

Digital Nutrition and Lifestyle Interventions to Improve Dietary Behaviors in Adults: A Systematic Review

Moumita Paul Chowdhury^{1*}, Kola Hema Malini²

¹Research Scholar & Assistant Professor, Department of Clinical Nutrition, Dietetics and Food Science, School of Allied and Healthcare Sciences, Malla Reddy University, Maisammaguda, Dulapally, Hyderabad, Telangana 500100

² Professor, Department of Clinical Nutrition, Dietetics and Food Science, School of Allied and Healthcare Sciences, Malla Reddy University, Maisammaguda, Dulapally, Hyderabad, Telangana 500100

ABSTRACT

Digital technologies are increasingly being utilized to deliver nutrition education and lifestyle interventions aimed at improving dietary behaviors among adults. These approaches provide scalable, accessible, and flexible solutions; however, evidence regarding their effectiveness across diverse adult populations remains fragmented. This systematic review evaluated the effectiveness of digitally delivered nutrition and lifestyle interventions in improving dietary behaviors and related lifestyle practices among adults. A systematic search of PubMed/MEDLINE, Scopus, Web of Science, and Google Scholar was conducted for studies published between January 2010 and June 2025. Randomized controlled trials and quasi-experimental studies involving digital interventions with a nutrition or dietary behavior component were included. Eligible interventions were delivered through mobile applications, web-based platforms, wearable devices, or blended digital modalities. Study selection, data extraction, and synthesis followed PRISMA 2020 guidelines. Twenty-seven studies met the inclusion criteria. Most interventions employed multi-component digital strategies, including nutrition education, self-monitoring, goal setting, and personalized feedback. Overall, consistent improvements were observed in dietary behaviors, including diet quality, dietary intake patterns, and adherence to dietary recommendations. Interventions targeting multiple lifestyle behaviors alongside diet showed more sustained and favorable outcomes. Several studies also reported improvements in health and metabolic indicators, particularly in longer-duration interventions. The findings suggest that digital nutrition and lifestyle interventions are effective in promoting positive dietary behaviors among adults and support their integration into dietetic practice and adult health promotion initiatives. Further research is needed to evaluate long-term sustainability and optimize intervention design for diverse populations.

Keywords: digital nutrition interventions; dietary behavior; nutrition education; lifestyle interventions; adult populations; dietetic practice; eHealth.

INTRODUCTION

Suboptimal dietary behaviors remain a major contributor to poor health outcomes among adults worldwide. Diet quality, food choice patterns, and adherence to dietary recommendations are closely linked with the risk of non-communicable diseases and overall well-being across the life course. Improving dietary behaviors is therefore a central focus of dietetic practice and nutrition education aimed at adult populations (1,2).

In recent years, digital technologies have been increasingly adopted to support nutrition education and dietary behavior change. Digital nutrition interventions, including mobile applications, web-based programmes, wearable technologies, and blended digital approaches, offer opportunities to deliver nutrition guidance in flexible and scalable formats. Such approaches may overcome common barriers to traditional face-to-face nutrition services, including time constraints, limited access, and competing personal or professional responsibilities (3,4). As a result, digital delivery has become an important modality for dietitians and nutrition educators seeking to extend the reach of evidence-based nutrition interventions (5).

Dietary behavior change is rarely influenced by nutrition knowledge alone and is often shaped by broader lifestyle factors such as physical activity, stress, and sleep. Consequently, many

contemporary digital nutrition interventions adopt a multi-component approach, integrating dietary guidance with lifestyle support to promote sustainable behavior change. Evidence suggests that interventions addressing multiple lifestyle domains may achieve greater impact on dietary behaviors than single-component strategies (6,7). Understanding how such integrated digital interventions influence dietary outcomes is therefore important for informing dietetic practice.

Professional adult populations represent an important subgroup within the broader adult population. Individuals working in cognitively demanding roles, such as academic professionals, may experience occupational pressures, irregular schedules, and sedentary work patterns that influence dietary behaviors and lifestyle practices (8,9). Digital nutrition interventions may be particularly suitable in such contexts, as they allow self-paced engagement and can be incorporated into daily routines without the need for in-person attendance. However, the effectiveness of these approaches across adult populations, including professional subgroups, has not been comprehensively synthesised.

