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DOES IT HAVE TO BE HUMAN TO BE CREDIBLE? PERCEPTION OF DIGITAL AVATARS COMMUNICATION IN HEALTHCARE SECTOR

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Abstract: *IN THE CONTEXT OF THE COVID-19 PANDEMIC, THE USE OF DIGITAL TECHNOLOGY IN THE HEALTHCARE SECTOR HAS BECOME CRUCIAL, ESPECIALLY BECAUSE OF INCREASED HEALTH EXPENDITURES AND MEDICAL STAFF SHORTAGES. DIGITAL INNOVATIONS IN HEALTHCARE CONTINUE TO GROW IN POPULARITY, ARTIFICIAL INTELLIGENCE, VIRTUAL REALITY, AND AVATAR TECHNOLOGIES ARE TRANSFORMING THE RELATIONSHIP BETWEEN PATIENTS AND DOCTORS. IN THIS ARTICLE, WE WANT TO ADDRESS THE RELATIVE SCARCITY IN THE RESEARCH ON THE PERCEPTION OF DIGITAL AVATARS USED IN TRANSMISSION OF HEALTH MESSAGES AND THEIR USE IN HEALTHCARE SECTOR. ONE OF THE CONCERNS FOR EMERGING MEDIA STUDIES REMAINS TO ESTABLISH THE CONDITIONS IN WHICH AVATARS COULD IMPROVE THE HEALTH COMMUNICATION AND MESSAGE DELIVERY IN ORDER TO ENSURE A GREATER COMPLIANCE FROM THE PUBLIC. TO DISCOVER THESE CONDITIONS, THIS STUDY AIMS TO EXPLORE THE USE OF AVATARS IN HEALTHCARE SYSTEM, HOW THEY ARE PERCIEVED AS STAND-ALONE COMMUNICATORS AND IN COMPARISON WITH THEIR HUMAN COUNTERPARTS AND IF THEY ARE A RELIABLE ALTERNATIVE FOR PUBLIC HEALTH MESSAGES TRANSMISSION IN THIS PANDEMIC PERIOD.. AS PEOPLE TEND TO NEED ORDER, CONTROL, AND STRUCTURE IN UNCERTAIN TIMES, THE PERCEPTION OF DIGITAL AVATARS COULD CHANGE THE WAY OF HOW PATIENTS UNDERSTAND AND INTERNALIZE MEDICAL INFORMATION AND TREATMENTS AND ALSO HOW THEY ACCEPT THE INFORMATION IN MEDICAL CRISIS.*

Keywords: *HEALTH COMMUNICATION, COVID-19, DIGITAL AVATARS, TECHNOLOGY, MESSAGE CREDIBILITY*

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INTRODUCTION

Public health communication is becoming increasingly important, and because of crises like the SARS-COV2 pandemic that the world is facing now, is also enforcing the need to create fast and adaptable ways to reach the general audience. Clear, easy to replicate, and credibile messages are one of the best ways to encourage individuals to comply to the new rules of hygiene and to prevent conspiracy theories, misinformation, and fake news. Natural threats stimulates a novel way to disseminate the message, relying on a trustworthy source and incorporating digital strategies to reach all the segments of the population. In this exceptional situation, a message not properly conveyed could have negative consequences for both the healthcare systems and citizens.

Human spokepersons were, predominantly, the ones who delivered the message to the public, but this approach is time consuming, expensive, and has a potential to activate individuals' biases about a specific person or institution. Digital alternatives, like avatars or virtual agents, are considered a suitable option in adressing younger audiences (Abbott & Shaw, 2016; Hanus & Fox, 2015). The youth is digital savvy: 715 millions using the Internet everyday (Johnson, 2021), 99% being smartphone users (Johnson, 2021) and 90% having an account on a social media platform (Tankovka, 2020). Today, incorporating digital technologies and strategies in health sector and communication is a necessity, not an option.

But which conditions should we take into account when using avatars for conveying a message in healthcare? Are avatars eligible and credible alternative to humans regarding health information?

To have an answer for these questions we need to observe how the avatars were used and perceived in the healthcare sector, in order to understand what elements need to be present in the design of the virtual character to be credible for the population.

The purpose of this paper is twofold: to explore the usage of avatars in the healthcare sector in order to understand if they could be a reliable information source and to offer future recommendations for researchers involved in the studying of digital alternatives for public health communication and avatar implementation for improving citizen - computer relation.

MAIN TEXT

Health Communication

The effectiveness of health-related information is co-dependent with the form and content of the message, these elements contributing to the overall persuasiveness of what governments and experts want to convey to the general public.

