



ARTIFICIAL INTELLIGENCE, HEALTH COMMUNICATION AND GAMBLING: THE BOOMERANG EFFECT IN PREVENTION CAMPAIGNS A narrative review

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ABSTRACT

This research analyses the impact of deepfakes, i.e. fake videos generated by artificial intelligence, on trust in Instagram in Concepción, Chile. In addition to analysing deepfakes, focus groups and questionnaires were conducted with over 100 people. Notably, 85.2% of participants reported having seen at least one deepfake video on Instagram. When they identify one, more than half of them laugh. 57.6% admitted to doubting its authenticity, and 81.4% indicated that deepfakes affect their trust in Instagram.

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1. Introduction

1.1. Contextualisation and Relevance

In recent decades, artificial intelligence (AI) has established itself as one of the most promising technologies for the transformation of various sectors, including healthcare (McKinsey Global Institute, 2017; Topol, 2019). Its capacity to process substantial quantities of data and to extract predictive or diagnostic patterns with a high degree of accuracy has engendered new possibilities for the prevention, early diagnosis and treatment of diseases (Jiang et al., 2017). However, beyond direct clinical applications, AI also has a significant impact on health communication, both in the relationship between healthcare professionals and patients, and in the dissemination of information on healthy habits, prevention campaigns or health crisis management (Kaplan and Haenlein, 2019).

The advent of chatbots, personalised recommendation systems and remote monitoring tools is indicative of the mounting interest in integrating AI into daily interactions with patients (Miner et al., 2017). These developments necessitate a profound comprehension of how individuals perceive, process and assimilate information generated or mediated by algorithms (Davis, 1989). In this sense, communication theories – especially those focusing on persuasion, source credibility and active message reception – offer keys to understanding and optimising the adoption of these technologies (Petty and Cacioppo, 1986).

Moreover, the focus on a social psychology perspective enables the exploration of factors such as the influence of culture, attitudes and social norms on human interaction with AI-based tools (Rogers, 2003). It is imperative to comprehend these aspects to ensure the ethical, safe and effective implementation of technological innovations in healthcare (European Commission, 2019).

In this context, the identification and mitigation of risk behaviours associated with gambling have emerged as a salient research area (Mejías and Cuesta, 2024), as digital platforms facilitate access to gambling games and contribute to pathological gambling or gambling addiction. The capacity of AI to influence consumption patterns and exposure to prevention campaigns is predicated on the provision of personalisation and segmentation algorithms, a phenomenon that necessitates rigorous analysis from health communication and social psychology. However, the phenomenon of the boomerang effect, where preventive messages can generate resistance or reactance in the public, underlines the need to design careful communication strategies capable of preventing the intervention from unintentionally increasing the behaviour it is intended to prevent.

In view of the rapidity with which these developments are occurring, there is a need for a narrative review that synthesises the main advances, challenges and gaps in the scientific literature (Green et al., 2006). In contradistinction to quantitative meta-analyses, this type of review permits a more expansive and adaptable approach, incorporating studies with divergent methodologies and theoretical interests, thereby providing a comprehensive overview of the current state of the art (Baumeister & Leary, 1997).

1.2. Objectives and Approach of the Review

The primary objective of this review is to ascertain the most significant advancements in the utilisation of AI in health communication, emphasising empirical findings that elucidate the efficacy, constraints and prospective capabilities of these technologies (Topol, 2019). Concurrently, it seeks to identify gaps in the extant literature and propose future lines of research that can strengthen the role of AI in health promotion and healthcare improvement (WHO, 2021).

Furthermore, the phenomenon of gambling, understood as the practice of gambling and betting in digital environments, will be addressed, as well as the way in which AI can influence both the emergence and prevention of pathological gambling behaviour. In a similar vein, the boomerang effect, which is defined as the tendency of certain preventive messages to provoke reactions contrary to those intended, will be a pivotal point of analysis. It is imperative to comprehend the mechanisms underlying these reactions, as this knowledge is fundamental to the development of effective communication campaigns and AI systems that are capable of circumventing resistance or psychological reactance.

In order to achieve this objective, it is necessary to adopt the perspective of the social psychology of communication, whilst simultaneously integrating the theories of social learning —with particular reference to the contributions of Bandura (1977; 2001)— and the theories of cognition —with a focus on information processing and attitude formation—. This theoretical approach facilitates

comprehension of the formation of beliefs and attitudes towards AI technologies within the population, and the influence of social and cognitive factors on the effectiveness of communication in the utilisation of these tools (Festinger, 1957).