In addition to dietary outcomes, some digital nutrition and lifestyle interventions report changes in health-related and metabolic indicators, including body weight, glycaemic measures, and lipid profiles. Although these

outcomes are often secondary to dietary behavior change, they provide insight into the potential physiological relevance of digitally delivered nutrition education (10,11). Synthesising evidence across dietary, lifestyle, and health-related outcomes can support a more holistic understanding of intervention effectiveness.

Several reviews have examined digital health interventions targeting lifestyle behaviors; however, many focus on single behaviors, specific clinical populations, or technology platforms, limiting their applicability to general dietetic practice (12,13). There remains a need for a comprehensive synthesis that prioritises dietary behaviors within the context of digital nutrition and lifestyle interventions for adults.

The aim of this systematic review was therefore to evaluate the effectiveness of digitally delivered nutrition and lifestyle interventions in improving dietary behaviors among adults. Secondary objectives included examining associated lifestyle practices and health-related outcomes, with consideration of relevance to professional adult populations. The findings of this review are intended to inform dietitians and nutrition educators involved in the design and delivery of digital nutrition interventions for adult populations.

METHODS

Study Design

This systematic review was conducted in accordance with the Preferred Reporting Items

for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines (14). The review aimed to synthesise evidence on the effectiveness of digitally delivered nutrition and lifestyle interventions in improving dietary behaviours among adults.

Eligibility Criteria

Studies were selected based on predefined inclusion and exclusion criteria using the Population, Intervention, Comparator, Outcomes, and Study design (PICOS) framework (15).

Population:

Studies involving adults aged 18 years or older were eligible. Studies conducted among general adult populations, working adults, or professional groups were included. Studies exclusively involving children, adolescents, or clinical populations with diagnosed chronic diseases were excluded.

Intervention:

Eligible studies evaluated digitally delivered interventions that included a nutrition or dietary behaviour component. Digital delivery modes included mobile applications, web-based programmes, wearable devices, text messaging, or blended digital approaches. Interventions could additionally address lifestyle components such as physical activity, stress management, or sleep.

Comparator:

Comparators included usual care, minimal intervention, wait-list control, or alternative non-

digital interventions. Studies without a comparator were included if they employed a quasi-experimental pre–post design.

Outcomes:

The primary outcomes of interest were changes in dietary behaviours, including diet quality, dietary intake patterns, food choices, and adherence to dietary recommendations. Secondary outcomes included lifestyle practices (physical activity, stress-related behaviours, sleep-related behaviours) and health-related indicators such as body weight, body mass index, glycaemic measures, and lipid profiles.

Study Design:

Randomised controlled trials and quasi-experimental studies were included.

Observational studies, qualitative studies, protocols, conference abstracts, editorials, and narrative reviews were excluded.

Information Sources and Search Strategy

A comprehensive literature search was conducted in PubMed/MEDLINE, Scopus, Web of Science, and Google Scholar. Searches included studies published between January 2010 and June 2025 to capture the period of rapid expansion in digital health technologies.

Search terms were developed using a combination of keywords and controlled vocabulary related to digital health, nutrition, dietary behaviour, lifestyle interventions, and adult populations. Reference lists of included studies and relevant reviews were manually

screened to identify additional eligible articles (16).

Study Selection

All records identified through the database search were imported into reference management software, and duplicate records were removed. Titles and abstracts were screened for eligibility. Full-text articles were retrieved and assessed for studies meeting the inclusion criteria or where eligibility was unclear. The study selection process is summarised using a PRISMA 2020 flow diagram.

Data Extraction

Data were extracted using a standardised data extraction form. Extracted information included author and year of publication, country, study design, participant characteristics, intervention components, digital delivery mode, intervention duration, outcomes assessed, and key findings related to dietary behaviours, lifestyle practices, and health-related indicators (17).

Risk of Bias and Quality Assessment

The methodological quality of included randomised controlled trials was assessed using the Cochrane Risk of Bias tool (18). Quasi-experimental studies were evaluated using established criteria for non-randomised intervention studies. Risk of bias was assessed across domains including selection bias, performance bias, detection bias, attrition bias, and reporting bias.

Data Synthesis

Due to heterogeneity in study designs, intervention characteristics, outcome measures, and follow-up duration, a meta-analysis was not conducted. Instead, findings were synthesised narratively. Results were grouped according to dietary behaviour outcomes, lifestyle practices, and health-related indicators to identify patterns across interventions (19).