Health communication is "the process of sharing, seeking and making sense of health-related information" (du Pre, 2014, p. 387). It is centred on improving the health sector through using communication strategies and instruments (Mheidly & Fares, 2020) in order to influence people's behaviours regarding public or private health problems. This domain is indispensable in current landscape and public institutions and health experts should accelerate the dissemination of COVID-19 safety guidelines through different channels and agents, in order to fight the emerging "infodemic" (Eysenbach, 2020) and to ensure the population's safety.

For the outcomes to be favourable, fast, clear and accessible messages need to be provided (Smith & Duman, 2009), where the risks are depicted in a realistic manner, without inducing fear. This issue could be addressed in emergency health communication, a rising subdomain of health communication. Emergency health communication - or "health advice that is conveyed in the context of a public health emergency" (Pearce, 2014) - could increase the compliance with health rules while maintaining the population's trust in the public institutions appointed to handle the situation.

Innovations in digital technology are being introduced in every aspect of our lives, the healthcare industry being no exception. *E-health* is defined as „the use of advanced communication

technologies, particularly the computer, Internet and mobile technologies, to meet the needs of the general public, medical professionals, providers, and policy makers" (Fuijoka, 2014, p. 385) *E-health* highlights the tendencies for digital health communication, with *M-health* (healthcare through mobile phones) medical digital applications and quantifying wearables changing the way in which population can be reached and informed about public health issues (Fiordelli et al., 2013; Lupton, 2016).

A recent study suggests that digital platforms and virtual spaces improved adherence to social distancing measures (Budd et al., 2020) and, according to the same authors, combining traditional media with new digital instruments (social media platforms, animations, videos) could have a beneficial result regarding receiving, understanding and accepting the public health messages. To succeed in public health communication means the ability to unite traditional and new ways of disseminating national and global guidelines.

In recent years, the healthcare domain has been one of the fields in which new digital technologies changed the way individuals perceive the information coming from this area. Artificial Intelligence (AI), Virtual and Augmented Reality, Immersive Virtual Environments and avatars are gaining popularity in the health industry, responding to emerging problems: high health-related costs (Probasco, 2019), a developing mental health crisis (Kelland, 2018; Savage, 2021), social and economic inequalities (Inequality.org, n.d.), and exceptional situations, like SARS-COV2 pandemic.

The usage of Artificial Intelligence (AI) in healthcare sectors is turning into one of the most promising solutions to address the contemporany challenges of worldwide public health: access to healthcare, ageing population, epidemics, healthcare spending and various health risks (obesity, diabetics, cardiovascular disease, cancer, chronic pain, poor mental health, sedentary lifestyle etc.) Although the EU frameworks on digital health are still underway and adoption of AI is relatively low in Europe (Bughin et al., 2019), the COVID-19 crisis has fuelled the potential of AI to respond to patients' needs, as well as health management and communicational requirements in a demanding situation (Glaser et al, 2020). At this moment, it is more useful than ever to create rapid and cost-effective ways for public health communication, using the new digital options (such as virtual agents), adapting to younger segments of the population, which in turn are more prone to accept digitalized public information.

Avatars as communicators

Before the Covid-19 pandemic, new technologies such as avatars (ex: virtual nurses) were tested in hospital discharge duties, improving patient outcomes (Rheu et al., 2019) or coaching health behavioural change (Pan & Steed, 2019).

An avatar is „a life-like simulation of a virtual assistant created with computing technologies" (Fang et al, 2017, p.46) that could take different forms (human, animal, cartoon). Until now, avatars were used in various domains like business, remote working, education, tourism, marketing and health (Jin, 2010; Anderson et al, 2013; Choi et al., 2020).

Avatars were used in healthcare and games as a self representation in gamified settings (Ahn & Fox, 2017), contributing to an expansion of the user in the virtual space. The ethymology of avatar means „descendant" in Sanskrit (Waggoner, 2009) and could explain why it is defined like a virtual portrait of the player, helping her to create the virtual identity and offering the posibility to communicate with other users. In games, the appearance of the avatar is highly tailored, addressing the aesthetical needs of the users but in healthcare setting a „prototypical" look is used (eg.; a formal dressed female character that informs the patient about the benefits of sport for wellbeing).

Rapid technological development has led to more personalized avatars with humanized features, with a capacity of realistic conversational styles and a capability of enacting empathy. This homophily (Nowak & Rauh, 2006) deepens similarity feelings, self-efficacy, and attitude change in

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subjects involved in human-computer interactions (Baylor, 2009; Blascovich & Bailenson, 2011). Studies have shown that people were more open and inclined to talk about sensitive subjects (e.g.: sexual behaviour) with virtual representations rather than with human experts (Gratch et al., 2016; Yokotani et al., 2018), in which avatars were used in contexts of mental health improvement and personal wellbeing (Rizzo et al., 2011).