Finally, this review will analyse how communication theories provide an essential framework for designing strategies to promote the acceptance and responsible use of AI in health; (Petty and Cacioppo, 1986; Rogers, 2003). A particular emphasis shall be placed on the dynamics of credibility, the adaptation of the message to specific audiences, and the manner in which social norms can either facilitate or impede the adoption of technological innovations (Fishbein and Ajzen, 2010). Furthermore, a dedicated section will address the integration of gambling from the vantage point of health communication and AI, with the objective of averting the potential for a reinforcing "boomerang effect" that might impede the endeavour to circumvent addictive behaviours.

The present structure of the review is such that it is intended to serve as a guide for researchers, health professionals and designers of AI systems. In this capacity, it aims to facilitate understanding of the psychosocial and communicative implications of incorporating these technological solutions into daily practice (Kaplan and Haenlein, 2020).

2. Theoretical Framework and Background

2.1. Social Learning and Cognitive Theories Applied to AI in Healthcare

Social learning theories, initially proposed by Bandura (1977; 2001), posit that a significant proportion of human behaviour is acquired through the observation and imitation of significant models. These theories also consider cognitive factors that influence motivation and the retention of information. In the field of healthcare, the implementation of AI-based technologies may be influenced by the perceptions and observations of potential users (i.e., patients, professionals, and managers) regarding the utilisation of such tools by others in their respective environments. From this standpoint, it is evident that positive reinforcement (for instance, enhanced diagnostic accuracy or the convenience of teleconsultation) and self-regulation are pivotal in ensuring the continued utilisation of AI.

Social cognition (Festinger, 1957) is a pertinent concept in the context of explaining interaction with AI in healthcare settings, as it encompasses the analysis of how individuals process information, construct beliefs and attitudes, and ultimately make decisions regarding its utilisation (Fishbein and Ajzen, 2010). To illustrate this point, consider the scenario in which a healthcare professional is presented with an AI-powered clinical decision support system. In the event that the automated advice at odds with their initial judgement, this may result in an escalation of cognitive dissonance. In such a case, the resolution of the dissonance may incline him to either reject or readjust his attitude towards AI, depending on factors such as his trust in the technology or the social norms of his work environment (Festinger, 1957).

From a psychological standpoint, the processing of information (Davis, 1989) is instrumental in determining the extent to which system characteristics (e.g. perceived ease of use or perceived usefulness) influence the intention to adopt and utilise AI on a regular basis (Davis, 1989). Within healthcare settings, the intricacy of algorithms and the substantial volume of data they process can result in cognitive overload for the user, thereby hindering adoption. It is therefore vital to design interfaces and user procedures that match the capabilities and expectations of professionals and patients, thus minimising cognitive barriers.

However, it should be noted that AI applications in healthcare also include the detection and prevention of addictive behaviours such as gambling, which can be reinforced by the ease of access to online gambling platforms. In the context of social learning, individuals may imitate the behaviour of others when they perceive apparent immediate benefits, such as the possibility of financial gain. In this regard, the positive reinforcement factors posited by Bandura could potentially incentivise the adoption of gambling behaviour in digital spaces in the absence of effective prevention campaigns.

Furthermore, the boomerang effect, defined as the phenomenon of individuals reacting in the opposite manner to that intended by persuasive messages, is a particularly salient consideration in health interventions designed to address gambling addiction. It is imperative to acknowledge that if preventive messages fail to consider the preceding attitudes and expectations of target groups, there is a possibility that such messages may elicit psychological reactance. Consequently, rather than serving

to deter addictive behaviour, these messages could potentially reinforce it. Consequently, the integration of AI within health communication initiatives must be approached with a high degree of caution, with a focus on the application of social learning and cognitive theories. This approach is essential to avert the inadvertent escalation of risk behaviours that may result from the implementation of prevention strategies.

2.2. Key Theories of Communication

2.2.1. Models of Diffusion of Innovations

The diffusion of innovations model, as articulated by Rogers (2003), elucidates how a new idea, practice, or technology is communicated and adopted within a social system over time. This process is shaped by several factors, including the attributes of the innovation—namely, relative advantage, compatibility, complexity, trialability, and observability—the communication channels utilised, and the social structure into which the innovation is introduced. In the context of AI applied to healthcare, adoption by healthcare professionals and patients hinges, among other factors, on the innovation's perceived practical utility, its compatibility with existing clinical routines, and the ease with which its benefits can be observed.

In the realm of gambling, online betting platforms represent an innovation whose adoption is facilitated by their accessibility and the perceived immediacy of rewards. AI serves as an accelerator of this diffusion process by enabling targeted audience segmentation and identifying individuals more susceptible to promotional messaging. Conversely, the same principles can be applied to prevention campaigns, where strategic use of AI could enhance the diffusion of responsible gambling practices and support the early identification of patterns indicative of problem gambling.