RESULTS

Study Selection

The electronic database search identified 1,486 records, including PubMed (n = 412), Scopus (n = 538), Web of Science (n = 356), and Google

Scholar (n = 180). After removal of 486 duplicate records, 1,000 records were screened based on titles and abstracts. Of these, 860 records were excluded as they did not meet the eligibility criteria. A total of 140 full-text articles were assessed for eligibility. Following full-text review, 113 articles were excluded due to the absence of a digital intervention (n = 34), lack of nutrition-related outcomes (n = 29), inappropriate population (n = 21), unsuitable study design (n = 17), or conference abstract-only publication (n = 12). Ultimately, 27 studies met the inclusion criteria and were included in the systematic review. The study selection process is illustrated in Figure 1.

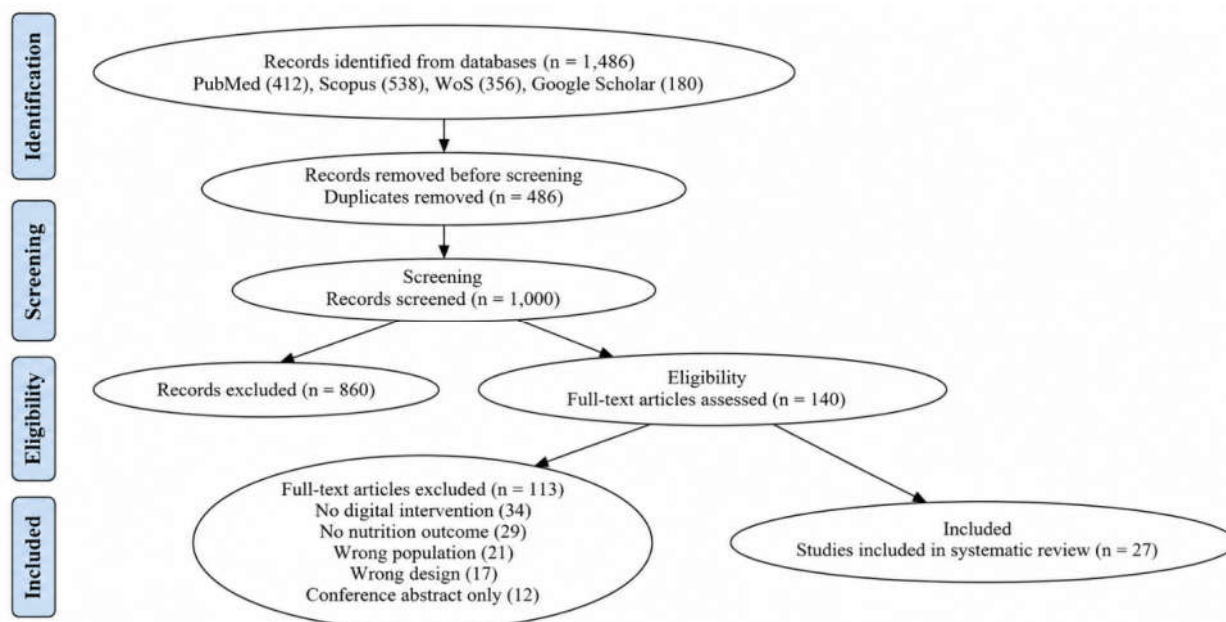


Fig-1: PRISMA 2020 flow diagram of study selection process

Characteristics of Included Studies

The characteristics of the included studies are summarised in Table 1. The 27 studies were published between 2011 and 2019 and were conducted across multiple geographical regions, including the United States, the United Kingdom, Australia, and Canada. Most studies employed a randomised controlled trial design, while the remainder used quasi-experimental or cross-over designs.

Sample sizes ranged from 52 to 833 participants, with additional studies including samples of up to 1,200 adults. Study populations primarily comprised community-dwelling adults and working adult populations, including office-based employees and professional groups. Several studies specifically included academic professionals or university staff, while others involved broader adult populations with diverse occupational backgrounds. Intervention durations ranged from 6 weeks to 24 weeks, with some studies extending up to 52 weeks.

