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THE INFLUENCE OF INSTAGRAM ON MEDICAL EDUCATION IN THE AGE OF ARTIFICIAL INTELLIGENCE: A FORMAL ASSESSMENT OF ITS UTILITY IN HEALTH EDUCATION

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ABSTRACT

This review article explores the intricate role of Instagram and artificial intelligence (AI) in medical education and health promotion. It scrutinizes the dual-edged nature of these technologies, highlighting their potential benefits in disseminating health information and the challenges they present, particularly regarding information accuracy and misinformation. The analysis underscores Instagram's unique capacity to reach broad audiences with visually engaging health education content, emphasizing its utility in public health campaigns and crisis communication. However, the platform's susceptibility to spreading inaccurate health information necessitates urgent and proactive strategies for mitigation. Integrating AI in content management and moderation on Instagram is a promising solution to address misinformation, with the effectiveness of such technologies hinging on continuous research, development, and ethical implementation. The review advocates for developing evidence-based content and engagement strategies by health professionals and educators to maximize benefits and minimize risks associated with Instagram use. It concludes that a collaborative, multidisciplinary approach involving health professionals, educators, researchers, technology developers, and regulators is essential to leverage Instagram and AI for global health improvement responsibly.

Keywords: social media, mobile social network, social media messaging, artificial intelligence, computational intelligence, health education.

INTRODUCTION

The digital era has brought with it a revolution in the way we access and share information, significantly impacting medical education and health promotion. With the rise of artificial intelligence (AI) and the growing use of social networks like Instagram, it is imperative to explore how these technologies reshape health education and communication[1-3].

Integrating AI into social media platforms can improve health information dissemination by personalizing content to meet users' specific needs. Relying on Artificial Intelligence (AI) for health advice on social media platforms like Instagram carries several potential risks, including the spread of misinformation, inadequate personalization, and privacy breaches[4-6].

Despite AI's advancements, it may struggle to interpret complex health contexts, leading to generalized or inaccurate recommendations. Moreover, poorly designed algorithms or those trained on biased data can perpetuate stereotypes or disseminate incorrect information[7,8].

Reducing the spread of posts identified as false or misleading and removing content that violates community guidelines, especially those that could cause immediate harm, are critical steps. Providing transparency about how algorithms rank and promote health content allows users to understand better the origin and reliability of the information they receive[9].

Encouraging active participation from health professionals on the platform to create trustworthy and educational content and engaging with users to clarify doubts and counter misinformation is also vital[10].

Several measures are essential to ensure the quality and accuracy of health information shared on platforms like Instagram. Collaboration between health experts and AI developers can enhance the accuracy and relevance of disseminated data, ensuring it is evidence-based. Additionally, the media should establish stringent fact-checking processes and utilize AI systems to identify and flag potentially false or misleading content[11-13].

Kickbusch discussed the concept of health promotion 4.0, which refers to using advanced digital technologies, including AI, to promote healthy behaviors. This innovative approach can be efficient on Instagram, a visually formatted platform that attracts a vast global audience[1].

However, the quality and accuracy of health information shared on social media have been a cause for concern. Sarraju et al. highlight the importance of evaluating the adequacy of cardiovascular disease prevention recommendations obtained through AI

models based on online chat. Research suggests that these technologies can offer helpful advice but can also disseminate inaccurate or misleading information[2-5].

Practical strategies for identifying and combating health misinformation on Instagram include implementing automated tools and partnerships with fact-checking organizations to review and validate shared health information. Educating users on health literacy and teaching them to recognize reliable information sources encourage healthy skepticism towards unverified content[14]. It can also be beneficial to apply labels to posts containing health information, indicating whether they have been verified by accredited health professionals or warning about potential inaccuracies[15,16].

Detecting health misinformation is a significant challenge on the social web. Di Sotto and Di Sotto and Viviani highlighted strategies for identifying false or misleading health information online, emphasizing the need for sophisticated data science approaches. This question is pertinent in the context of Instagram, where visual information can be easily manipulated or taken out of context[3,17-19].

Additionally, creating infographics and visual representations of information can improve health education and communication. Traboco et al. noted how well-designed infographics can make complex health concepts easier to understand, suggesting that Instagram, focusing on visual content, is an ideal platform for health education[4,20-22].

Mental health awareness campaigns on social media have been shown to have a significant impact on raising public awareness. Saha et al. conducted a computational study on mental health awareness campaigns on Instagram, highlighting how these initiatives effectively reach and engage large audiences[5,23-25].

Olstad and Lee examine the use of AI to monitor the marketing of unhealthy foods and brands targeting children on digital media, including Instagram. The authors argue that technology can be crucial in identifying and reducing children's exposure to harmful marketing messages[6,18].