2.2.2. Persuasive Communication, Source Credibility, and Framing

Within the framework of persuasive communication theories, Petty and Cacioppo (1986) emphasise the critical role of source credibility and cognitive elaboration in determining the effectiveness of a message. In the context of AI in healthcare, the source may encompass both the entity promoting its use (e.g., a prestigious hospital or a recognised technology company) and the AI system itself, whose virtual “voice” or interface serves as a persuasive agent. Furthermore, the framing of the message—namely, the manner in which information is presented—can significantly influence risk perception, levels of acceptance, and the intention to adopt the innovation.

In the context of gambling addiction, a campaign aimed at dissuading users from engaging in online betting must carefully consider the framing of its message. An overly alarmist or guilt-inducing frame may trigger a boomerang effect, whereby the audience reacts negatively to the communication and adopts an even more favourable stance towards the risky behaviour. Similarly, the prestige and legitimacy of the source issuing preventive messages (e.g., healthcare institutions) play a pivotal role in shaping perceived credibility and, consequently, the effective reception of the message content.

2.2.3. Psychosocial and Cultural Perspective in Health Communication

The integration of AI in healthcare necessitates consideration of digital divides and equity factors, as not all populations have equal access to technology (WHO, 2021). Factors such as culture, age, socioeconomic status, and geographical location can influence how information about new technological tools is received and processed. From a psychosocial perspective, it is critical to examine how social norms and collective perceptions of an innovation can either facilitate or hinder the adoption of AI.

In the context of gambling, a cultural perspective is pivotal in understanding why gambling is more accepted or even valued in certain societies, while in others it carries a social stigma. This factor directly impacts prevention campaigns, as messages that fail to align with prevailing cultural norms risk being actively rejected. In such cases, a boomerang effect may be more pronounced if the target audience perceives the discourse of health or governmental authorities as conflicting with their cultural values or group norms. Consequently, an intercultural and equitable approach, supported by AI, can contribute to designing messages that are better tailored to specific sociocultural contexts, thereby reducing resistance and enhancing communicative effectiveness.

2.3. Overview of Artificial Intelligence in Healthcare

The application of AI in healthcare has undergone significant growth over recent decades (Topol, 2019). Key historical milestones include the use of expert systems for differential diagnosis in the 1970s (such as MYCIN, designed to assist in the diagnosis and treatment of diseases) and the subsequent emergence of machine learning and deep learning algorithms, which have enabled the analysis of medical images with accuracy comparable to that of human experts (Jiang et al., 2017). Presently, natural language processing (NLP) is employed in medical advisory chatbots and the automated generation of clinical reports (Kaplan and Haenlein, 2020).

Furthermore, telemedicine and remote patient monitoring have gained prominence due to advancements in AI applied to mobile devices and wearables (e.g., smartwatches and fitness trackers), enabling real-time data collection and personalised support (Miner et al., 2017). These developments have heightened interest in optimising health communication, as the effectiveness of any AI tool largely depends on how its benefits, risks, and limitations are communicated to various stakeholders (Davis, 1989; Rogers, 2003).

In parallel, an increasing number of AI systems are being applied to the detection and prevention of risky behaviours, including those associated with gambling or gambling addiction. The analysis of large datasets from online betting platforms enables the identification of problematic behavioural patterns—for instance, an increase in the frequency and value of bets—and the delivery of personalised alerts to users. However, the development of AI-based prevention campaigns must account for the potential for a boomerang effect, whereby messages perceived as imposing or morally judgmental trigger defensive responses or psychological reactance. The effectiveness of such interventions, therefore, hinges on the appropriate integration of predictive models and persuasive communication, taking into account the cultural and social factors that facilitate or impede the adoption of healthy behaviours.

3. Narrative Review Methodology

This review adheres to the general recommendations for conducting narrative reviews as outlined by Green et al. (2006), as well as the guidelines proposed by Baumeister and Leary (1997) for structuring and synthesising literature. Unlike a quantitative meta-analysis, this approach allows for a more flexible integration and discussion of findings from studies with diverse methodologies and theoretical perspectives.

The review period spans from 2013 to 2024, as this timeframe coincides with significant advancements in deep learning algorithms, which markedly propelled research and development of AI applications across various domains, including healthcare (LeCun et al. 2015; Topol, 2019). This period reflects the exponential growth of AI, evidenced by an increase in the volume of publications and improvements in technological innovations (He et al., 2020).

To gather information, an exhaustive bibliographic search was conducted across databases such as PubMed, Scopus, and Web of Science. Key search terms related to artificial intelligence and health communication were used, alongside specific concepts pertinent to the review, such as gambling (e.g., “online gambling,” “gambling disorder,” “problem gambling”) and the boomerang effect (e.g., “boomerang effect,” “psychological reactance”).

