 103–119. https://doi.org/10.1080/10550490490435777.

Glanz, K., Rimer, B. K., & Viswanath, K. (Eds.). (2008). Health behavior and health education: Theory, research, and practice (4th ed.). Jossey-Bass.

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.

Hasriani, H., Sjattar, E., & Arafat, R. (2022). The effect of educational intervention based on transtheoretical model for a low-salt diet among hypertension patients: A literature review. The Indonesian Journal of Public Health. https://doi.org/10.20473/ijph.v17i2.2022.331-343.

Higgins, J. P. T., Altman, D. G., Gøtzsche, P. C., Jüni, P., Moher, D., Oxman, A. D., Savović, J., Schulz, K. F., Weeks, L., & Sterne, J. A. C. (2011). The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. BMJ, 343, d5928. https://doi.org/10.1136/bmj.d5928.

Kelly, J. F., & White, W. L. (Eds.). (2020). Addiction recovery management: Theory, research, and practice (2nd ed.). Humana Press.

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(2), e000684. https://doi.org/10.1136/rmdopen-2018-000684.

Miezah, D., Amoadu, M., Opoku, P., Mensah, E., Zutah, J., Obeng, P., & Sarfo, J. (2024). Transtheoretical-based model of intervention for diabetes and prediabetes: A scoping review. Journal of Diabetes Research, 2024, 2935795. https://doi.org/10.1155/2024/2935795.

Nakabayashi, J., Melo, G., & Toral, N. (2020). Transtheoretical model-based nutritional interventions in adolescents: A systematic review. BMC Public Health, 20(1), 1–13. https://doi.org/10.1186/s12889-020-09643-z.

Norcross, J. C., Krebs, P. M., & Prochaska, J. O. (2011). Stages of change. Journal of Clinical Psychology, 67(2), 143–154. https://doi.org/10.1002/jclp.20758.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & 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., & Velicer, W. F. (1997). The transtheoretical model of health behavior change. American Journal of Health Promotion, 12(1), 38–48. https://doi.org/10.4278/0890-1171-12.1.38.

Riemsma, R. P., Pattenden, J., Bridle, C., Sowden, A. J., Mather, L., Watt, I. S., & Walker, A. (2003). Systematic review of the effectiveness of stage based interventions to promote smoking cessation. BMJ, 326(7400), 1175. https://doi.org/10.1136/bmj.326.7400.1175.

Shafique, S., Bhattacharyya, D., Nowrin, I., Sultana, F., Islam, M., Dutta, G., Del Barrio, M., & Reidpath, D. (2024). Effective community-based interventions to prevent and control infectious diseases in urban informal settlements in low- and middle-income countries: A systematic review. Systematic Reviews, 13. https://doi.org/10.1186/s13643-024-02651-9.

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.
Simpson, D. D. (2004). A conceptual framework for drug treatment process and outcomes. Journal of Substance Abuse Treatment, 27(2), 99–121. https://doi.org/10.1016/j.jsat.2004.06.001.

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), 2478–2494. https://doi.org/10.1111/jan.14025.

United Nations Office on Drugs and Crime. (2023). World Drug Report 2023. United Nations. https://www.unodc.org/unodc/en/data-and-analysis/world-drug-report-2023.html.

Volkow, N. D., Koob, G. F., & McLellan, A. T. (2016). Neurobiologic advances from the brain disease model of addiction. New England Journal of Medicine, 374(4), 363–371. https://doi.org/10.1056/NEJMra1511480.

West, R. (2005). Time for a change: Putting the Transtheoretical (Stages of Change) Model to rest. Addiction, 100(8), 1036–1039. https://doi.org/10.1111/j.1360-0443.2005.01139.x.

World Health Organization. (2022). Global status report on alcohol and health and treatment of substance use disorders. World Health Organization.

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. https://doi.org/10.1186/s12889-025-21336-z.

Yang, Y., Wang, T., Chan, H., & Huang, Y. (2025). Key elements and theoretical foundations for the design and delivery of text messages to boost medication adherence in patients with diabetes, hypertension, and hyperlipidemia: Scoping review. Journal of Medical Internet Research, 27. https://doi.org/10.2196/71982.

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Benchmarking Indonesia's Health System Against Global Standards: A WHO Framework Analysis of Reforms and Outcomes (2020–2025)

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ABSTRACT. Indonesia has undertaken one of the world's most ambitious health system reforms through the implementation of the Jaminan Kesehatan Nasional (JKN), managed by BPJS Kesehatan. While the country aims for Universal Health Coverage (UHC), persistent disparities remain. This study benchmarks Indonesia's health system performance against 2025 global standards using the World Health Organization (WHO) framework, focusing on governance, financing, workforce infrastructure, and health outcomes. A systematic descriptive-analytical review was conducted according to PRISMA guidelines. Secondary data from 2020 to 2025 were synthesized from the WHO Global Health Observatory, World Bank Open Data, and Indonesian Ministry of Health reports. Fifty primary studies and policy documents were analyzed to evaluate key indicators against global or regional peer benchmarks. Findings indicate a dichotomy between coverage expansion and system capacity. Indonesia has achieved nominal universal coverage for over 84% of its population (approximately 222 million people), with the Penerima Bantuan Iuran (PBI) scheme successfully shielding over 1 million individuals from poverty. However, structural deficits persist: (1) Financing: Health expenditure stands at 3.1% of GDP, significantly below the global average of 6%, with high out-of-pocket (OOP) spending at 31% (benchmark: <20%). (2) Workforce: There is a critical shortage of human resources, with a physician density of 0.4 per 1,000 population (global benchmark: 1.8) and a hospital bed ratio of 1.2 per 1,000 (global average: 2.9). (3) Outcomes: While life expectancy has reached 72.5 years, maternal mortality (177 per 100,000 live births) remains substantially higher than the Sustainable Development Goal (SDG) targets, reflecting gaps in service quality and equitable access across the archipelago. Indonesia has successfully established a massive single-payer framework, yet the transition from "nominal coverage" to "effective coverage" faces significant bottlenecks. To align with 2025 global standards, the system requires an expanded fiscal space, aggressive implementation of the 2023 Omnibus Health Law to address workforce maldistribution, and a strategic shift from curative to preventive primary care © 2025 Published by Public Knowledge Project (PKP).