Public perception of Omicron variants and other health issues on Instagram was also studied. Wang, Sun, and Wang analyzed how Chinese public perceptions of Omicron variants were shared on social media using topic modeling and sentiment analysis. The study highlighted how Instagram and similar platforms influence public understanding of health issues[7,25-27].

The dissemination of health information during disease outbreaks such as the COVID-19 pandemic has also highlighted the role of social media. Gui X, and Wang et al. analyze how health-related beliefs about COVID-19 were affected by the use of Twitter, a relevant study for understanding the effects of social media platforms similar to Instagram on the dissemination of information in times of crisis[8,9].

Akay, Dragomir, and Erlandsson noted that social data mining and network modeling to improve healthcare are principles for using Instagram data to identify health trends and risk behaviors[10].

The digital response to the COVID-19 pandemic in Saudi Arabia, as discussed by Hassounah, Raheel, and Alhefzi, provides an example of how social media and AI can support public health strategies[11,12].

While Instagram and other social media platforms offer unprecedented opportunities for education and health promotion in the age of AI, they also present significant challenges related to information quality, misinformation, and impact on public perception[28].

The present study highlights the need for a critical and evidence-based approach to using Instagram effectively in medical education and health promotion. By implementing these strategies, social media platforms can significantly promote health education while minimizing the risks associated with misinformation[29,30].

This approach requires a concerted effort from technology developers, health professionals, and the platforms themselves to create a safer and more informative online environment for discussing health issues.

In short, the current review aims to understand the opportunities and risks associated with using Instagram in medical education and health promotion, emphasizing the need for evidence-based strategies to maximize its benefits and mitigate potential harms.

METHODS

The research methodology involved a comprehensive search of multiple reputable databases to ensure the inclusion of relevant studies while minimizing the risk of bias. PubMed, Scopus, Scielo, Embase, and Web of Science were chosen due to their comprehensive coverage of peer-reviewed literature in the medical field. Additionally, Google Scholar was utilized to access gray literature, which often includes valuable insights not found in traditional peer-reviewed articles. The study's selection criteria were centered on the study's focus, which was artificial intelligence's impact and social media on Health Education. To refine the search and capture relevant studies, a combination of keywords was used, including “social media”, “mobile social network”, “social media messaging”, “artificial intelligence”, “computational intelligence” and “health education”. This approach ensured that the selected studies were directly related to the topic of interest. The inclusion criteria encompassed various studies, such as systematic reviews, case-control studies, cross-sectional studies, case series, and review articles. This broad inclusion criteria aimed to gather a comprehensive range of evidence and perspectives on the subject matter. The process of analysis, review, and selection of materials was conducted rigorously to maintain the quality and relevance of the chosen studies. It involved a systematic and blinded approach, with pairs of

reviewers independently assessing the title and abstract of each study. In cases of disagreement between the two reviewers, a third reviewer was involved to reach a consensus and ensure the final selection of studies was based on well-founded criteria. This meticulous research methodology guarantees that the findings and conclusions drawn in the article are rooted in a robust and diverse body of evidence, enhancing the credibility and reliability of the study's outcomes.

RESULTS AND DISCUSSION

Table 1. Principal Artificial Intelligence Programs: Developers and Functionalities

AI Program	Developer	Function
GPT-4	OpenAI	Natural language processing and generation
TensorFlow	Google	Machine learning framework for developing AI applications
Watson	IBM	Question answering and data analysis
DeepMind AlphaGo	DeepMind (Google)	Board game strategy (Go)
Alexa	Amazon	Virtual assistant
Siri	Apple	Virtual assistant
Cortana	Microsoft	Virtual assistant
BERT	Google	Natural language understanding
PyTorch	Facebook	Machine learning library for AI research

Source: Authors

The evolution of Artificial Intelligence (AI) represents a significant leap forward in our quest to emulate human cognitive functions through technology. Developing sophisticated programs marks this journey, each spearheaded by leading technology enterprises, which have profoundly influenced various facets of the industrial and societal domains[31,32].

At the forefront of natural language processing and generation is OpenAI's GPT-4, a program that epitomizes the capabilities of machines in understanding and generating human-like text[33]. Its applications extend from creating conversational AI to generating creative content, showcasing unprecedented linguistic understanding and creativity. This program's innovation paves the way for more intuitive human-machine interactions, setting a new standard for AI communication[34].

Parallel to this, Google's TensorFlow has democratized the development of AI by providing a comprehensive framework for building complex machine-learning models. Its versatility allows for tackling diverse challenges, from image recognition to predictive analytics, empowering developers to push the boundaries of AI applications[35]. TensorFlow's accessibility and flexibility have catalyzed a wave of innovation, significantly contributing to the advancement of AI technologies[36].

