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REVIEW ARTICLE

Virtual applications with artificial intelligence to promote healthy eating habits

Aplicaciones virtuales con inteligencia artificial para promover hábitos alimenticios saludables

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Abstract

Virtual applications supported by artificial intelligence (AI) are transforming strategies for the promotion of healthy eating habits by enabling personalized, adaptive, and data-driven nutritional guidance. The purpose of this review was to analyze current virtual applications that incorporate AI to promote healthy dietary behaviors, identifying their main functionalities, benefits, limitations, and reported effectiveness in health promotion contexts. A documentary review was conducted using academic databases, including Scopus, PubMed, SciELO, Redalyc, and Google Scholar, focusing on studies published between 2019 and 2024. The analysis indicates that AI-based applications contribute to improved dietary awareness, personalization of nutritional recommendations, continuous user monitoring, and greater engagement in behavior change processes. However, limitations remain related to data privacy, unequal access to digital technologies, variability in scientific validation, and the need for professional supervision. Overall, the findings suggest that AI-driven virtual applications represent a promising complementary tool for nutrition education and health promotion, provided that their implementation is guided by ethical principles, scientific evidence, and educational integration.

Keywords: artificial intelligence; virtual applications; nutrition; healthy eating habits; health promotion

Resumen

Las aplicaciones virtuales que emplean inteligencia artificial (IA) están revolucionando la forma en que las personas abordan la nutrición y la salud, estas herramientas innovadoras utilizan algoritmos avanzados para proporcionar recomendaciones dietéticas personalizadas, basadas en datos individuales como preferencias alimenticias, objetivos de salud y patrones de comportamiento. El propósito de este artículo fue explorar las aplicaciones digitales que incorporan la IA para fomentar hábitos alimenticios saludables, identificando las características y funcionalidades, ventajas, limitaciones, así como eficacia en la promoción de dichos hábitos. Para llevar a cabo esta revisión, se empleó un método de análisis documental, recopilando y examinando una amplia gama de estudios y fuentes académicas relevantes. Los hallazgos obtenidos a partir de este análisis demuestran de manera contundente los beneficios del uso de aplicaciones basadas en IA en el ámbito de la salud, encontrándose entre las ventajas más notables la capacidad de personalizar las recomendaciones dietéticas, el seguimiento continuo del progreso del usuario y el acceso a información nutricional precisa y actualizada. Se concluye que estas aplicaciones no solo facilitan la adopción de hábitos alimenticios más saludables, sino que también educan a los usuarios sobre la importancia de una nutrición balanceada y cómo mantenerla a lo largo del tiempo

Palabras clave: inteligencia artificial; aplicaciones; nutrición; hábitos alimenticios; salud

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INTRODUCTION

In the current digital era, artificial intelligence (AI) is transforming a wide range of fields, and the promotion of healthy dietary habits is no exception. The growing prevalence of diet-related chronic diseases, such as type 2 diabetes mellitus, hypertension, and obesity, has underscored the urgent need for innovative strategies to improve public health. In this context, AI-supported mobile applications have emerged as key tools for reshaping how individuals approach nutrition and dietary behaviours (Almeida et al., 2023).

AI-based applications designed to promote healthy eating habits leverage advanced data-processing algorithms and machine-learning techniques to deliver personalised dietary recommendations. Unlike traditional approaches, which often rely on generic and non-individualised advice, these applications analyse personal data—including food preferences, nutritional requirements, and consumption patterns—to generate tailored dietary plans for each user. This level of personalisation not only enhances the relevance of recommendations but also improves adherence to nutritional goals, thereby facilitating sustainable changes in eating behaviours (Prado & Rodríguez, 2022).

Moreover, the ability of these applications to provide real-time feedback constitutes a distinctive feature that differentiates them from conventional methods. Users can receive immediate alerts and suggestions regarding their food choices, enabling them to dynamically adjust their behaviour. This rapid and continuous responsiveness fosters greater awareness of daily dietary decisions and supports the development of healthier habits (De Jesús, 2024).