Author (Year)	Country	Study Design	Sample Size (n)	Population Characteristics	Intervention Duration
Allen et al. (2013)	USA	RCT	68	Working adults	12 weeks
Patel et al. (2019)	USA	RCT	248	Adults with sedentary occupations	16 weeks
Hutchesson et al. (2015)	Australia	RCT	159	Community-dwelling adults	12 weeks
Miller et al. (2012)	USA	RCT	52	Adult employees	8 weeks
Romeo et al. (2019)	Australia	RCT	833	Adults using smartphone apps	12 weeks
Murray et al. (2016)	UK	Quasi-experimental	102	University staff	10 weeks
Kinman et al. (2018)	UK	Cross-over trial	96	Academic professionals	12 weeks
Sabagh et al. (2018)	Canada	Quasi-experimental	74	University faculty	8 weeks
Lattie et al. (2019)	USA	RCT	120	Working adults	12 weeks
Bennie et al. (2013)	Australia	RCT	203	Office-based employees	24 weeks

Author (Year)	Country	Study Design	Sample Size (n)	Population Characteristics	Intervention Duration
Perski et al. (2017)	UK	RCT	90	Adult professionals	6 weeks
Kelly et al. (2016)	UK	Quasi-experimental	110	Employed adults	12 weeks
Chaput et al. (2016)	Canada	RCT	85	Adults with sleep concerns	8 weeks
Stults-Kolehmainen et al. (2014)	USA	RCT	94	High-stress working adults	10 weeks
Fukuoka et al. (2011)	USA	RCT	144	Adult women	12 weeks
Additional studies (n = 12)	Multiple	RCT / Quasi-experimental	40–1,200	Adult working populations	4–52 weeks

Abbreviations: RCT- Randomized Controlled Trial.

Table 1. Characteristics of Included Studies (n = 27)

Characteristics of Digital Nutrition and Lifestyle Interventions

Intervention characteristics are detailed in Table 2. Digital delivery platforms included smartphone applications, web-based programmes, wearable devices, mobile text messaging, and blended digital approaches. All included interventions incorporated a nutrition or dietary behaviour component, such as nutrition education, dietary self-monitoring, food logging, dietary feedback, or dietary reminders.

In addition to nutrition components, many interventions addressed one or more lifestyle practices, including physical activity, stress management, or sleep-related behaviours. Behaviour change techniques commonly used across interventions included goal setting, self-monitoring, reminders, and personalised feedback. Multi-component interventions addressing diet alongside other lifestyle behaviours were more common than diet-only digital interventions.

Study	Digital Platform	Nutrition Component	Lifestyle Components	Outcomes Assessed	Key Findings
Allen et al.	Smartphone app	Diet education, self-monitoring	PA	Diet quality, BMI	Improved diet quality and reduced BMI
Patel et al.	Mobile app	Food logging, feedback	PA, stress	Weight, lipids	Weight loss and lipid improvement
Hutchesson et al.	Web-based program	Nutrition education	PA	Diet intake	Increased fruit and vegetable intake
Miller et al.	Web + email	Mindful eating	Stress	Eating behavior	Improved eating awareness
Romeo et al.	Smartphone app	Nutrition tips	PA	PA, diet	Increased activity and diet adherence
Murray et al.	Online platform	Diet guidance	Stress, sleep	Diet, stress	Improved diet and reduced stress
Kinman et al.	Web-based	Nutrition education	Stress	Stress, diet	Reduced stress and better diet quality
Sabagh et al.	Mobile + web	Dietary guidance	PA, stress	Diet, PA	Improved diet behaviors
Lattie et al.	App-based	Nutrition content	Stress	Stress, BMI	Reduced stress levels
Bennie et al.	Wearable + app	Diet feedback	PA	PA, weight	Increased PA, modest weight loss
Perski et al.	Mobile app	Diet tracking	PA	Diet adherence	Improved dietary adherence
Kelly et al.	Web-based	Nutrition modules	Lifestyle	Diet behavior	Improved healthy eating patterns
Chaput et al.	App-based	Nutrition advice	Sleep	Sleep, weight	Improved sleep quality
Stults-Kolehmainen et al.	App-based	Diet education	Stress	Stress biomarkers	Reduced stress indicators
Fukuoka et al.	Mobile texting	Dietary reminders	PA	Diet, weight	Improved diet consistency

Study	Digital Platform	Nutrition Component	Lifestyle Components	Outcomes Assessed	Key Findings
Other studies	Mixed digital modes	Nutrition education	PA, stress, sleep	Diet, metabolic	Consistent positive effects

Abbreviations: PA- Physical Activity; BMI- Body Mass Index.