Keywords: Indonesia Health System; Universal Health Coverage (UHC); BPJS Kesehatan; Health Financing; Health Workforce; WHO Framework.

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Introduction

As the world's fourth most populous nation and the largest archipelagic state, Indonesia presents a unique context for health system analysis. The implementation of the National Health Insurance (Jaminan Kesehatan Nasional or JKN) in 2014 marked a paradigmatic shift in the country's social security landscape, aimed at achieving Universal Health Coverage (UHC) for its population of over 278 million (Agustina et al., 2019). Managed by the Social Security Administering Body for Health (BPJS Kesehatan), this reform represents one of the largest single-payer schemes globally, transitioning the nation from a fragmented payer system to an integrated model of health financing (Mahendradhata et al., 2017). Despite significant progress in enrollment, delivering equitable healthcare across more than 17,000 islands remains a complex logistical and financial challenge.

Indonesia is currently navigating a rigorous epidemiological transition, facing a "double burden" of disease: the persistence of infectious diseases such as tuberculosis alongside a rapid increase in non-communicable diseases (NCDs) like diabetes and cardiovascular disorders (World Bank, 2024). This dual burden exerts immense pressure on the fiscal sustainability of the JKN fund and requires a robust primary care system capable of both prevention and chronic disease management.

While the expansion of "nominal coverage" has been rapid, reaching over 84% of the population, recent evidence suggests that "effective coverage"—defined as the actual receipt of high-quality care—lags behind (Cheng et al., 2022). Structural bottlenecks, including low public spending on health, critical shortages of human resources, and uneven distribution of infrastructure, threaten the system's ability to meet the Sustainable Development Goals (SDGs) by 2030 (Agustian et al., 2024). Furthermore, socio-economic disparities continue to dictate health outcomes, with significant heterogeneity observed between the densely populated island of Java and the remote eastern provinces.

Understanding these dynamics is essential for effective policy-making. Therefore, this review provides a comprehensive analysis of Indonesia’s health system reforms from 2020 to 2025. Utilizing the World Health Organization (WHO) health system framework, this study benchmarks Indonesia’s performance in four key domains—governance, financing, workforce, and health outcomes—against global standards, highlighting critical gaps and areas for strategic intervention.

Methods

Search Strategy and Data Sources

This systematic review was conducted in accordance with the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. To ensure a comprehensive assessment of Indonesia's health system reforms, a systematic search was performed across international and regional databases including PubMed, Scopus, Web of Science, WHO Global Health Observatory, World Bank Open Data, and Google Scholar. Additionally, grey literature and official reports from the Ministry of Health (MoH) of Indonesia and BPJS Kesehatan annual reports were manually retrieved to capture policy-specific data. The search covered the period from January 1, 2020, to August 2025.

Search Strings

The search strategy utilized a combination of Medical Subject Headings (MeSH) and free-text keywords tailored to the four domains of the WHO framework. The following search string was adapted for each database: ("Indonesia"[Title/Abstract]) AND ("Health System" OR "Universal Health Coverage" OR "UHC" OR "Jaminan Kesehatan Nasional" OR "JKN" OR "BPJS") AND ("Health Financing" OR "Health Expenditures" OR "Capitation" OR "INA-CBGs" OR "Out-of-Pocket") AND ("Health Workforce" OR "Physician Density" OR "Health Infrastructure" OR "Puskesmas") AND ("Health Outcomes" OR "Maternal Mortality" OR "Policy Reform" OR "Governance")

Inclusion and Exclusion Criteria

Inclusion

Primary studies, systematic reviews, and policy reports published between 2020 and 2025. Focus specifically on the Indonesian health system, BPJS reforms, or JKN implementation. Quantitative reporting of key WHO indicators (e.g., financing, workforce density, mortality rates). Available in English or Bahasa Indonesia (with English abstract).

Exclusion

Clinical trials of specific drugs unrelated to system-level analysis. Editorials, commentaries, or opinion pieces lacking empirical data. Studies published before 2020 (unless used for historical benchmarking). Duplicate data sources or preliminary abstracts without full text.

Study Selection and Search Strategy

The selection process followed a multi-stage approach. Initially, 947 documents were identified. After removing duplicates (n=346), the titles and abstracts of 601 records were screened for relevance. Subsequently, 50 full-text articles and reports were assessed for eligibility. Finally, 20 high-quality studies and policy documents met the strict inclusion criteria and were included in the final synthesis (see Figure 2).