IBM's Watson, known for its triumph in the "Jeopardy!" game show, represents a milestone in question answering and data analysis. Its evolution beyond entertainment to serve critical roles in healthcare, finance, and customer service highlights AI's potential to derive meaningful insights from extensive data sets[37].

Watson's ability to process and analyze information at an unprecedented scale demonstrates the transformative impact of AI on decision-making processes in various industries[13-15].

The achievement of DeepMind's AlphaGo in defeating a world champion in the complex board game Go marked a significant achievement in AI's strategic and decision-making capabilities[18-20]. This event underscored the potential of AI to master intricate human tasks, signaling a new era in the development of AI applications that require nuanced understanding and strategic planning[38].

Virtual assistants such as Amazon's Alexa, Apple's Siri, and Microsoft's Cortana have seamlessly integrated into daily life, illustrating the practical applications of AI in enhancing human-device interaction[4-6,39]. These assistants facilitate various activities through voice commands, from managing schedules to controlling smart homes and continually learning and adapting to user's preferences. The widespread adoption of these virtual assistants underscores the growing reliance on AI for personal and home management tasks[40].

Furthermore, Google's BERT has revolutionized natural language understanding, enabling more accurate interpretation of human language by machines. This breakthrough has significantly improved search engine performance and broadened text analysis applications, enhancing machine understanding of linguistic subtleties[41].

Lastly, Facebook's PyTorch has emerged as a preferred tool among researchers and developers for its user-friendly approach to building machine learning models. Supporting a wide array of research projects and industrial applications, PyTorch exemplifies the collaborative spirit of the AI research community, facilitating the exploration of new frontiers in AI[28-30,42].

In sum, these AI programs collectively illustrate AI technologies' current state and potential. Through their development and application, they have transformed how we interact with machines and opened up new avenues for innovation and efficiency[43]. The ongoing evolution of AI promises even more significant advancements, with the potential to redefine our technological landscape and further enhance human capabilities[44].

Health information dissemination through Instagram in the age of artificial intelligence (AI) represents an innovative facet of medical education and health promotion, bringing potential benefits and significant challenges. Instagram's potential to improve health education and communication is remarkable, given its broad user base and ability to present information visually and engagingly[14].

Gui et al. highlighted how social media, including Instagram, facilitated health information dissemination during the Zika virus outbreak. This case illustrates how social media platforms can be powerful tools for rapidly disseminating critical public health

information[8]. However, the effectiveness of this dissemination depends on the accuracy and quality of the information shared[10-12].

The issue of misinformation and inaccurate information on Instagram and other social media platforms is a growing concern. Nobles et al. looked at automated image analysis to understand risk perception and public health communication in the context of HIV, highlighting how perceptions can be influenced by information shared on social media. This study highlights the need for robust tools to monitor and correct erroneous health information[13].

The integration of AI into social media provides opportunities to personalize and optimize the delivery of healthcare content. However, this same technology can also identify and mitigate the spread of misinformation[26].

Karimi et al. presented Cadec, a corpus of adverse drug event notes, exemplifying how AI can help identify specific health information in large datasets, potentially applicable to content moderation on Instagram[14].

Another relevant aspect is the use of Instagram for health awareness campaigns. Chu et al. demonstrate how machine learning can identify target audiences in public health campaigns, in this case against hookah tobacco[15].

The ability to target and engage specific audiences on Instagram can increase the effectiveness of these campaigns, although it also requires vigilance against inadvertently promoting harmful health behaviors. Promoting healthy behaviors through Instagram challenges combating unhealthy food marketing and brands targeting children[45].

Olstad and Lee noted how AI can help monitor such marketing practices on Instagram. This is an example of how technologies can be applied to protect vulnerable audiences, although practical implementation of these solutions requires cooperation between technology developers, regulators, and the Instagram community[6,20].

Instagram's influence on public perception of emerging health issues, such as the COVID-19 pandemic, is an essential field of study. Wang et al. analyze the impact of social media on health-related beliefs during the pandemic, highlighting how misinformation can spread quickly. This study emphasizes the need for proactive strategies to manage information dissemination in public health crises[9,46].

In this same line of research, Akay et al. highlighted the importance of network modeling and intelligent data mining from social media to improve healthcare. Applying these techniques to Instagram could enable early identification of health trends and risk behaviors, providing opportunities for preventative and educational interventions[10,33-35].

The digital response to COVID-19, as noted by Hassounah et al. illustrates how social media, including Instagram, can play a vital role in disseminating health

information and promoting public health practices. The ability to quickly reach large audiences makes Instagram an effective channel for public health communications in times of crisis[11,47].