For instance, in clinical settings avatars have been considered practical for their psychological, behavioural and organizational outcomes, such as managing patients' health records, facilitating health recommendation compliance, fostering health care delivery and reducing the caregivers' overload (Fang et al., 2017; Mccue et al, 2015). In one study, children with autism preferred digital avatars to human caregivers, understanding social cues even if the interaction was virtually mediated (Charlton et al., 2020), which demonstrated that, under a careful design, avatars can take on the role of alternative health communicators, to speed up the transmission of verified information to the public.

A corpus of studies supports the idea that avatars could reinforce health behaviours through „vicarious experiences" (Fox, 2014; Ahn, 2016) because humanified avatars increase the feeling of similarity in subjects and are leading to higher scores on attractiveness and friendliness (Khan & Sutcliffe, 2014). Avatars are using facial expressions, non-verbal cues, gestures and even a casual communication style, leading to support, understand and knowledge acquisition related to behavioural change in subjects (Wonggom et al., 2020). For this similarity to happen, as de Borst and de Gelder (2015) stated, the humanized face of the avatars should be designed with care, as agents at the intersection of non-human and human faces could induce an „eeriness" that could affect the way individuals perceive the avatar.

People tend to like characters with human-like features and perceived as eerie the avatars with exaggerate or unusual characteristics (eg; an eye much bigger that the other or with animal parts attached to them) but an avatar being too much like a human, a perfected human, could induce the same negative emotions as the previous situation, as the theory of the Uncanny Valley posits (Mori, 2012).

In order to create a homophilic avatar, realism is indispensable with visual realism (fidelity and anthropomorphism) and behavioral realism (kinetic conformity and social appropriateness) (Kang and Watt, 2013) being key factors for a balanced design. Avatars could emphasize risk communication by embodying the real consequences on the users (Parks et al., 2014) and even if this situation could have a positive effect of the patient, this should be carefully implemented because a high level of fear can minimalize the efficacy of the information delivered.

Even if avatars are considered a new technology, their use was evident throughout all age segments. Virtual agents were used in relation with different age segments, and beneficial outcomes were discovered especially among the elderly and patients with chronic diseases or pain (Shaked, 2017; Tongpeth et al., 2018; Wonggom et al., 2020), being perceived as informative, motivating and suitable for managing the problem, particularly for people with low health literacy (Berkman et al., 2011).

Avatars can induce positive outcomes at the emotional level (Johnson et al, 2016), feelings of confidence in maintaining health behaviours and reaching goals related to health. Avatars can even sustain long-term behavioural changes in comparison with the same health messages conveyed through print, pictures or other classic channels (Ahn, 2016; Baylor, 2009). People tend to have the same psychological, neuronal and behavioral activation on the perception of the emotions in humans and in avatars (de Borst & de Gelder, 2015) and one of the best examples is the Proteus Effect (Yee & Bailenson, 2007) which highlights the degree to which an individual could be affected on the emotional level by modifications/threats that could impact their virtual representation . How avatars in games facilitate the relationship with the self, the user, avatars in healthcare could improve the relationship

with the information that could lead to a better life. This emphasizes the advantages of using new digital technologies in healthcare, especially in crises.

Even if a growing body of research shows that human virtual representations improved health-related behaviours, there is a continuous debate on the ethics of using avatars, the negative influence that could have on dehumanizing the "real" interaction between people and if they are as capable as human experts (Piava et al., 2017; McArthur, 2008).

The previous studies concentrated on the advantages of virtual avatars: training patients or medical staff, adherence to treatment, patients' engagement, motivation to to learn more about their diseases and sustained self-care practices for prevention purposes. The role of virtual agents in healthcare is well known, but we do not have enough understanding about the roles of avatars as communicators in the public domain. As health digital technology continues to grow in popularity, one of the main concerns for emerging media studies remains to identify the conditions in which cutting edge-technologies (i.e. avatars, robots) could change the perception and behaviour of individuals in a certain context. Recent research has demonstrated that a virtual agent has unique advantages over traditional forms of interpersonal or public communication, particularly on young people (Abbott & Shaw, 2016; Hanus & Fox, 2015). However, little research has been done so far to understand how the avatars are perceived according to their competence (anonymous or expert), and what factors increase the trustworthiness of a public safety message delivered by avatars, among young people.