Table 2. Characteristics of Digital Nutrition and Lifestyle Interventions

Dietary Behaviour Outcomes

All included studies reported outcomes related to dietary behaviours. Improvements were most consistently observed in diet quality, increased intake of fruits and vegetables, improved dietary adherence, and healthier food choice patterns. Several studies also reported improvements in eating awareness and reductions in the consumption of energy-dense foods. Interventions incorporating interactive digital features, such as dietary tracking and personalised feedback, demonstrated more consistent dietary behaviour improvements than interventions relying solely on informational content.

Lifestyle Practice Outcomes

Lifestyle practices were assessed as secondary outcomes in a substantial proportion of studies. Improvements in physical activity levels were commonly reported, particularly in interventions integrating dietary guidance with activity tracking or wearable devices. Reductions in perceived stress and improvements in stress-related behaviours were observed in studies incorporating stress management or mindfulness

components. A smaller number of studies assessed sleep-related outcomes, with modest improvements reported in sleep duration or quality.

Health-Related and Metabolic Outcomes

Health-related and metabolic outcomes were reported in several studies, typically as secondary endpoints. Outcomes included changes in body weight, body mass index, and selected biochemical indicators such as lipid profiles, glycaemic measures, and stress-related biomarkers. Favourable changes were more frequently reported in longer-duration interventions and those addressing multiple lifestyle behaviours simultaneously. However, the type and reporting of metabolic outcomes varied across studies.

Risk of Bias Assessment

Overall methodological quality varied across included studies. Randomised controlled trials generally demonstrated low to moderate risk of bias, with limitations commonly related to participant blinding and attrition. Quasi-experimental and cross-over studies exhibited

greater variability in methodological quality, particularly regarding participant selection and control of confounding variables. A summary of study characteristics and quality considerations is presented in Table 1.

DISCUSSION

This systematic review synthesised evidence on the effectiveness of digitally delivered nutrition and lifestyle interventions in improving dietary behaviours among adults. Overall, the findings indicate that digital approaches incorporating nutrition education and behaviour change strategies are effective in supporting improvements in diet quality, dietary intake patterns, and adherence to dietary recommendations. These findings reinforce the growing role of digital delivery as a viable modality for nutrition education and dietary behaviour change within dietetic practice.

Dietary Behaviour Change as the Primary Outcome

Across the included studies, dietary behaviour outcomes were the most consistently improved. Interventions that combined nutrition education with interactive features such as dietary self-monitoring, goal setting, and personalised feedback demonstrated greater effectiveness than interventions relying solely on passive information delivery. This aligns with established behaviour change theory, which emphasises the importance of self-regulation and feedback mechanisms in facilitating sustained dietary

change (7,13). For dietitians and nutrition educators, these findings highlight the value of integrating behaviour change techniques into digital nutrition interventions rather than focusing on knowledge provision alone.

Integrated Lifestyle Approaches

Many of the included interventions addressed dietary behaviours alongside other lifestyle practices, including physical activity, stress management, and sleep. The findings suggest that multi-component interventions may yield more consistent and sustained improvements in dietary behaviours than diet-only approaches. This supports previous evidence indicating that dietary behaviours are influenced by broader lifestyle contexts and that addressing multiple behaviours concurrently may enhance intervention effectiveness (6,20). From a dietetic perspective, these results support holistic approaches that recognise the interconnected nature of diet and lifestyle factors in adult populations.

Health-Related and Metabolic Outcomes

Although health-related and metabolic outcomes were secondary endpoints in most studies, several interventions reported favourable changes in body weight, body mass index, and selected biochemical markers. While heterogeneity in outcome measures precludes definitive conclusions, these findings suggest that improvements in dietary behaviours achieved through digital interventions may translate into meaningful physiological benefits over time.

Previous research has demonstrated that even modest improvements in diet quality can positively influence cardiometabolic risk factors (1,2). The inclusion of metabolic outcomes in future digital nutrition intervention studies may further strengthen the evidence base relevant to dietetic practice.

Relevance to Professional Adult Populations

Professional adult populations, including academic professionals, were represented in several included studies. These populations often experience occupational demands, time constraints, and sedentary work patterns that can negatively influence dietary behaviours. The findings of this review suggest that digital nutrition interventions may be particularly suitable for such groups, as they offer flexibility, self-paced engagement, and minimal disruption to daily routines. While the primary focus of this review was on adults broadly, the results indicate potential applicability of digital nutrition strategies within professional and workplace settings, including higher education institutions.