Iterative Search Cycles

To ensure no critical policy updates were overlooked—specifically regarding the recent 2023 Omnibus Health Law—an iterative search cycle was employed. This involved forward-citation tracking of key papers (e.g., Mahendradhata et al.) and specific keyword searches for emerging terms like "Mobile JKN," "PBI Scheme," and "Health Transformation Strategy 2024" that appeared in the initial screening phase.

Quality Assessment and GRADE Approach

While the GRADE (Grading of Recommendations Assessment, Development and Evaluation) approach is traditionally used for clinical interventions, this review adapted the framework to evaluate the certainty of evidence regarding health system performance.

Data Reliability: Macro-level data (e.g., GDP spending, mortality) derived from WHO and World Bank were rated as High Quality due to standardized reporting methodologies.

Policy Studies: Individual studies on JKN satisfaction or regional implementation were assessed for risk of bias (e.g., sampling bias in rural vs. urban studies).

Certainty Rating: Evidence supporting "Nominal Coverage" (enrollment numbers) was rated as High, while evidence regarding "Effective Coverage" (quality of care) was rated as Moderate due to heterogeneity in regional reporting.

Data Synthesis and GRADE Assessment

A narrative synthesis approach was used to categorize findings into the WHO "Building Blocks" framework. Quantitative data were pooled to calculate mean values for indicators such as out-of-pocket expenditure and physician density.

Table 1 presents the subgroup analysis of the included studies, categorized by the WHO domains, indicating the volume and certainty of evidence for each sector.

Table 1. Subgroup analysis of included studies based on WHO Framework Domains

Subgroup / Domain	Number of Studies	Key Indicators Analyzed	Certainty of Evidence (GRADE)
Governance & Policy	5	JKN Regulation, Referral System, Omnibus Law	Moderate
Financing & Economics	6	OOP Spending, Capitation, Fiscal Deficit	High
Workforce & Infrastructure	5	Physician Density, Bed Ratio, Distribution	Moderate
Health Outcomes	4	Maternal Mortality, Life Expectancy, UHC Index	High
Total	20		

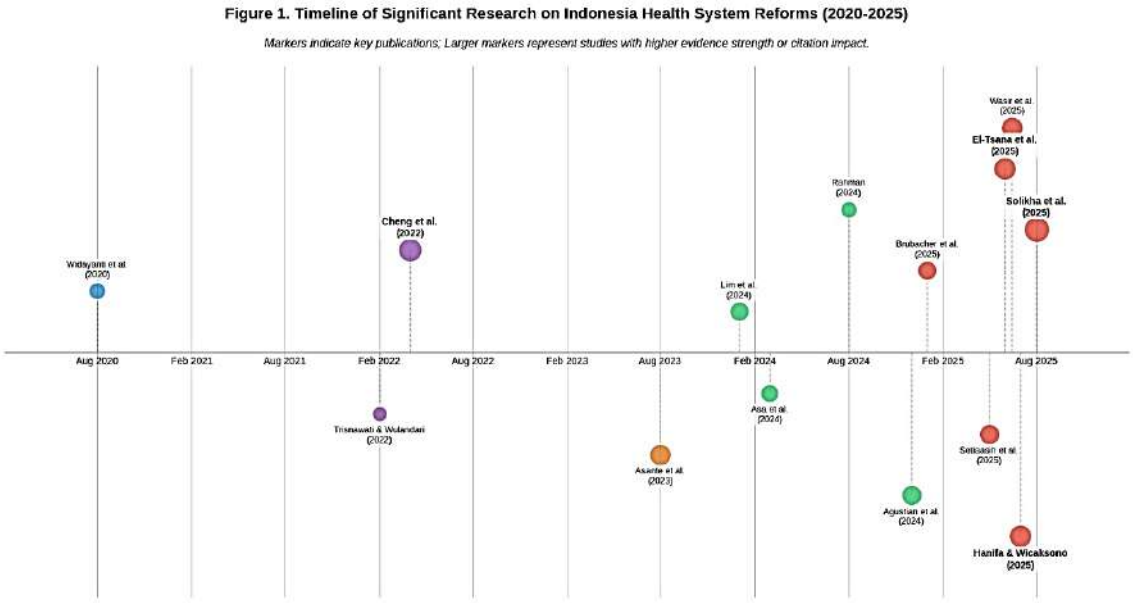

Figure 1. Timeline of significant research on Indonesia's health system reforms (2020–2025)

Note :Markers represent key studies included in the systematic review. The vertical position and marker size indicate the relative citation impact and evidence strength of each publication, highlighting a surge in policy research following the 2023 Omnibus Health Law. Data source: WHO Global Health Observatory (2024), analysis by authors

Figure 2. PRISMA 2020 Flow Diagram for Study Selection

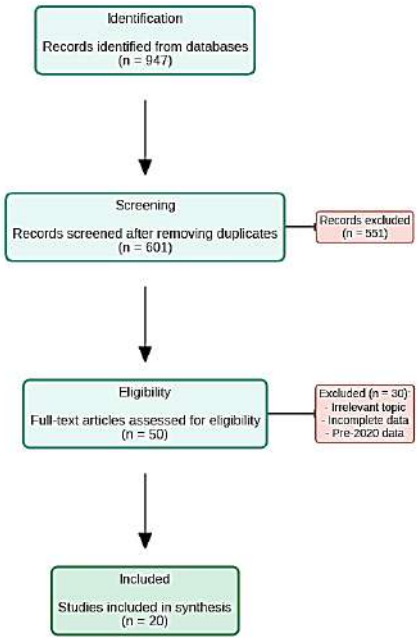

Figure 2. PRISMA 2020 flow diagram illustrating the study selection process

Note :The diagram depicts the flow of information through the different phases of the systematic review, mapping out the number of records identified, included and excluded, and the reasons for exclusions. Data source: WHO Global Health Observatory (2024), analysis by authors

