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Artificial Intelligence in Health Promotion: A Framework and Research Agenda

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Extended abstract

The rapid advancement of artificial intelligence (AI) presents transformative opportunities for health promotion and disease prevention worldwide. With global investment in healthcare projected to exceed $45 billion by 2026 (Markets and Markets, 2024), AI technologies are poised to revolutionize how we approach population health, behavior change, and wellness promotion. AI can be described as machine-based systems designed to simulate human intelligence to perform tasks, such as analysis and decision-making (Smith *et al.*, 2024). As health systems globally face mounting pressures from resource limitations, rising demands for preventive services, and persistent health disparities, AI-enabled solutions offer compelling opportunities for innovation. Healthcare organizations increasingly rely on AI algorithms that can process vast amounts of health data, predict risk factors, personalize interventions, and optimize health promotion campaigns (Yun *et al.*, 2021). Consumers benefit from these applications through more accessible health information, personalized wellness recommendations, early warning systems, and AI-enabled health coaching that promotes positive behavior change (Cadario *et al.*, 2021; Lee *et al.*, 2024).

Research on AI in health promotion has expanded rapidly, examining applications of AI- enabled health monitoring systems (Nasr *et al.*, 2021), automated treatment planning (Kisling *et al.*, 2019), AI-powered health communication strategies (Miller *et al.*, 2024), and AI as a tool to promote health behavioral changes (Aggarwal *et al.*, 2023; Lee *et al.*, 2024). Additional streams focus on AI ethics and inclusive deployment of technology in healthcare (Fisk *et al.*, 2023; Morley *et al.*, 2020; Siala & Wang, 2022), as well as patient´s perception of AI tools in medical settings (Cadario *et al.*, 2021; Zhang *et al.*, 2024). Despite the growing body of research, there remains a critical need for a systematic understanding of how AI applications influence health promotion and a clear roadmap for future development to maximize their potential for improving population health outcomes (Singh *et al.*, 2024).

Using a dual-methodological approach, we combine Natural Language Processing (NLP) with machine learning techniques to systematically map the intellectual landscape of AI applications in health promotion. Specifically, we employ topic modeling and scientometric analysis (Mustak *et al.*, 2021; Nikolenko *et al.*, 2017; Zhao *et al.*, 2019) to conduct a comprehensive examination of the field. Our analysis reveals eight critical themes, including user-centered health app design, digital health interventions, wearable technologies, AI in clinical research, behavioral responses to health communication, and AI in healthcare systems.

Theoretically, this study offers a significant contribution by introducing the AI–Health Promotion Framework, an evidence-based model that categorizes AI applications in healthcare along two key

dimensions: embedded vs. standalone AI, and patient-centered vs. provider- centered AI. This framework enhances our understanding of how AI interacts with various stakeholders, ranging from individual consumers to healthcare professionals, and clarifies the main areas of research and development in AI-driven health promotion.

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