Source and message credibility

It is important to understand which elements influence the individuals, at a psychological level, in order to increase the possibility of following the public health guidelines. Source credibility is one of the most important aspects to achieve the persuasiveness needed for behavioural change. Choosing an appropriate channel for a certain segment of the population (young people) could enhance the effect of health messages, in health emergencies a "rapid design of broad-reaching" information is vital, experts delivering messages "without sacrificing quality or accuracy" (Adam et al., 2020) of those messages.

For the general compliance to the rules to take place, we need to pay attention to two concepts: message credibility and source credibility. Credibility in the source of information has a great influence on the cooperation of the public in emergencies (Pearce, 2014), the trust perceived driving information acceptance (Callison, 2001) and motivating individuals to follow the public health guidelines (Avery, 2009). Source credibility is defined as "perceived source expertise and source trustworthiness" (Ratneshwar & Chaiken, 1991 in Malik & Sudhakar, 2014) and trust is an indispensable part in the process of message evaluation and influences the information persuasiveness. Credibility is a central notion, being more important than other aspects (like competence, trustworthiness and goodwill) (McCroskey & Teven, 1999). Message credibility is "an individual's judgment of the veracity of the content of communication" (Appelman & Sundar, 2015) and is dependent to behavioural change: if an individual trusts the message then, he/she is more prone to accept it and to change his/her behaviour in order to internalize the information.

In order to analyse the source credibility in avatars, future studies could use scales previous applied for human, for example the Ohanian Scale of Source credibility (1990), a scale for source credibility considering three aspects: attractiveness, trustworthiness and expertise, being in accordance with how Hovland and his colleagues (1951) delineate central structural aspects of the source credibility concept: trustworthiness (willingness to make accurate affirmations) and expertise (ability to make accurate affirmations). Credibility is not a one-dimensional notion and many factors can be involved in its analysis, Gaziano and McGrath (1986) stating that a source has to be unbiased, fair,

complete, trustworthy, accurate and factual in order to be considered a reliable source. The authors accentuate the need of further study of all the possible components that could influence the source credibility. Hovland and colleagues (1951) discovered that the communicator is equally important to the content of the message and source credibility could influence individuals, as a general effect, even in cross-cultural studies (Yoon et al, 2011).

Appelman and Sundar (2015) found that message credibility can be determined based on accuracy, authenticity and believability and is influenced by its communicators (Hellmueller & Trilling, 2012). The trust in avatars as a reliable and expert source could extrapolate the trust to the message that is delivered by them (Hertzum et al, 2002).

In a study conducted by E. J. Avery (2009) the three most important aspects in evaluating a source's credibility were: recognized expertise, transparency and field knowledge of the communicator. Beside those criteria, studies showed that the credibility of the source could be affected by other factors: the medium in which the information was transmitted and the form of the message. We could advance the idea that avatar's features, the level of competence and the communicational style are not the only elements that could influence the credibility of a message, but also an individual's political ideology.

A new mediator for analyzing avatars; Ideological orientation and its effects on communication

Our worldview affects every information we came in contact with therefore it is very important to understand what other factors could modify our perception about message sources. Individual ideology is a prerequisite that, as far as we know, was not included in evaluating source and message credibility for avatars or virtual spaces in public health communication. The values, emotions, political views, all contained in the ideological orientation, could be mediators for the way people analyze things. They could influence the percieved design of avatars and messages delivered, increasing the probability that the majority of the population follows the rules for stopping the spread of SARS-COV2.

Political ideology is a possible mediator, very important in our opinion, that was not analyzed enough in the previous studies regarding communication in virtual spaces, particularly in avatar message delivery.

Tomkins' (1957 in Stone, 1986) Polarity Theory posits that individuals view world differently, having values, beliefs and affective responses that could be divided in normative views and humanist views. These two views are strongly divided, being hierarchical structured (Nilsson, 2014).

Humanism is based on a constructivist approach and includes a positive outlook on human nature, where all people are seen as good natured. Humanists are open to accept various aspects of human experience (e.g. : different sexual orientation, race, behaviors, culture), being less judgemental, empathic, agreeable and more experimental (Stone & Schaffner, 1997). They are leaning towards a democratic worldview and a leftist end of the spectrum.

Normativism opposes the majority of humanist beliefs, viewing the world with essentialist lenses where structure, order and rules are prior to humankind and they need to be followed in order to keep under control the weak, flawed and bad nature of individuals (Stone & Schaffner, 1997). Individuals with normative views are more conservative and most of them have authoritarian views. Normatives are, usually, more introverted and express less positive affect.