The use of AI within these applications also enables effective integration with other emerging technologies, such as augmented reality (AR) and virtual reality (VR). For example, some applications combine AI with AR to offer interactive nutritional education experiences, allowing users to visualise how different foods affect their health and wellbeing within a virtual environment. This immersive methodology not only makes nutrition education more engaging but also facilitates a deeper and more practical understanding of key concepts (Espinosa & Cartagena, 2021).

The impact of these technologies on the promotion of healthy dietary habits has been the subject of numerous studies highlighting their effectiveness. Research has shown that AI-driven applications not only improve the accuracy and relevance of dietary recommendations, but also play a crucial role in the management of chronic diseases and overall health improvement. Their capacity to integrate seamlessly into users' daily lives and provide continuous support represents a significant advancement in addressing diet-related health problems (González et al., 2020).

The incorporation of artificial intelligence into applications aimed at promoting healthy dietary habits represents a critical advance in health and wellbeing management. By offering personalised

recommendations, real-time feedback, and innovative educational experiences, these digital tools are redefining how nutrition is addressed and establishing a new standard in the promotion of healthy eating behaviours (Andrés, 2021).

The World Health Organization, through the Ottawa Charter, defines Health Promotion as a global political and social process encompassing actions aimed at strengthening the skills and capacities of individuals and communities, as well as modifying social, environmental, and economic conditions to generate a positive impact on individual and collective health (De la Guardia & Ruvalcaba, 2022).

A healthy lifestyle is defined as one that reduces the risk of serious illness or premature death and encompasses physical, mental, and emotional health, which have historically been considered key elements in health promotion, albeit to varying degrees (Valderrama, Castillo & Méndez, 2023).

Currently, up to 70% of primary care consultations in developed countries are related to lifestyle-derived diseases. Therefore, understanding the role of these factors is crucial for preventing the morbidity and mortality associated with multiple chronic non-communicable diseases, making them a primary focus of health promotion and prevention strategies worldwide. Moreover, interventions from this perspective have been shown to be cost-effective (Tala, Vásquez & Plaza, 2020).

Health education is fundamental to health promotion and is defined as a pedagogical process that, through the dialogue of knowledge, seeks to build or strengthen the capacity of individuals, families, communities, and organisations to promote health care, manage risks, and positively transform environments (Téllez, Miranda & Ortiz, 2018). In this context, it is essential for health systems to employ diverse resources in the design of policies and strategies that encourage healthy lifestyles through a comprehensive and systemic approach (Ballinas, 2021).

Information and Communication Technologies (ICTs) constitute valuable resources for providing information and education on physical activity, offering advice and techniques for specific exercises, establishing realistic goals, and developing personalised training plans. They also enable users to connect with personal trainers and other physical activity professionals online, facilitating the performance of physical activities from any location with internet access (Melo, 2023).

In Latin America, mobile device usage reaches approximately 73%, with the majority being smartphones. Among individuals who own these devices, each has an average of 18 applications installed, of which 59% are health-related, particularly nutrition applications (Murillo, 2021). These applications have a high capacity for data storage and continuous accessibility, making them highly available tools for nutritional interventions.

Four general categories have been identified: calorie counters, food scoring systems, diet plan generators, and healthy shopping lists, with some applications combining multiple functions (Novoa, 2023).

Artificial intelligence is a branch of computer science that encompasses concepts of logic and learning, simulating human intelligence processes such as learning, reasoning, and self-correction through the use of algorithms that enable machines to learn and make decisions. This allows for multiple forms of machine learning across computers, devices, robots, the internet, and mobile applications (Ruival et al., 2023). AI-based tools have also been adopted by health regulatory bodies; for instance, the Pan American Health Organization has developed a Virtual Campus (VCPH) that utilises AI to strengthen the capacities and competencies of health professionals (Listovsky et al., 2022).

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This study aims to: (1) analyse the effectiveness of AI-based applications in promoting healthy dietary habits; (2) identify how these applications influence eating behaviours; (3) evaluate their effectiveness in improving health and preventing diet-related diseases; and (4) determine the advantages and disadvantages of this technology compared with other strategies for promoting healthy habits.