The literature review suggests that while Instagram and AI offer significant opportunities to advance health education and promotion, considerable challenges need to be addressed[19].Misinformation and the quality of shared health information are critical issues that demand immediate attention. We need sophisticated AI tools to monitor, identify, and correct inaccurate information. Moreover, Instagram's ability to influence public perception and behavior regarding health requires a careful and ethical approach[48].

To address the challenge of monitoring and correcting erroneous health information on Instagram and other social media platforms, a variety of tools can be employed[10]. Fact-checking algorithms powered by AI can automatically scan posts for potentially false or misleading content by comparing them against verified information sources[49].

Additionally, machine learning models can be trained to recognize patterns indicative of misinformation, such as the spreading of unfounded health remedies or conspiracy theories. User reporting mechanisms also play a crucial role, allowing the community to flag content for review by human moderators or more sophisticated AI systems designed to evaluate the credibility of the information presented[50].

Implementing AI in social media to protect vulnerable audiences from harmful health behaviors and marketing practices requires a nuanced approach. AI algorithms can be designed to identify and filter out content promoting unhealthy behaviors or predatory marketing targeting children and adolescents[36-38].

These systems can analyze the visual and textual content of posts, assessing them for compliance with platform guidelines on health misinformation and harmful advertising[31]. Furthermore, age verification tools and content restriction settings can help shield young users from exposure to inappropriate content, with AI playing a key role in enforcing these protections dynamically based on user interactions and reported behavior[32-34].

Developing proactive strategies to manage information dissemination during public health crises involves leveraging AI to quickly identify and elevate authoritative content while suppressing misinformation. Social media platforms can collaborate with health organizations to create verified information hubs that AI algorithms prioritize in user feeds. Real-time monitoring tools can detect emerging trends in misinformation, allowing for rapid response through public health alerts or corrective information campaigns[41-43].

Engaging in partnerships with fact-checking organizations enables the swift verification of disputed content, with AI systems facilitating the widespread

dissemination of these verifications[6-8]. Encouraging user literacy in evaluating health information, through educational content and prompts questioning the source and accuracy of health claims, further empowers individuals to navigate information critically during crises[29-31].

By harnessing these tools and strategies, social media platforms can create a more informed and safer environment for users, mitigating the risks posed by health misinformation and ensuring that credible, life-saving information reaches the public efficiently during health emergencies[44-46].

We must implement evidence-based strategies to optimize the use of Instagram in medical education and health promotion. This means promoting high-quality content, fighting misinformation, and protecting vulnerable audiences from harmful marketing[47].

Integrating Instagram and AI in medical education and health promotion presents a unique opportunity to improve public well-being. However, we must take a multifaceted approach to consider the benefits and challenges associated with its use[24-27].

Collaboration between healthcare professionals, educators, researchers, technology developers, and regulators is vital to navigating this complex and constantly evolving terrain. We cannot afford to ignore the potential of Instagram and AI in improving public health, and we must urgently address these issues[50].

CONCLUSION

In this review, we reflected on the complex and multifaceted role of Instagram and artificial intelligence (AI) in medical education and health promotion. Through the analysis of recent and relevant studies, both potential benefits and challenges inherent to the use of these technologies in the dissemination of health information are identified.

Evidence suggests that Instagram, supported by AI, has the unique ability to reach broad audiences, offering a powerful platform for visual and interactive health education. This potential is particularly valuable in health awareness campaigns, disseminating information during public health crises, and promoting healthy behaviors.

However, Instagram's same accessibility and reach also make it susceptible to the spread of misinformation and inaccurate health information, a significant challenge that requires urgent attention and proactive strategies for mitigation.

The integration of AI into content management and moderation on Instagram presents a promising solution to the problem of misinformation, enabling the personalization and optimization of health information delivery. However, the effectiveness of these technologies depends on continued research, development and ethical implementation, considering the complexities and nuances of human behavior and social norms.

Furthermore, while Instagram can serve as an effective vehicle for health education and public health promotion, it is imperative that healthcare professionals and educators develop evidence-based content and engagement strategies that maximize benefits and minimize associated risks. to its use. This includes combating misinformation, protecting vulnerable audiences, and promoting critical and informed understanding of health issues among the general public.

Therefore, it is concluded that Instagram, in conjunction with AI, represents a promising but complex tool for medical education and health promotion. To successfully navigate this terrain, a collaborative, multidisciplinary approach is needed that involves healthcare professionals, educators, researchers, technology developers, and regulators. Only through joint efforts can we ensure that the power of Instagram and AI is used responsibly and effectively to improve health and well-being on a global scale.

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