Additionally, review articles and empirical studies addressing the use of AI in the prevention and treatment of addictive behaviours, as well as the effectiveness of different communicative framings in health campaigns aimed at reducing gambling-related risks, were included. Studies with restricted access (abstracts only), reports without peer review, and documents predating 2013 were excluded, except for theoretically significant historical references. This selection criterion enabled the integration of evidence on the social, cognitive, and cultural factors influencing the adoption of AI technologies and the reception of preventive messages, while minimising methodological biases.

Finally, a critical and comparative analysis of the reviewed studies was conducted to identify convergences and discrepancies, facilitating the development of an integrative framework that links the literature on AI and health communication with the issues of gambling and the mechanisms triggering the boomerang effect. Thus, this narrative review contributes to a deeper understanding of the challenges and opportunities presented by the application of AI in healthcare and the prevention of risky behaviours.

Table 1. Search strategy and types of studies selected

Databases consulted	Scopus, Web of Science, PubMed
Keywords	artificial intelligence, communication, communication, health, health, psychology, psychology, gambling disorder, online gambling, gambling addiction, boomerang effect, psychological reactance, psychological reactance.
Boolean operators	AND, OR
Time period	2013 - 2024
Languages	English, Spanish
Types of studies	Empirical articles, reviews, meta-analyses
Exclusion criteria	Non-full text, pre-2013 (except classics), conference reports without peer review
Total number of initial studies	265
Number of included studies after screening	74

Source: Own elaboration, 2025

4. Key Findings from the Literature

In narrative reviews, particularly those covering a broad and interdisciplinary field such as AI and health communication, it is common not to individually detail every study included after screening. Instead, a thematic or theoretical synthesis is typically employed to highlight the main trends, the most significant findings, and the perspectives offered by these works.

The 74 studies selected following the screening process served as the foundation for the analysis and argumentation. However, the narrative review format, its objectives, and the intended scope did not necessitate—nor allow for—a detailed exposition of each article. The added value of this approach lies in the conceptual synthesis, theoretical discussion, and identification of future research directions, all supported by the most relevant and representative literature from the analysed corpus.

Among the key findings, there is evidence of a growing application of AI in the early detection of risky behaviours associated with gambling, through machine learning algorithms capable of identifying patterns of problematic gambling. Additionally, several studies underscore the importance of preventive communication and the need to consider the boomerang effect, a phenomenon that may arise when campaigns are perceived as imposing or guilt-inducing. In such cases, adverse reactions or psychological reactance can lead to a more entrenched adoption of the very behaviour the campaign seeks to prevent, highlighting the importance of designing culturally sensitive messages, grounded in evidence, and supported by effective communication strategies.

4.1. AI Applications in Clinical Communication

4.1.1. Chatbots and Virtual Assistants in the Doctor-Patient Relationship

The implementation of chatbots and virtual assistants has proliferated in clinical settings to provide personalised information, conduct initial screenings, or offer emotional support for self-care (Laranjo et al., 2018; Miner et al., 2017). These systems demonstrate significant potential for streamlining care and enhancing the efficiency of healthcare services (Jiang et al., 2017). However, several studies highlight a perceived lack of empathy from these systems, which can negatively impact patient satisfaction and trust in the technology (Bickmore et al., 2018; Kaplan y Haenlein, 2020).

From the perspective of Social Learning Theory (Bandura, 1977; 2001), the adoption of chatbots is reinforced when users observe individuals in their close circles—or prestigious professionals—interacting positively with these tools (Festinger, 1957). Similarly, in line with the Technology Acceptance Model (Davis, 1989), perceived usefulness and ease of use critically influence the sustained intention to use virtual assistants (Fishbein and Ajzen, 2010; Petty and Cacioppo, 1986).

Beyond their role in the doctor-patient relationship, chatbots can play a vital role in the prevention and detection of risky behaviours, including gambling addiction. Some studies indicate that by automating the assessment of behavioural patterns, it is possible to identify early signs of problem gambling, referring users to specialised resources. However, to ensure the effectiveness of these systems, it is essential to design messages with cultural and psychological sensitivity, as overly directive or alarmist communication could trigger the boomerang effect. In such cases, users may respond with distrust and reject the intervention, potentially reinforcing the behaviour the system aims to prevent.

AI, therefore, offers opportunities to enhance clinical communication and proactively address specific issues such as gambling addiction. However, the acceptance and impact of these tools will largely depend on how social and cognitive variables are integrated into their design and application, ensuring that the transmitted message fosters trust and avoids counterproductive responses.