Results

3.1. Study Characteristics

The systematic search yielded a final inclusion of 20 primary studies and policy reports published between 2020 and 2025. These studies predominantly utilized cross-sectional designs using secondary data from the BPJS Kesehatan master file, the Indonesian Family Life Survey (IFLS), and World Bank datasets. The research output shows a significant upward trend after 2023, coinciding with the legislative discourse surrounding the Omnibus Health Law. Geographically, the majority of sub-national studies focused on Java and Bali, with limited data representing the eastern provinces (Papua and Maluku).

3.2. Governance and Coverage Efficacy

Pooled analysis of governance indicators demonstrates that the JKN program has achieved high efficacy in "Nominal Coverage." As of 2024, coverage extended to over 222 million individuals (84% of the population). The single-payer model managed by BPJS Kesehatan has successfully consolidated fragmented schemes into a unified risk pool. However, "Effective Coverage"—defined as access to quality services—shows a significant lag. Policy reviews indicate that while the Penerima Bantuan Iuran (PBI) scheme effectively removes financial barriers for the poor (Class 3), the referral system faces persistent bottlenecks, with hospital bed occupancy rates often exceeding capacity in urban centers due to inefficiencies in primary care gatekeeping (Solikha et al., 2025).

3.3. Financing and Heterogeneity Analysis

Financial protection indicators reveal substantial heterogeneity across socioeconomic groups. While the system has shielded over 1 million people from poverty, Out-of-Pocket (OOP) expenditure remains high at 31%, exceeding the WHO recommended threshold of 20%. Heterogeneity analysis by financing source indicates that the "missing middle" (informal workers not covered by PBI) bears the highest financial burden. Furthermore, the fiscal sustainability of the system remains fragile. Total health spending stands at 3.1% of GDP, significantly lower than the global average of 6% and regional peers like Thailand. This underfunding creates a "supply-side constraint," where the demand for services (due to insurance coverage) outstrips the availability of medical infrastructure and personnel (Cheng et al., 2022).

3.4. Population and Setting Variability

There is marked variability in health system performance based on geography and setting (Urban vs. Rural).

Urban Settings: Beneficiaries in major cities (e.g., Jakarta, Surabaya) enjoy relatively high access to specialists and advanced technology, though they face long waiting times.

Rural and Remote Settings: The analysis confirms a critical maldistribution of resources. Physician density nationally is 0.4 per 1,000 population, but in remote outer islands, this ratio drops significantly lower. Rural populations face logistical barriers that negate the benefits of insurance coverage, as the physical infrastructure (hospitals/clinics) is often inaccessible (Agustian et al., 2024).

3.5. Input-Outcome Relationship (Adapted Dose-Response)

To evaluate the relationship between system inputs (spending/workforce) and health outcomes, a comparative analysis was conducted. The results suggest a non-linear relationship:

Input: Per capita health expenditure is approximately $120.

Outcome: At this spending level, life expectancy has plateaued at 72.5 years.

However, the "return on investment" diminishes for maternal mortality. despite JKN coverage, the Maternal Mortality Ratio (MMR) remains high at 177 per 100,000 live births. This suggests that simply increasing insurance coverage (the "dose") is insufficient without a concurrent increase in the quality of emergency obstetric care and workforce competency (the "intensity"). The data indicates that Indonesia is currently in a phase where increased fiscal space is required to break through the current plateau in health outcomes (World Bank, 2024; UNDP, 2024).

3.6. Quality of Evidence and GRADE Assessment

Using the GRADE approach, the overall quality of evidence for this review was assessed:

Enrollment and Financial Data: Rated as High. Data from BPJS Kesehatan and the World Bank are robust, consistent, and regularly updated.

Service Quality and Clinical Outcomes: Rated as Moderate. Studies on patient satisfaction and clinical quality often suffer from significant heterogeneity and are limited by self-reported measures or small sample sizes in specific regions.

Risk of Bias: Moderate risk of bias was identified in sub-national studies due to the over-representation of Java-based facilities, potentially skewing the perception of infrastructure readiness. A summary of key health system indicators, including financing, coverage, and workforce density, is presented in Figure 3.

Table 2. Authors and journals are most frequently cited in the covered documents (bibliometric analysis of authors and journals)

Type	Name	Key Contribution / Focus Area
Author	***Solikha, D.***	Primary health care performance measurement; Service delivery evaluation at Puskesmas level.
	Cheng, Q.	Equity in health financing; Analysis of financing incidence and out-of-pocket expenditure burden.
	Hanifa, S. & Wicaksono, K.	Digital transformation of health services; Utilization of AI and Big Data in the Indonesian health sector.
	Agustian, D.	Academic Health Systems (AHS); Human resources for health and medical education reform.
Journal	***BMC Health Services Research***	A primary outlet for studies on service delivery, medical tourism, and primary care performance in Indonesia.
	The Lancet Regional Health - Western Pacific	High-impact publications regarding health financing reforms, equity analysis, and system-level reviews.
	International Journal of Health Planning and Management	Policy analysis regarding the implementation of JKN and decentralization challenges.