METHODS, TECHNIQUES AND INSTRUMENTS

This section describes the methodology employed to fulfil the objectives of the study through documentary analysis. According to Bermeo et al. (2016), this method involves a series of specific processes, including the search, selection, organisation, and analysis of relevant documents. Tobón et al. (2015) emphasise that this process is oriented towards answering specific questions related to a particular topic. The primary aim of this methodological approach is to relate existing data on a given construct, thereby providing a comprehensive perspective that facilitates the formulation of appropriate solutions to the problem under investigation (Rivera et al., 2018).

This article examines key concepts related to virtual applications that employ artificial intelligence to promote healthy dietary habits. Their main characteristics, functionalities, advantages, and

limitations are identified, and an analysis is conducted of how these applications may influence the promotion of healthy eating behaviours and the management of specific nutritional conditions. To achieve these objectives, a rigorous selection of academic publications was carried out using databases such as Google Scholar, Redalyc, Dialnet, and SciELO, covering literature published between 2019 and 2024.

The initial search process was conducted using key terms such as artificial intelligence, applications, and healthy dietary habits. Filters and Boolean operators were applied to refine the results and ensure the relevance of the selected documents. The search yielded 3,140 results in Google Scholar, 1,687 in Redalyc, 8,777 in Dialnet, and 120 in SciELO. These records were subsequently subjected to a rigorous selection process to ensure that only the most relevant and up-to-date studies were included in the analysis.

Once the documents were collected, they were organised and analysed. The studies were classified according to their relevance and contribution to the topic under investigation, and various qualitative analysis techniques were employed to identify patterns and trends within the data. This process enabled an in-depth understanding of AI-based virtual applications and their impact on the promotion of healthy dietary habits.

Particular attention was given to studies addressing the effectiveness of these applications in modifying eating behaviours, their capacity to personalise dietary recommendations, and their potential to improve nutritional health at both individual and population levels. In addition, advantages such as access to accurate nutritional information and continuous monitoring of user progress were assessed, as well as limitations, including the need for constant internet access and variability in the quality of recommendations.

The findings of this documentary review provided a solid informational basis for addressing the study objectives. Synthesis of the collected data made it possible to formulate well-supported conclusions regarding the use of artificial intelligence–based applications in the promotion of healthy dietary habits. This comprehensive approach not only offers an overview of the current state of technology in this field, but also highlights areas where improvements and future research efforts may be directed.

RESULTS AND DISCUSSION

According to the bibliographic review conducted, it can be established that information and communication technologies (ICTs) have the potential to overcome temporal and geographical barriers that hinder collaboration among the various stakeholders involved in the process. This potential may be leveraged to promote healthy lifestyles and to facilitate family involvement in such processes.

In this context, the use of mobile phones is prioritised as a primary connectivity device, as they enable accessibility at any time and from any location,

thereby creating new opportunities for learning (Cristóbal, Cabrera & Aravena, 2023). Likewise, electronic media and web-based platforms for health education (e-learning) provide valuable resources for healthcare professionals, service users, and the general population.

Their main objective is to promote good practices in healthcare delivery and to encourage the adoption of healthy habits.

Additionally, these portals enable patients to access information related to their own health, thereby empowering them to participate actively in decision-making processes and to improve communication with other patients. This aspect is particularly relevant in the management of chronic diseases, where informed and engaged patients play a central role in achieving better health outcomes (Valenzuela, 2021). The following section presents a set of articles that report the main findings related to artificial intelligence and nutrition (Table 1).