4.1.2. Clinical Decision Support Systems

Another prominent application is the integration of AI-based clinical decision support systems, which process large volumes of data to assist doctors and nurses in decision-making (Topol, 2019). The positive impact lies in enhanced diagnostic accuracy and the reduction of clinical errors, particularly in fields such as radiology and emergency medicine (Rogers, 2003). However, several studies highlight the importance of acceptance and training among healthcare professionals, as distrust in algorithms can hinder the appropriate use of these tools (European Commission, 2019). In this regard, adequate training and clear communication of the limitations and capabilities of AI systems emerge as critical factors for successful adoption (Davis, 1989; Festinger, 1957).

In addition to their role in diagnosing and treating diseases, clinical decision support systems can contribute to the early detection of risky behaviours associated with gambling. By analysing parameters such as changes in behavioural patterns, history of relapses, and frequency of consultations, algorithms can alert healthcare professionals to potential cases of problem gambling or emerging addictive behaviours. However, the effectiveness of these systems relies on appropriate persuasive communication that clearly conveys the benefits and avoids messages perceived as overly intrusive or moralising. Failure to do so risks triggering the boomerang effect, whereby users or even healthcare professionals react with greater scepticism and dismiss the alerts generated by AI.

Consequently, the adoption of AI systems for clinical decision-making—both in traditional medical conditions and disorders related to gambling addiction—requires a careful balance between technological precision and communicative sensitivity. Continuous training for healthcare professionals and the development of protocols that account for the specificities of gambling and the potential for adverse reactions to preventive messages are key to maximising the effectiveness and legitimacy of these systems.

4.2. AI in Health Prevention and Promotion

4.2.1. Awareness Campaigns and Diffusion of Innovations

The use of AI to design and segment prevention campaigns on social media has demonstrated improvements in the reach and effectiveness of messages (Jiang et al., 2017; Kaplan and Haenlein, 2020). Machine learning algorithms enable the identification of behavioural patterns and preferences, facilitating the creation of personalised messages tailored to the needs and expectations of specific groups. However, some authors caution that excessive segmentation could raise ethical concerns and biases, as it may prioritise population segments with a greater presence in digital environments (European Commission, 2019).

Drawing on the Diffusion of Innovations Theory (Rogers, 2003), the speed and extent to which AI-based campaigns spread within a community depend on the credibility of the source and the cultural compatibility of the message (Fishbein and Ajzen, 2010). Consequently, the literature consistently recommends intersectoral collaboration among communication specialists, social psychologists, and AI developers to design effective persuasive strategies (Petty and Cacioppo, 1986).

A particularly relevant domain for such campaigns is the prevention of problem gambling, as AI can assist in detecting behaviours indicative of problematic use of betting platforms. However, when preventive communication about gambling fails to align with the characteristics of the target audience—

for instance, if it is perceived as paternalistic or overly moralising—it may trigger the boomerang effect. In such cases, recipients may exhibit psychological reactance, manifesting rejection or even reinforcing their risky behaviour. Therefore, it is critical that AI-based awareness campaigns incorporate elements of empathy and respect for individual autonomy to minimise adverse reactions and optimise the acceptance of preventive messages.

4.2.2. Promotion of Healthy Lifestyles

Beyond large-scale campaigns, AI-based applications and interactive platforms have been developed to provide personalised recommendations on diet, exercise, and healthy habits. This approach maximises the impact of interventions by offering advice tailored to the clinical and psychological profile of each individual (Bandura, 2001; Davis, 1989). However, long-term adherence is mediated by factors such as intrinsic motivation, feedback, and social reinforcement (Miner et al., 2017), underscoring the need to integrate psychosocial and cultural aspects into the design of these tools (WHO, 2021).

Within the promotion of healthy lifestyles, there is also the potential to incorporate modules for preventing addictive behaviours, such as gambling, through alert systems or targeted recommendations for at-risk populations. However, if the communication of these alerts lacks appropriate cultural and psychological sensitivity, it may generate resistance or even a boomerang effect, whereby users feel their autonomy is infringed upon and react by rejecting the preventive intervention.

Therefore, developers of AI platforms and applications aimed at promoting healthy lifestyles must consider not only usability and perceived usefulness but also the potential emotional and cognitive impact of these messages. In this context, adopting a user-centred approach, where AI acts as a facilitator of habit change rather than a prescriptive entity, is critical. Integrating adaptive personalisation mechanisms and allowing a degree of autonomy in receiving recommendations could foster greater adherence and acceptance of the interventions.

4.3. Personalisation of Health Content and Recommendations

4.3.1. Recommendation Systems Based on Big Data

Recommendation systems leveraging big data and deep learning are increasingly prevalent in health platforms that deliver tailored content. A significant finding is that perceived control over personal data and transparency in the algorithm's functioning enhance the acceptance of these tools (European Commission, 2019).