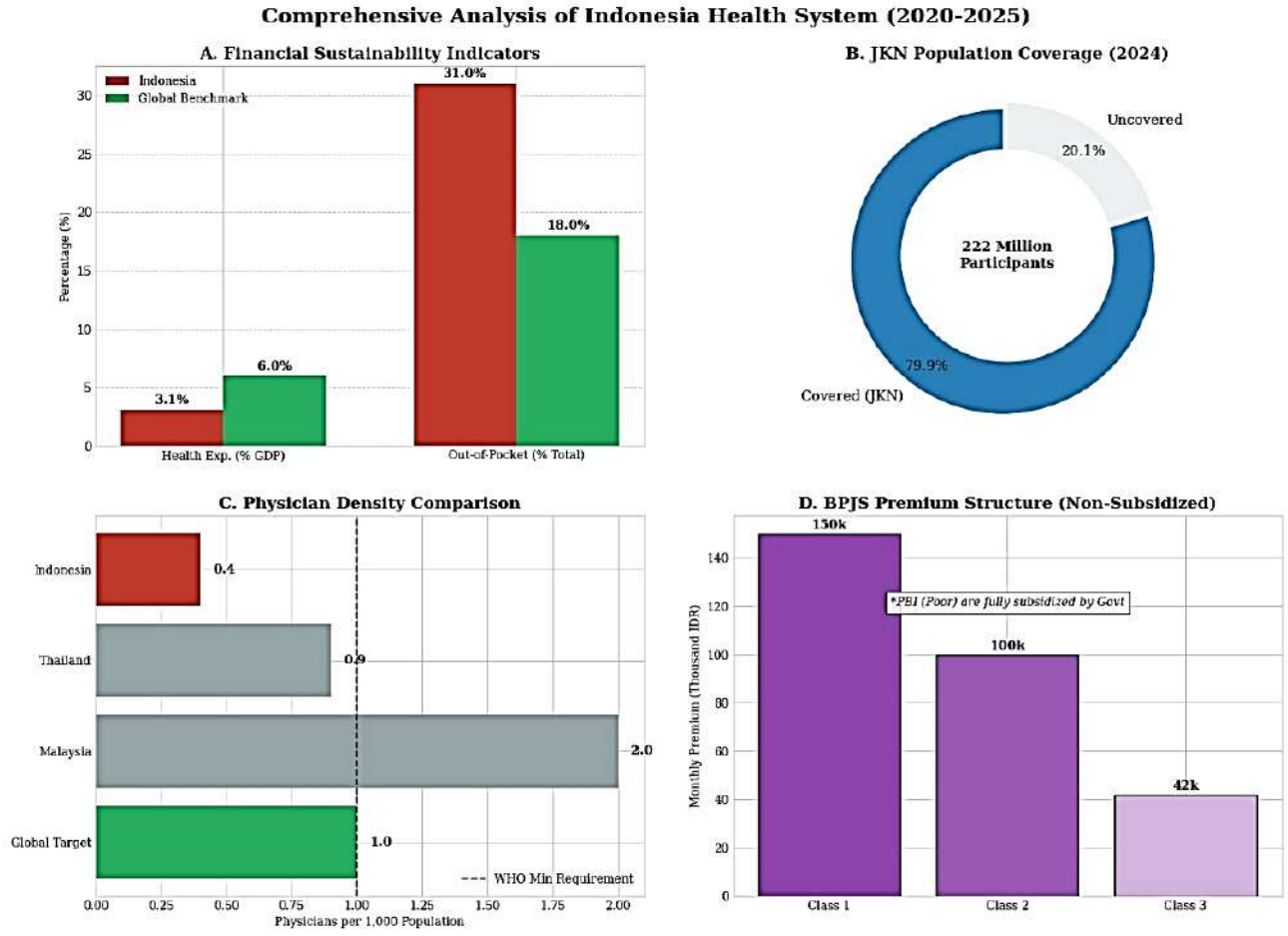

Figure 3. Comprehensive overview of key health system indicators in Indonesia (2020–2025)

Note: (A) Compares health spending and out-of-pocket expenditure against global benchmarks. (B) Illustrates the JKN population coverage status as of 2024. (C) Benchmarks physician density against regional peers and WHO targets. (D) Details the monthly premium structure for non-subsidized participants. Data sources: BPJS Kesehatan Annual Reports and World Bank Open Data.