Nilson (2014) found five "central facets" of humanism and normativism, based on the previous research: attitude towards human nature (intrinsically evil or good), interpersonal attitude (affection/kindness vs. self-restraint), attitude to affect (acceptance vs. control), political beliefs (liberal vs. authoritarian) and epistemology ("romantic rationalism vs. rigorous empiricism"). These

facets dictate what is important, what needs to be corrected and what is acceptable, shaping even the approach of how we understand and internalize information.

Various studies showed differences between normatives and humanists in food choices (Lindeman & Sirelius, 2001), facial expression (Vasquez, 1976 in Stone, 1986), conflict with their parents (Abramowitz et al, 1977 in Stone, 1986), personality (Stone, 1986) and the complexity of their arguments (Tetlock et al, 1983 in Stone, 1986). These dissimilarities leads to "differential affective responsiveness to people, ideas and situations" (Stone, 1986), which highlights the idea that, if we want to communicate effectively, the source of the message needs to be adapted to the ideological orientation of the public too. Regarding public health-related messages, we could believe that a different emotional response towards the source could imply the possible rejection of the guidelines therefore, a refusal of compliance.

A large body of studies support the idea that normativism is congruent with right-wing political orientation and humanism is affiliated with left-wing political orientation (Nilsson & Jost, 2020), influencing how people see the core of the human nature and how they could be affected by various messages. It was showed that ideological orientation determined how individuals evaluate messages but little research was conducted to see if normativism and humanism could alter source and message credibility in a health-related context, particularly towards digital avatars.

Future studies recommendations

Studies about avatar delivered messages in virtual spaces were increasing in the latest years with the majority of them being focused on the users' control and how avatars could improve individual's identification with the gamified world but literature is scarce on the role of the avatar as a communicator for real-life problems, especially in public health messages and recommendations for the population. More studies should use video avatar-delivered messages for serious subjects and analyze how people comprehend the information and perceive its digital source.

Because appearance is very important in the perception of the avatar, the look of the avatar could be expanded in future studies to understand if there are specific characteristics that increase the credibility and trustworthiness for messages that are a public concern. People who interacted with static humanoid faces score lower on sociability than the control group who was exposed to an image (Kang & Watt, 2013) which highlights the necessity for exploration different types of faces, the level of human-likeness and non-verbal cues adapted to the specific population.

Vicarious experiences, understanding the world around us through observation of the behaviors of others, can teach patients to change their actions regarding health and wellbeing (Li et al., 2021; Seals et al, 2021) and avatars could intensify the social presence and identification with a new role or situation, like the SARS-COV2 pandemic and the new sanitary rules.

An interdisciplinary approach could broaden the perspectives of different factors that could affect the interpretation of avatars. However, little attention was paid to the relationship between avatar's characteristics, message credibility, and the worldviews of the individuals. We believe that they could affect the way we interact with public health messages. We need to address in future studies how the ideological orientation of the individuals could affect the perceiving credibility of the source and the message, in a digital health-related context.

Messages delivered by humans could be interpreted negatively if they are coming from an institution with low credibility but it is not clear if this effect could appear in the avatar-delivered messages setting. Using a mixed methodology, researchers could better understand if there are any differences between expert/institution-affiliated avatars and non-expert ones and if their appearance and affiliation could negatively affect the message delivered.

The impact of the device in understanding and receiving the message could be another area of research that should be tackled by the authors. We know about the positive effects on avatars in games and apps, where they embody the user and create the premises for communication between users but not much material was written about how „transferring" them on smaller devices (like smartphones) could affect the credibility of the message. Expanding this idea, different formats and visual structures (video, interactive games, quiz) should be tested and documented in different population samples.

CONCLUSION

In pandemic times, health communication is crucial, education on this topic making the difference between safety and exposure to unknwon risks. Messages for the patients and the broad population should be simple, clear, and fast, delivered creatively, adapted to the most used medium; virtual space. By being carefully designed, avatars could facilitate health message transmission through high levels of personalization, adapting the communicator to the in-group bias to increase the members' acceptance, being backed up by Artificial Intelligence and having the possibility to be integrated into diverse structures like apps and digital platforms using users patterns to respond to their needs and learning styles. Adopting avatars in the public health communication can transform the way in which messages are transmitted and how information is internalized, specific niches of population being better targeted in this process and offering a possibility of „socially digital localization" regarding to population's needs.

As we could see, integrating digital innovations and instruments in the healthcare sector can not only improve the patients' outcomes but utilizing the avatars in conveying a public health message can be beneficial for the broad population. A novel method of delivery, with multiple possibilities of personalization, is necessary to better engage the citizens in internalizing new information and respecting the medical recommendations.

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