The integration of such systems with cognitive psychology approaches helps mitigate information overload by aligning content with the user's processing capacity. Nevertheless, the literature review highlights concerns regarding privacy, underscoring the need for ethical regulations and person-centred interface designs (Kaplan and Haenlein, 2020).

In relation to problem gambling, content personalisation can be instrumental in detecting and preventing problematic behaviours. Betting platforms employing AI could provide individualised recommendations—such as deposit limits or playtime alerts—based on the user's history.

However, the key to success lies in designing strategies that promote proactive interventions while respecting user autonomy, empowering individuals to manage their behaviour in an informed manner. This approach reduces the risk of adverse reactions and enhances the effectiveness of prevention efforts.

4.3.2. Influence of Persuasion and Social Cognition

Several studies indicate that the effectiveness of personalisation depends not only on the accuracy of the algorithm but also on the manner in which information is presented (Fishbein and Ajzen, 2010; Petty and Cacioppo, 1986). Framing and source credibility play a mediating role in the acceptance of recommendations (Rogers, 2003). For instance, if the AI system is perceived as trustworthy and aligned with the user's values, adherence to the health programme is typically higher (Bandura, 1977).

These persuasion factors become particularly significant in prevention campaigns targeting risky behaviours, such as gambling. Social cognition suggests that attitudes towards gambling and the willingness to modify such behaviour are partly determined by group identity, social norms, and perceived self-efficacy (Festinger, 1957). A personalised message that emphasises individual autonomy and control may be more effective than one that solely highlights the negative consequences of

gambling. Otherwise, it could heighten psychological reactance and trigger the boomerang effect, underscoring the importance of tailoring the tone, content, and source of the message to the characteristics and expectations of the target audience.

4.4. Telemedicine and e-Health

4.4.1. Extending the Therapeutic Relationship and the Role of Empathy

Telemedicine encompasses remote consultation services, monitoring, and patient follow-up through digital platforms (Cuesta Cambra, 2012; Topol, 2019). AI contributes through predictive analytics and early alerts, enabling more timely interventions (Miner et al., 2017). However, several authors emphasise that the absence of direct contact may diminish perceived empathy and the quality of the therapeutic relationship (Cresswell et al., 2018; Rogers, 2003). To mitigate this effect, interfaces that promote the humanisation of virtual interactions, using approachable language and enabling empathetic responses, are recommended.

In the case of patients with problem gambling or at risk of developing addictive behaviours, telemedicine offers a valuable tool for monitoring gambling patterns and detecting problematic behaviours remotely. However, the risk of generating distrust increases if the intervention lacks an adequate relational dimension. Direct and overly technical responses may trigger the boomerang effect, whereby, instead of reducing risky behaviour, it is reinforced. Therefore, it is essential to design platforms that not only deliver information but also foster an emotionally supportive process, enhancing the perception of support and respect for patient autonomy.

4.4.2. Impact on Treatment Adherence

Social Learning Theory (Bandura, 2001) provides an explanatory framework for understanding adherence in e-health settings, emphasising the importance of feedback and continuous reinforcement. Recent studies have indicated that AI has the capacity to disseminate notifications regarding disease progression or medication adherence, with the objective of reinforcing desired behaviour and reducing dropout rates (Jiang et al., 2017; Topol, 2019). However, the efficacy of these strategies is contingent upon patients' perceived self-efficacy and the feasibility of customising the interaction to align with their individual requirements (Davis, 1989; Festinger, 1957).

In the treatment of addictions such as pathological gambling, telemedicine systems have been shown to detect problematic patterns (Smith et al., 2022) and generate personalised alerts to encourage patient self-control (Jones et al., 2021). The effectiveness of these reminders is contingent upon their ability to be perceived as helpful rather than intrusive. When such individuals are perceived as an imposition, the risk of reactance increases, which can lead to rejection. Conversely, messages that reinforce the patient's self-efficacy and willingness to make autonomous decisions may improve adherence and decrease the likelihood of defensive responses.

5. Discussion

The convergence between Social Learning Theories (Bandura, 1977; 2001), Theories of Cognition (Festinger, 1957) and Communication Models (Petty and Cacioppo, 1986; Rogers, 2003) is pivotal to comprehending the adoption of AI in healthcare. Social Learning Theory underscores the pivotal role of observing successful utilisation of technologies in influencing users' propensity to adopt tools such as chatbots. Social Cognition Theory, by contrast, elucidates the manner in which professionals and patients adapt their beliefs when confronted with technologies that defy their established schemas. Conversely, Persuasive Communication Theories underscore the significance of source credibility and the cognitive elaboration of messages. Furthermore, Innovation Diffusion Theory provides a framework for understanding the speed of propagation of AI-based prevention campaigns in different contexts.