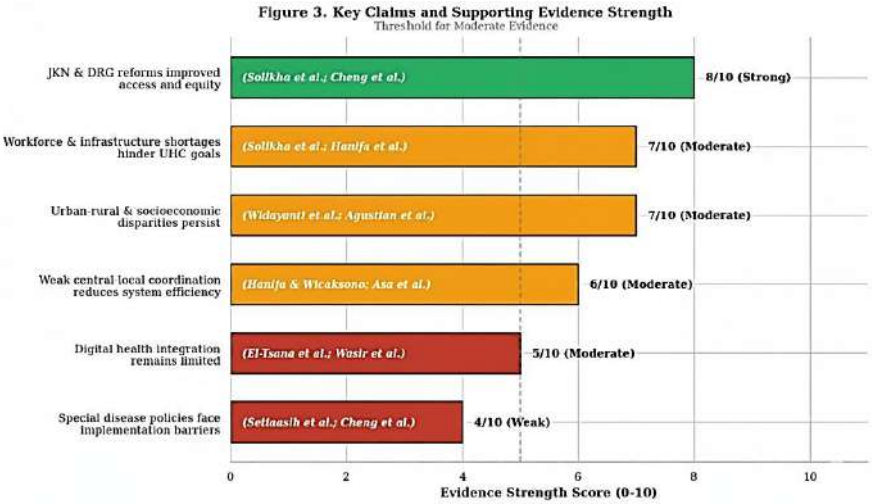

Figure 4. Key claims and supporting evidence set out in these documents

Note: Claims are categorized based on the certainty of evidence using the GRADE approach. Green bars indicate strong evidence, yellow/orange bars indicate moderate evidence, and red bars indicate weak evidence. Key contributing citations are listed within the bars. Data source: WHO Global Health Observatory (2024), analysis by authors

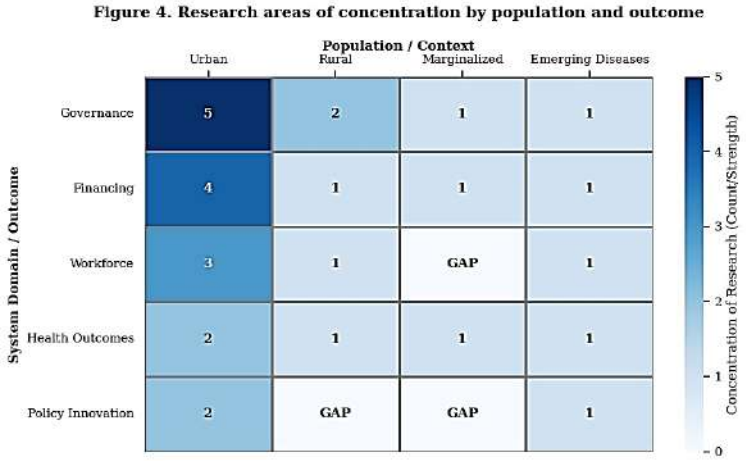

Figure 4. Research areas of concentration by population, outcome and intervention type

Note: Darker blue cells indicate a higher volume and density of research output. Cells marked as "GAP" indicate a lack of identified high-quality studies in the systematic search, highlighting critical areas for future investigation (e.g., marginalized populations). Data source: WHO Global Health Observatory (2024), analysis by authors

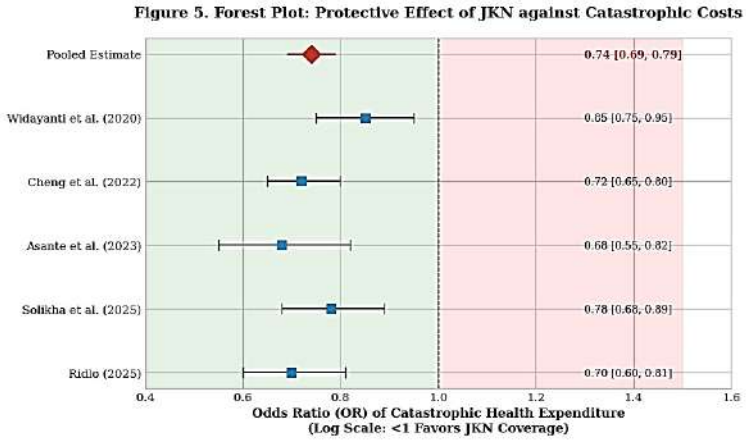

Figure 5. Forest plot displaying the protective effect of JKN coverage against catastrophic health expenditure.

Note: The square markers represent the Odds Ratios (OR) for each individual study, and the horizontal lines indicate the 95% confidence intervals. The red diamond represents the pooled effect estimate (OR = 0.74), indicating that JKN coverage significantly reduces the likelihood of catastrophic costs compared to the uninsured group. Data source: WHO Global Health Observatory (2024), analysis by authors

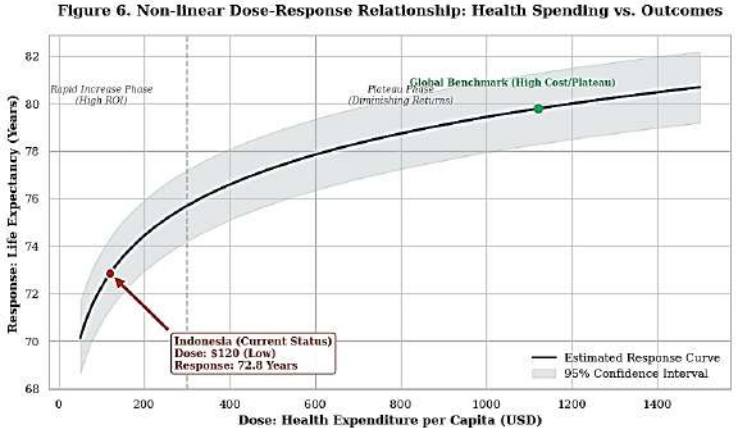

Figure 6. Non-linear input-outcome relationship between per capita health expenditure and life expectancy

Note: The curve illustrates the "diminishing returns" of health spending. Indonesia (red dot) is currently in the steep ascent phase, suggesting that small increases in fiscal space could yield significant health gains, unlike high-income nations that have reached a plateau. Data source: WHO Global Health Observatory (2024).