Table 1. *Main studies on artificial intelligence and nutrition*

Author	Concept	Similiarities
Ehis & Peabalo (2020)	That electronic devices, particul tarly sum-artphones, are vital today, are connected to current phenomena such as hybrid education and education records. This offere great opportunities for promoting health.	Tools, Promotion of health
Valencia Lozano & Bayona (2021)	The emergence of artificial vision allows collaborative valuēbus the eurrupytrypiar its integral componenal across pro-processes. Medicine and industries have addressed technological solutions and pmo-moted im}mplementation of Artificial Intelli-	Data analysis
Jiménez. (2021)	The AI in the natural sector contributes to pravide thé eurrence of evaluating its role about the training attention to health not on a good management of attention to health but also because it integrates.	Health sector, Management of health
Duárte· Sandoval & Ichazo (2022)	Prosent research from Colombia impoplementing a study using a study used in telemedicine, allowing patients to self-monitor data when recelving remote T3C treatment at a minimum risk level.	Tools, Health service
Gómez et al. (2022)	The example of researeh froming ressarach from Colombia implemented a study using its tuidy using telemedicine, allowing the patient to self-monitor data when receiving remotr-T3C treatment at a minimum risk level.	Improvemerit of health
Goldman (2024)	An intificial intelligence (AI) is a precise technology able to process large amounts of data and obtain a way that all provic bamer health and well-being fór people.	Data processing
Ramirez et al. (2023)	Show the power of AI as transforming health by improving its quality of its citizens, by improving data management, and promoting equality in the healthcare service as access.	Data management, Health service
Zambambo & Mata (2024)	AI changes show tools could embolize therapeutic education in diabetes.	Tools

In the field of health, Martínez, González, and García (2023) describe how new technologies promote healthy lifestyles by providing tools to inform and educate about the importance of physical activity and a healthy diet. There are numerous applications and online tools available for monitoring physical activity, offering real-time feedback. However, the responsible use of information and communication technologies (ICTs) is crucial to prevent sedentary behavior and other negative effects. International organizations such as the Pan American Health Organization (PAHO) have implemented programs such as the Information Systems for Health (IS4H), which manage interoperable systems with open data to generate strategic information for the benefit of public health (Díaz & Condori, 2024). Other studies, such as that of Vásquez (2021), highlight the advantages and disadvantages of virtual education, emphasizing its flexibility and accessibility, as well as challenges related to infrastructure and study habits.

Recent research on applications using artificial intelligence (AI) to promote healthy eating habits has shown promising results. A study conducted by Celuppi et al. (2020) demonstrated that the use of AI-based mobile applications can significantly improve adherence to healthy diets by personalizing dietary recommendations based on each user's profile and specific needs. Hoyos et al. (2023) employed fuzzy cognitive maps to support nutritional decision-making, enabling real-time adjustment of recommendations and improving adherence to dietary plans. Baquero et al. (2023) found that AI-powered mHealth applications allow continuous monitoring and provide instant feedback, which is effective in reducing risk factors associated with chronic diseases such as diabetes and hypertension. These studies highlight the transformative potential of AI in promoting health and well-being through the improvement of dietary habits.

CONCLUSIONS

Currently, the promotion of health and the prevention of diseases associated with unhealthy lifestyles have become fundamental priorities. In this context, health education plays a crucial role, and information and communication technologies (ICTs) offer significant potential to provide effective education on physical activity and nutrition. These technologies stand out for their ability to deliver real-time information, personalize content according to individual needs, and reach a broad audience quickly and efficiently.

The incorporation of new technologies, such as virtual reality (VR), augmented reality (AR), and educational platforms like Moodle, has proven to be highly effective in improving teaching, learning, and the promotion of healthy habits. Virtual and augmented reality, in particular, provide immersive experiences that facilitate a deeper and more practical understanding of health-related concepts. Moodle, meanwhile, offers a structured learning environment that supports continuing education and access to educational resources.

Furthermore, virtual applications that integrate artificial intelligence (AI) have demonstrated high

efficiency as tools for promoting healthy eating habits. These applications are characterized by high accuracy, sensitivity, and specificity, significantly contributing to the personalization of dietary recommendations and the continuous monitoring of eating behaviors. Their ability to provide instant feedback and real-time adjustments makes them valuable resources for health professionals, who can use them to optimize patient care and treatment processes. Consequently, ICTs and AI are transforming health education and healthcare delivery, enhancing the effectiveness of strategies for promoting healthy habits and optimizing population health.

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