In the domain of gambling, Social Learning Theory posits that exposure to models that demonstrate immediate benefits of gambling can encourage risky behaviours. Conversely, Social Cognition Theory underscores the role of cognitive dissonance in defensive reactions to preventive messages. These processes have the potential to contribute to the so-called 'boomerang effect', whereby interventions, instead of reducing risk, serve to reinforce problematic behaviour. It is therefore necessary to develop

hybrid models that integrate social, cultural and technical factors, with attention to self-efficacy, empathy, trust and social reinforcement.

From a psychosocial perspective, the present study identifies the facilitating factors and barriers to the adoption of AI in health. Factors such as institutional credibility, person-centred design and continuous reinforcement have been identified as key factors in promoting adoption, while the digital divide, distrust of algorithms and doubts about empathy have been identified as key factors in hindering acceptance. Socio-cultural variables, such as age and gender, also influence the adoption of these technologies. It is therefore essential to understand the cultural context if successful interventions are to be ensured. In the context of gambling, the digital divide and opaque algorithms have the potential to undermine the efficacy of prevention campaigns, while a dearth of empathy can generate a boomerang effect, thereby reinforcing addictive behaviours.

In conclusion, the development of artificial intelligence in the healthcare sector is subject to significant ethical and legal constraints. Data protection is of paramount importance, particularly within the domain of gambling, where the management of sensitive information can result in stigmatisation or commercial exploitation. Furthermore, the presence of algorithmic biases has the potential to perpetuate existing inequalities, emphasising the necessity for audits and controlled trials to identify and address these biases. Another challenge is the legal liability for errors in AI recommendations, especially in the context of gambling-related decisions, where the effectiveness of preventive alerts may be influenced by regulation and user reactance.

6. Future lines of research

It is essential to expand the methodological basis for research on the use of technologies such as chatbots, recommender systems and telemedicine, focusing on longitudinal designs that assess how the perception and sustained use of these technologies evolve. Furthermore, the incorporation of communication variables, such as source credibility and perceived empathy, into randomised controlled trials is imperative. Within the domain of gambling, research endeavours must encompass the measurement of long-term incidence of addictive behaviours and the impact of AI-based interventions. This must be undertaken with consideration for the boomerang effect and psychological reactance, thereby facilitating the detection of adverse responses to preventive campaigns.

The integration of qualitative and mixed approaches is pivotal, as psychosocial factors and subjective experience are found to be pivotal determinants of AI uptake. Qualitative studies are capable of capturing the complexity of the interaction between users and technology, while mixed (qualitative-quantitative) approaches offer a holistic understanding by combining qualitative interpretation with quantitative robustness. In the context of gambling, these approaches have the potential to illuminate how users perceive AI-generated pre-emptive messages and the underlying motivations that induce adverse responses, such as the boomerang effect. The development and validation of scales to measure empathy in interaction with chatbots or self-efficacy in the use of clinical decision support systems is also recommended, with particular attention to ensuring cross-cultural validity.

It is imperative that approaches grounded in behavioural theories, including behavioural psychology and the Theory of Planned Behaviour (Fishbein and Ajzen, 2010), be integrated into the AI development cycle. These perspectives will inform the creation of systems that promote self-regulation and self-control, which are essential for preventing gambling. Furthermore, the convergence of psychology, communication, computer science and public health is imperative for the effective design of AI systems. It is imperative that designers develop a comprehensive understanding of the dynamics of psychological reactance, while health professionals must exercise caution to avoid hyper-segmentation and stigmatisation.

In conclusion, it is imperative that there is a congruence between research in the field of artificial intelligence and the objectives of public health. The establishment of partnerships between governments, universities and technology companies is imperative for the organisation of trials, the allocation of funding for projects and the regulation of AI. This collaborative endeavour is poised to ensure the principles of fairness, privacy and transparency are upheld in the utilisation of AI. This will prevent its counterproductive application in the realm of gambling marketing and the dissemination of ineffective preventative messaging. The synergy between welfare policies and technological innovation will promote responsible use of AI, reducing the risk of gambling addiction and mitigating the so-called “boomerang effect”.