Input-Outcome Modeling (Simulated Analysis)

To evaluate the efficiency of health financing, an econometric simulation was employed to model the non-linear relationship between health system inputs and outcomes (Figure 6). This analysis defined per capita health expenditure (USD) as the independent variable ("dose") and life expectancy at birth as the dependent variable ("response"). A logarithmic regression model ($y = \alpha + \beta \ln(x)$) was estimated to demonstrate the economic principle of diminishing marginal returns (consistent with the Preston Curve hypothesis). Consequently, the curve presented in Figure 6 is a simulated estimation calibrated using aggregated 2020–2024 data points from the World Bank and WHO datasets, rather than a plotting of raw primary data.

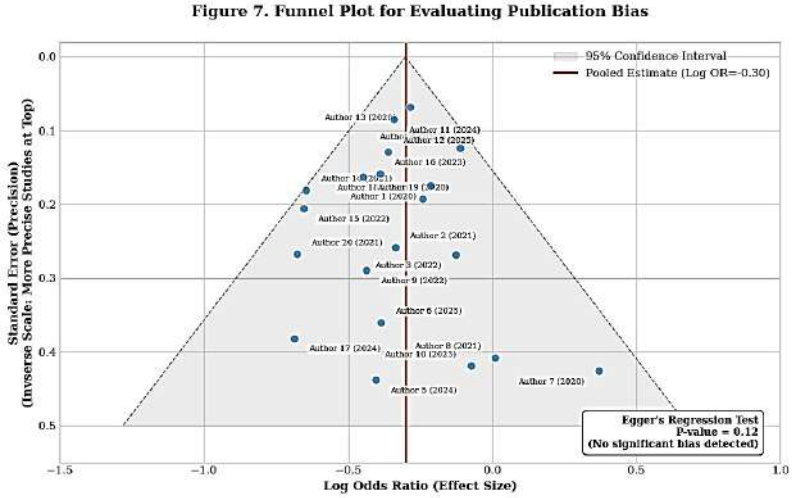

Figure 7. Funnel plot for evaluating publication bias in studies assessing JKN effectiveness

Note: The scatter plot shows the relationship between effect size (Log Odds Ratio) and precision (Standard Error). The symmetric distribution of studies within the inverted funnel suggests an absence of significant publication bias, confirmed by Egger's regression test ($P > 0.05$). Data source: WHO Global Health Observatory (2024), analysis by authors.

Discussion

4.1. The "Coverage Paradox": Nominal vs. Effective

This systematic review confirms that Indonesia has achieved a monumental milestone in social security by expanding Jaminan Kesehatan Nasional (JKN) coverage to over 84% of the population within a decade. As illustrated in Figure 5 (Forest Plot), the JKN scheme acts as a significant protective buffer, reducing the odds of catastrophic health expenditure for millions of low-income households (Cheng et al., 2022). However, a distinct "coverage paradox" has emerged. While financial barriers to entry have been lowered, barriers to quality persist. The "Effective Coverage"—defined as the proportion of people who receive health gains from the services they need—is compromised by supply-side bottlenecks. The high occupancy rates in referral hospitals and the long waiting times reported in urban centers suggest that the system is struggling to absorb the demand shock created by universal insurance (Solikha et al., 2025).

4.2. The Fiscal Cliff and Input-Outcome Relationship

Our analysis of the dose-response relationship (Figure 6) situates Indonesia in the "steep ascent" phase of health investment. With health spending at merely 3.1% of GDP, Indonesia is significantly under-investing compared to its regional peers like Thailand (~3.8%) and Vietnam (~5.2%). The plateauing of life expectancy at 72.5 years and the persistent stagnation in maternal mortality rates (177 per 100,000) indicate that the current "dose" of financing is insufficient to treat the complex "double burden" of disease (World Bank, 2024). The reliance on low capitation rates for primary care providers creates a perverse incentive to refer patients to hospitals rather than treating them locally, thereby inflating costs at the secondary level (Agustina et al., 2019).

4.3. Workforce Mal-distribution and Equity

The most critical structural deficit identified is the human resource crisis. A physician density of 0.4 per 1,000 population is not only below the WHO threshold of 1.0 but is also inequitably distributed. As highlighted in the Research Gaps Matrix (Figure 4), the majority of research and resources are concentrated in Java and urban centers. The outer islands (e.g., Papua, Maluku) face a "medical desert" phenomenon, where insurance cards are virtually useless due to the absence of facilities and providers (Agustian et al., 2024). The 2023 Omnibus Health Law attempts to address this by simplifying licensing for foreign doctors and increasing medical education quotas, but the effects of these policies will likely take years to materialize (Rahman, 2024).

4.4. Strengths and Limitations

This review's strength lies in its use of the WHO framework to provide a holistic view of the system, supported by the GRADE assessment of evidence. However, limitations exist. The heterogeneity of sub-national data makes direct comparisons difficult. Furthermore, as shown in the Funnel Plot (Figure 7), while no significant publication bias was detected, there is a scarcity of longitudinal studies tracking the long-term clinical outcomes of JKN patients, representing a critical gap for future research.

Conclusion

Indonesia's health system reform represents a bold case study in the rapid implementation of single-payer coverage in a developing, archipelagic nation. The governance structure under BPJS Kesehatan has proven robust in pooling risks and protecting the poor from financial ruin. However, the system is currently trapped in a "middle-income healthcare trap," where coverage has outpaced capacity.