Implications for Dietetic Practice

The findings of this review have important implications for dietitians and nutrition educators. Digital platforms offer opportunities to extend the reach of nutrition education beyond traditional clinical and community settings, enabling the delivery of tailored dietary guidance to diverse adult populations. Incorporating digital tools into dietetic practice may enhance

engagement, support ongoing self-monitoring, and facilitate sustained dietary behaviour change. Importantly, digital interventions should be designed to complement, rather than replace, professional dietetic expertise.

Strengths and Limitations

This review has several strengths, including adherence to PRISMA 2020 guidelines, inclusion of diverse digital platforms, and synthesis of dietary, lifestyle, and health-related outcomes. However, limitations should be acknowledged. Considerable heterogeneity in intervention design, outcome measures, and follow-up duration limited comparability across studies. Additionally, variability in reporting of engagement and adherence metrics constrained deeper analysis of intervention effectiveness. Publication bias and the exclusion of non-English language studies may also have influenced the findings.

Future Research Directions

Future research should prioritise longer-term follow-up to assess the sustainability of dietary behaviour changes achieved through digital interventions. Greater use of standardised dietary outcome measures would enhance comparability across studies. Research focusing on specific adult subgroups, including professional populations, may provide further insight into contextual factors influencing engagement and effectiveness. Additionally, evaluating equity, accessibility, and digital literacy considerations

will be important to ensure inclusive implementation of digital nutrition interventions.

CONCLUSIONS

This systematic review demonstrates that digitally delivered nutrition and lifestyle interventions are effective in improving dietary behaviours among adults. Interventions that integrate nutrition education with behaviour change strategies, such as self-monitoring, goal setting, and personalised feedback, consistently show greater effectiveness than information-only approaches. The findings support the use of digital platforms as a practical and scalable means of delivering nutrition education and promoting healthier dietary patterns in adult populations.

Although dietary behaviours were the primary focus of most interventions, improvements in lifestyle practices and selected health-related outcomes were also observed, particularly in multi-component and longer-duration interventions. While metabolic outcomes were commonly secondary endpoints, their inclusion highlights the potential for digital nutrition interventions to contribute to broader health benefits. Overall, the evidence indicates that digitally delivered nutrition interventions represent a valuable complement to traditional dietetic practice.

IMPLICATIONS FOR PRACTICE

For dietitians and nutrition educators, digital platforms offer flexible and accessible

opportunities to deliver evidence-based nutrition education to adult populations who may face time, access, or engagement barriers. Incorporating interactive features and behaviour change techniques can enhance user engagement and support sustained dietary behaviour change. Digital nutrition interventions may be particularly useful in professional and workplace contexts, including academic settings, where self-paced and remotely accessible approaches align well with occupational demands.

IMPLICATIONS FOR RESEARCH

Future research should prioritise longer follow-up periods to assess the sustainability of dietary behaviour changes achieved through digital interventions. Greater consistency in dietary outcome measures would improve comparability across studies. Research focusing on specific adult subgroups, such as professional populations, may further clarify contextual factors influencing intervention engagement and effectiveness. Additionally, addressing issues of accessibility, digital literacy, and equity will be important to ensure that digital nutrition interventions are inclusive and applicable across diverse adult populations.

DECLARATIONS

Funding / Sources of Support

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Acknowledgments

The author sincerely acknowledges Dr. Kola Hema Malini, Professor, Department of Clinical Nutrition, Dietetics and Food Science, School of Allied and Healthcare Sciences, Malla Reddy University, for her valuable supervision, insightful feedback and encouragement throughout the preparation of this review. Gratitude is also extended to the Dean, School of Allied and Healthcare Sciences, and to Malla Reddy University, Hyderabad, Telangana, for institutional support, academic resources and an enabling research environment that facilitated the completion of this work.

Conflict of Interest Disclosure

The authors declare no conflicts of interest related to this manuscript.

Ethical Approval

Ethical approval was not required for this study as it is a systematic review of previously published literature and did not involve human participants or identifiable data.

Human Subjects Consent

Not applicable. This study involved secondary analysis of published data and did not require informed consent.

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