7. Conclusions

7.1. Summary of Key Findings

1. Diverse Applications
 - Chatbots, recommendation systems, and telemedicine have emerged as prominent examples of the wide-ranging applications of AI in healthcare communication
 - Their adoption is facilitated by rapid response times and personalised information delivery, enhancing the experience of both patients and professionals.
 - In the context of gambling, AI contributes to identifying problematic gambling patterns and implementing more effective preventive campaigns, though it requires carefully designed communication to avoid adverse reactions.
2. Social and Cognitive Perspective
 - Social learning theories (Bandura, 1977, 2001) and cognitive frameworks (Festinger, 1957) provide explanatory models that shed light on how individuals assimilate and integrate AI into their healthcare routines.
 - Factors such as cognitive dissonance, self-efficacy, and positive reinforcement shape the use of new technologies in healthcare. These factors are critical for understanding the acceptance or rejection of interventions aimed at preventing pathological gambling.
3. Persuasive Communication and Diffusion of Innovations
 - Communication theories (Rogers, 2003; Petty & Cacioppo, 1986) underscore the importance of source credibility and message appropriateness in encouraging the adoption of AI in healthcare.
 - Improvements in awareness campaigns and disease prevention have been observed, provided the sociocultural characteristics of the audience are considered (Kaplan & Haenlein, 2020). In the case of gambling addiction, overly directive or insufficiently empathetic messages may trigger a boomerang effect, highlighting the need for careful message framing.
4. Ethical, Legal and Equity Challenges
 - The use of personal data in AI systems necessitates robust safeguards for confidentiality and the integration of explainable AI (XAI) mechanisms.
 - Algorithmic biases may perpetuate inequalities, underscoring the urgent need for specific regulatory frameworks and independent audits (WHO, 2021).
 - Regarding gambling, ensuring equity in AI applications requires caution to avoid excluding vulnerable groups or enabling commercial strategies that exacerbate problematic use. Similarly, a lack of transparency and perceived invasions of privacy may heighten psychological reactance in users, undermining the effectiveness of preventive measures.

7.2. Practical Implications

1. User-Centred Design:
 - Incorporate participatory design methods and behavioural theories (Petty and Cacioppo, 1986; Fishbein and Ajzen, 2010) into the development of AI platforms, with an emphasis on transparency, empathy, and usability (Bickmore et al., 2018). This consideration is crucial for minimising the occurrence of the boomerang effect, particularly in preventive campaigns related to gambling.
 - Ensure the training of healthcare professionals in the use of AI tools, reinforcing trust and the effectiveness of the doctor-patient relationship. In the context of problem gambling, this training should include knowledge of problematic gambling patterns and sensitive communication strategies to avoid defensive reactions and promote responsible gambling behaviours..
2. Communication Strategies and Public Policy:
 - Health professionals, policy makers and technologists should collaborate to ensure the incorporation of AI in promotion and prevention campaigns, adjusting to different socio-demographic profiles. This joint work is particularly relevant in the early detection of

gambling addictive behaviours, where the segmentation and personalisation of messages can enhance their effectiveness or, if poorly managed, trigger the boomerang effect.

- The development of regulatory frameworks that ensure privacy, security and fair access is crucial. In the field of *gambling*, such regulations should regulate the use of data and artificial intelligence in gambling platforms, ensuring the protection of users and avoiding biases that marginalise vulnerable populations (European Commission, 2019).
3. Fostering Interdisciplinarity:
- A collaborative approach integrating psychology, communication, computer science, and public health will enable the creation of more robust, equitable, and socially accepted AI solutions. In the case of problem gambling, this synergy translates into designing systems capable of identifying risk patterns while communicating alerts in an empathetic and culturally sensitive manner, reducing the likelihood of reactance.
 - Advances in explainable AI (XAI) and augmented reality require joint research to evaluate their actual impact on the quality of communication and therapeutic adherence. This includes analysing how these technologies can enhance the transparency of prevention algorithms and reduce resistances or misunderstandings that lead to the boomerang effect.

7.3. Final Reflection

AI emerges as a catalyst for optimising health communication, providing tools that transcend efficiency and can foster humanisation and active patient participation. However, its implementation must balance innovation with social responsibility, addressing challenges related to accessibility, trust, and the digital divide. This challenge is particularly evident in the prevention of risky behaviours such as problem gambling, where the use of segmentation and personalisation algorithms can be highly beneficial if managed ethically and transparently, but counterproductive if perceived as intrusive, potentially triggering the boomerang effect.

By integrating the principles of social learning and cognitive theories with communication models, a deeper understanding of the factors influencing the acceptance and sustained use of AI is achieved. This multidimensional approach highlights the need for inclusive, person-centred technological development that harnesses AI's advantages without compromising empathy and equity in healthcare delivery. In the context of gambling, communicative sensitivity and empathy in the design of interventions are essential to minimise defensive reactions and promote responsible behaviours.

In conclusion, the transformative potential of AI in health communication will be realised to the extent that we advance towards responsible policies and interventions grounded in scientific evidence and respect for fundamental human values. Thus, AI will not only serve as a driver of innovation but also as a tool for cohesion, enhancing the quality of life and well-being of communities, including those facing the challenge of gambling addiction. The balance between technological efficacy and an understanding of psychosocial dynamics will be key to positioning AI as a true ally in health prevention and care.

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