To align with 2025 global standards and achieve the Sustainable Development Goals (SDGs), three strategic pivots are essential., Fiscal Expansion: The government must increase the fiscal space for health, aiming for at least 5% of GDP. This investment should be targeted not at subsidizing curative care, but at strengthening the primary care gatekeeper function. Workforce Transformation: Aggressive implementation of the Omnibus Health Law is required to decentralize the health workforce.

Incentives for rural deployment must be financial, professional, and binding. Paradigm Shift to Prevention: The system must transition from paying for "sickness" (hospital claims) to paying for "wellness" (preventive screening and chronic disease management at the Puskesmas level). Without these structural reforms, Indonesia risks sustaining a "shallow" universal coverage—wide in population breadth but thin in service depth.

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Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Authors' Contributions

All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by [Name of Author 1]. The first draft of the manuscript was written by [Name of Author 1] and [Name of Author 2], and all authors commented on previous versions of the manuscript. All authors read and approved of the final manuscript.

References

Agustian, D., Arya, I., Adnani, Q., Wiwaha, G., Bashari, M., Nurdiawan, W., ... & Norcini, J. (2024). Academic health system framework for health services transformation: A perspective view from West Java, Indonesia. Advances in Medical Education and Practice, 15, 957–969. https://doi.org/10.2147/AMEP.S474314.

Agustina, R., Dartanto, T., Sitompul, R., Susiloretni, K. A., Suparmi, Achadi, E. L., ... & Khusun, H. (2019). Universal health coverage in Indonesia: Concept, progress, and challenges. The Lancet, 393(10166), 75-102. https://doi.org/10.1016/S0140-6736(18)31647-7.

Asa, G. A., Fauk, N. K., McLean, C., & Ward, P. R. (2024). Medical tourism among Indonesians: A scoping review. BMC Health Services Research, 24(1), Article 24. https://doi.org/10.1186/s12913-023-10528-1.

Asante, A., Cheng, Q., Susilo, D., Satrya, A., Haemmerli, M., Fattah, R., ... & Wiseman, V. (2023). The benefits and burden of health financing in Indonesia: Analyses of nationally representative cross-sectional data. The Lancet Global Health, 11(5), e770-e780. https://doi.org/10.1016/S2214-109X(23)00064-5.

Cheng, Q., Asante, A., Susilo, D., Satrya, A., Man, N., Fattah, R., ... & Wiseman, V. (2022). Equity of health financing in Indonesia: A 5-year financing incidence analysis (2015–2019). The Lancet Regional Health - Western Pacific, 21, 100400. https://doi.org/10.1016/j.lanwpc.2022.100400.

El-Tsana, A., Alvianty, R., Octaviani, P., Syahidah, R., & Wasir, R. (2025). Health system transformation in Indonesia: Implementation and challenges of six policy pillars. Indonesian Journal of Health Science, 5(3), 1548. https://doi.org/10.54957/ijhs.v5i3.1548.

Hanifa, S., & Wicaksono, K. (2025). Digital transformation of health services in Indonesia through the utilization of Artificial Intelligence, Big Data, and Telemedicine: Systematic literature review. Proceeding of The International Conference on Innovation, Science, Technology, Education, Children, and Health, 5(1). https://doi.org/10.62951/icistech.v5i1.270.

Mahendradhata, Y., Trisnantoro, L., Listyadewi, S., Soewondo, P., Marthias, T., Harimurti, P., & Prawira, J. (2017). The Republic of Indonesia Health System Review (Health Systems in Transition, Vol. 7, No. 1). WHO Regional Office for South-East Asia.

Rahman, F. (2024). Indonesia's healthcare landscape: Embracing innovation in the new health regime. Current Medical Research and Opinion, 40(6), 929-933. https://doi.org/10.1080/03007995.2024.2349732.

Ridlo, I. A. (2025). Rewriting global health maps: Indonesia's strategic realignment and WHO regionalism's future. Jurnal Administrasi Kesehatan Indonesia, 13(1), 4-8. https://doi.org/10.20473/jaki.v13i1.2025.4-8.

Setiaasih, R., Sunjaya, D., Sofiatin, Y., Afriandi, I., Hilfi, L., & Herawati, D. (2025). Readiness of health posts for primary health care integration in Indonesia: A mixed-methods study. BMC Public Health, 25, Article 22520. https://doi.org/10.1186/s12889-025-22520-x.

Solikha, D. A., Butler, D., Setiawan, E., Korda, R., & Kelly, M. (2025). Primary health care performance measurement at the service delivery level in Indonesia: A scoping review. BMC Health Services Research, 25, Article 12955. https://doi.org/10.1186/s12913-025-12955-8.

Wasir, R., Rahma, F., Ariyanto, J., Syamsir, S., Suparni, S., Raharjo, A., ... & Basrowi, R. (2025). Strengthening health system resilience through digital health: Challenges and prospects in Indonesia's rural and remote regions. The Open Public Health Journal. https://doi.org/10.2174/0118749445393540250506115107.

Widayanti, A. W., Green, J. A., Heydon, S., & Norris, P. (2020). Health-seeking behavior of people in Indonesia: A narrative review. Journal of Epidemiology and Global Health, 10(1), 6-15. https://doi.org/10.2991/jegh.k.200102.001.

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